CFORCE 520
SERVICE MANUAL

CFMOTO

CF500AU-7L/ CF500AU-7S SERVICE MANUAL

READ THIS MANUAL CAREFULLY
It contains important safety information

This ATV should not be ridden by anyone under 16 years of age. Passenger under 12 are prohibited.

CFMOTO

WWW.CFMOTO.COM

Zhejiang CFMOTO Power Co., LTD

January. 2016

FOREWORD

This manual introduces CF500AU -7S/ CF500AU-7L maintenance information, removal & installation procedure, checking & adjustment methods, troubleshooting and technical specifications in detail. There are illustrations to guide your operations.

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

Chapter 2 mainly introduces assemble and disassemble vehicle body covering parts methods.

Chapter 3 mainly introduces checking & adjustment methods and how to do vehicle maintenance.

Chapter 4 mainly introduces how to remove the parts at side the engine

Chapter 5 mainly introduces how to remove, check and maintain the engine parts, and some matters need to pay attention.

Chapter 6 mainly introduces the infomations of the vehicle chassis

Chapter 7 mainly introduces how to check and maintain lighting system and signal system

Appendix: electrical schematic diagram

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

January. 2016

INDEX

Conversion Table

Item	Conversion
Pressure	1kgf/cm^2=98.0665 kPa; 1kPa=1000Pa
	1mmHg=133.322 Pa=0.133322kPa
Torque	1kgf·m=9.80665N·m
Volume	1mL=1cm^3=1cc
Force	1L=1000cm^3
	1kgf=9.80665 N
Length	1in=25.4mm

Dangerous/Warning/Attention

Please read below explanation carefully,it explained the meaning of "DANGER/ WARNING/ATTENTION", pls pay attention during mentain the engine.

Danger: This is the safety alert symbol. It is used to alert you to potential personal injury hazards.

Warning: A WARNING indicates a hazardous situation. It could result in death or serious injury if not avoided.

Notice: A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.

But, pls notice, the "Danger / Warning / Attention" can't cover all potential risks during use or maintain the engine. So,beside these notice on vehicles, the person who maintains the vehicle must have the basic mechanical safety knowledge.If you don't have, pls ask for help from senior mechanist.

1 Maintenance Information

1.1 Operation cautions

Safety cautions

1、Wear proper work clothes(e.g.:boiler suits), cap and boots. If necessary, wear dust-glass, gloves and mask.

2、Engine exhaust fumes are poisonous and can result in loss of consciousness or death. Do not run the engine in an enclosed or poorly ventilated area.

3、Do not touch the engine or muffler with bare hands after the engine has been just stopped to avoid burns.

4、Battery electrolyte (dilute sulfuric acid) is highly caustic and can result in burns from contact with skin and eyes. If you spill electrolyte on skin,flush with water and seek for medical attention immediately. If you spill electrolyte on clothes,flush with water in order to avoid burns.Keeping battery and electrolyte out of reach of children。When the battery is being charged, it produces explosion gases which may cause explosive.. Charge the battery in a well-ventilated area.

5、Coolant is poisonous. Do not drink or spill it on skin, eyes or clothes. If you spill coolant on skin,pls wash with soap and water immediately. If you spill coolant on eyes, flush with water and seek prompt medical attention.If you swallow coolant, induce vomit and see the doctor. Keep coolant out of reach of children.

6、Gasoline is highly flammable. Don't smoke or fire. Also keep gasoline away from sparks.. Vaporized gasoline is also explosive. operate it in a well-ventilated area.

7、Be careful not to get pinched by the turning parts like wheels and clutch.

8、When more than two people are operating, keep reminding each other for safety purpose.

Cautions for removal and installation

1、Use genuine CFMOTO parts, lubricants and service products。

2、Store the removed components separately in order for correct installation.。

3、Clean mud, dust before servicing。

4、Replace the removed washers, o-rings, piston pin retainers, cotter pins with new ones。

5、Elastic retainers might get distorted after disassembled. Do not use the loosened retainers.

6、Clean and blow off the detergent after removal. Apply lubricants on the surface of moving parts.

7、Measure the data during removal for correct installation.

8、Pre-tighten the bolts, nuts and screws, then torque to specification.The basic sequence is from big to small, from inner side to outer side and criss-cross.

9、Checking the removed rubber parts are aged and replace if necessary. Keeping the rubber parts away from grease.

10、Apply or inject recommended lubricant to the specified lubrication points.

11、Use special tools when necessary.

12、Finger turn the inner and outer rings of ball bearing to make sure the bearing will turn smoothly. When ball bearing is removed by pressing steel balls, it can not be reused:

·Replace if the axial or radial play is too big.

·If the bearing surface is uneven, clean with oil and replace if the cleaning does not work.

·When pressing the bearing into the machine or onto the shaft,if the bearing can not be securely seated, replace it.

13、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.

14、Install the elastic circlip properly. Turn the circlip after assembling to make sure is has been installed into the slot.

15、After assembling, check wether all the tightened parts are properly tightened and can move smoothly.

16、Brake fluid and coolant may damage painting, plastic and rubber parts. Flushing with water if you splashed on these parts.

17、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

18、When installing pipes, insert the pipe till the end of joint. Fit the pipe clip, if any, into the groove. Replace the pipes or hoses that cannot be tightened.

19、Do not mix mud or dust into engine and/or the hydraulic brake system.

20、Clean the gaskets and washers of the engine casing before assembling. Remove the scratches on the joint faces by polishing evenly with an oilstone.

21、Do not twist or bend the cables too much. Distorted or damaged cables may cause poor performance.

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

Ⅰ ENGINE BREAK-IN

There are many movable components inside the engine, such as piston, piston ring, cylinder, crankshaft, gears and so on.During initial use period, proper run-in for every critical component is necessary.Break-in can help engine components match each other better and adjust working condition.Careful treatment of a new engine will result in more efficient performance and a longer service life.

Recommended break-in period: First 20 hours

0~10 Hours：Do not operate continously at more than 50% throttle position. Cool down the engine for every 5~10 minutes after every 1 hour operation. Avoid sudden acceleration.Vary the throttle position slowly and smoothly.Do not vary the throttle position rapidly.

10~20 Hours：Avoid long-time run at more than 75% throttle position. Do not open throttle completely during the period.

ATTENTION:

·Maintain and repair as regular procedures during break-in period;

·After break-in, do not forget to check and maintain the engine before normal using.

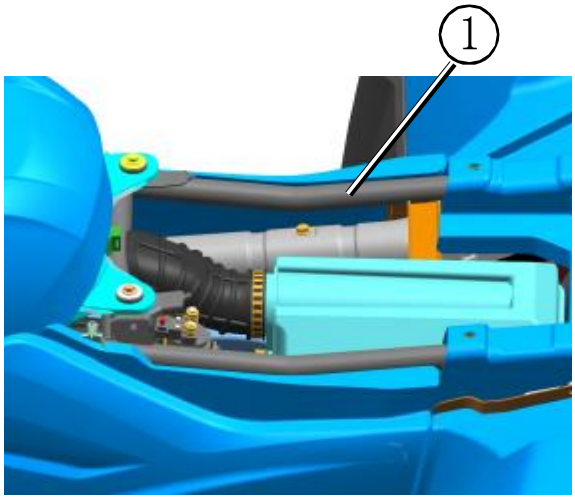
1.2 LOCATION OF VIN/EIN

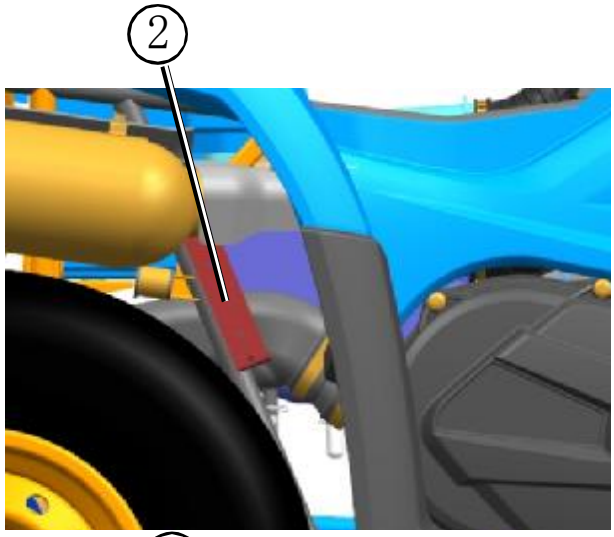
Model Number：CF500AU-7S/CF500AU-7L

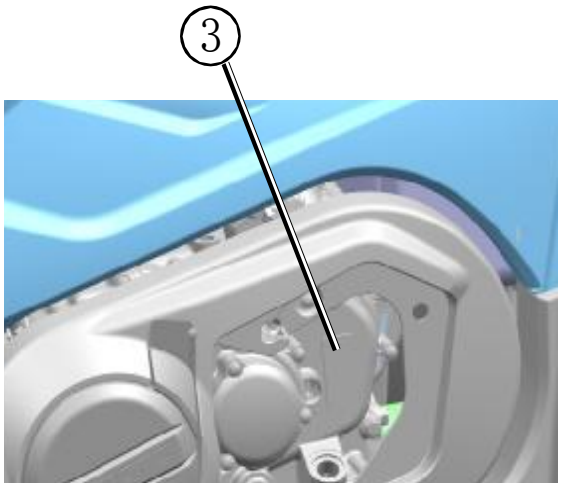
① Vehicle identification number(VIN)：LCELDTZ9~/LCELDTZA~;

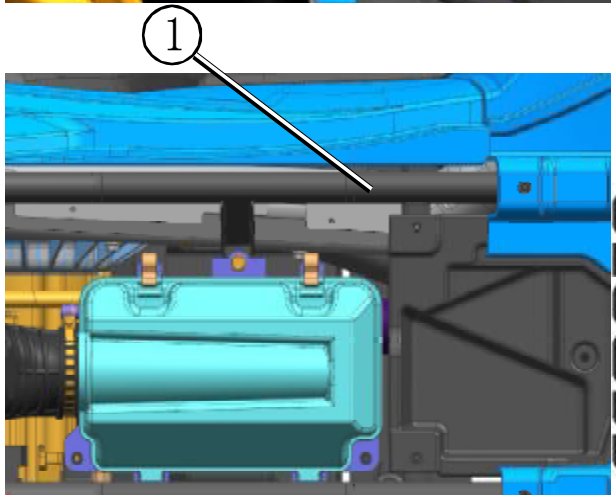
② Name plate (Vehicle identification number label);

③ Engine identification number(EIN)：191R～;









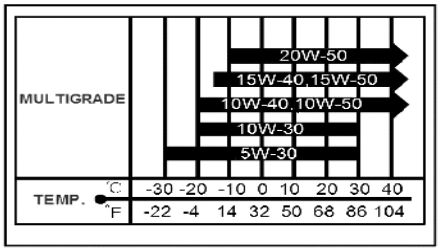
1.3 GENERAL INFORMATION

Item		Specifications	
Model type		CF500AU-7S	CF500AU-7L
Overall length×width×height		2090mm×1100mm×1150 mm	2290mm×1100mm×1350 mm
Wheelbase		1260 mm	1460 mm
Engine type		191R	
Displacement		495mL	
Fuel type and Octane No.		RQ-93 or higher unleaded gasoline	
Dry weight		345 kg	360kg
Passengers		1 persons	2 persons (including driver)
Total vehicle load allowed		1persons+60 kg =135 kg	2persons+60 kg =210 kg
Tire	Front	24×8-12 45J / AT25×8-12 40J / AT25×8-12 40L	
	Rear	24×10-12 52J / AT25×10-12 47J / AT25×10-12 50L	
Min. ground clearance		250mm	
Min. turning radius		7m	
Engine	Starting	Electric start	
	Type	Single cylinder,4-stroke,liquid-cooled,4 valves,SOHC	
	Valves	SOHC /Timing chain drive	
	Bore×Stroke	91mm×76.2mm	
	Compression ratio	10.3:1	
	Lubrication	pressure+splash lubrication	
	Oil pump	Rotor drive	
	lubricating oil filter	Full flow rotory filter, paper type	
	Engine oil type	SAE15W-40/SG or higher	
	Cooling system	Liquid-cooled/close-loop cooling	
	Coolant type	-30℃anti-corrosion and anti-freezing cooling liquid	

Item				Specifications		
Air filter type				Paper filter element		
Throttle body	Type			0GR0-173000		
	Diameter of throttle body			40mm		
Fuel tank capacity				15L±1L		
Drive train	Clutch type			Wet shoes and auto centrifugal		
	Transmission type			CVT + Gearshift		
	Gearshift			Two drive gears, one reverse gear, one parking gear		
	Gearshift methods/orders			Manual operation/L-H-N-R-P		
	CVT ratio range			0.675～3.021		
	Gearshift ratio			"H" gear	"L" gear	"R" gear
			Final ratio	1.333		
			Secondary ratio	1.952		
			Single gear ratio	1.350	2.533	2.071
			Total ratio	3.513	6.591	5.389
	Ratio of drive gear		Front	33 / 9 = 3.667		
			Rear	33 / 9 = 3.667		
	Output type			Front/Rear shaft drive		
	Rotation of engine output			When forward, clockwise (rear view)		
Steering	Turn angle		inner	21°		
			Outer	28°		
Brakes			Front	Hydraulic Disc		
			Rear	Hydraulic Disc		
Absorber	Suspension			Double A-arm and independent		
Frame type				Steel tube and plate		

1.4 MAINTENANCE SPECIFICATIONS

I Lubrication System

Item		Standards	Service Limit
Engine OiL Capacit	Oil Change	2800mL（without oil filter）	—
	Oil Change	2900mL（replace the oil filter）	
	Oil	3000mL	—
Recommend engine oil（see attached） 		·Specially for 4 stroke motor: SAE-15W-40 If it's not available,select alternative according to the following specifications API classifications: SG or higher ·SAE rating：choose from the left chart according to	
Oil Pump Rotor	Clearance Between Inner and Outer Rotor	0.07 mm～0.15mm	0.2mm
	Clearance Between Outer Rotor and Bore	0.03 mm～0.10mm	0.12mm
	Rotor End Clearance	0.023 mm ～0.055 mm	0.12 mm
	Oil Pressure	1400r/min，90 ℃ 200kPa ~400kPa，Normally 240 kPa 6000r/min，90 ℃ 600kPa ~700kPa，Normally 600 kPa	

I Air Intake System（See 05- Engine）

I Cooling System

Item		Standards		Remark
Coolant capacity	Full capacity	Around 2500mL		
	Capacity of reservoir tank	350mL		
	Standard density	50%		
Opening pressure		110 kPa±15kPa(1.1kgf/cm^2)		
Thermostat	Opening temperature	65℃±2℃		
	Fully opening	85℃		
	Travel when fully opening	85℃时，＞5mm		
Relations between water temp.and resistant of water temp. sensor	Water temperature（℃）	Resistant of B terminal（Ω）	Resistant of A,C terminal（kΩ）	
	-20	----	13.71~16.94	
	25	-----	1.825~2.155	
	50	176~280	-----	
	80	63.4~81.4	0.303~0.326	
	110	24.6~30.6	0.138~0.145	
Working temp. of thermoswitch	OFF-ON	Around 88℃		
	ON-OFF	Around 82℃		
Coolant type	-30℃ anti-freezing, anti-corrosive and high boiling point			

l Wheel（same for front & rear）

Item		Standard value	Service limit
Rim jump	Longitude	1.0mm	2.0mm
	Transverse	1.0mm	2.0mm
Tire	Remaining groove	—	3.0mm
	Front tire Pressure	56kPa（0.57kgf/cm^2）	—
	Rear tire Pressure	42kPa（0.43kgf/cm^2）	—

l Braking System

Item		Standard value	Service limit
Front brake	Thickness of brake disc	3.5mm	2.5mm
Rear brake	Free play of brake lever	10 mm~20 mm	—
	Thickness of brake disc	7.5mm	6.5mm

l Battery / Charging Device

Item			Standards
AC Magneto	Type		Magneto 3-phase AC flywheel generator
	Output		3-phase AC output
	Resistance of coil（20℃）		0.2Ω～0.3Ω
	Resistance of pick-up coil		250Ω～300Ω
	Voltage without load(cold engine)		＞100V（AC），5000r/min
	Max. output power		350W，5000r/min
	Stable voltage		13.5V～15.0V, 5000r/min
	Peak voltage of pick-up		≥1.5V，200 r/min
Regulator type			3-phase supply power of thyristor trigger circuit
Battery	Capacity		12V 30Ah
	Voltage between terminals	Fully recharged	14.4V
		Not-fully recharged	≤11.8V
	Recharging current/time	Standard	2.7A/5 h～10h
		Quick	12A/1h

l Ignition System

Item		Standards
Ignition type		ECU
Spark plug	Type	Resistant-type
	Standard	DCPR8E (NGK)
	Gap of spark plug	0.8mm～0.9mm
	Characteristic	＞8mm，1kPa
Ignition t ime	BTDC10° 1500r/min	
Resistance of ignition coil	Primary	0.74Ω～0.78Ω
	Secondly	10.1kΩ～11.1kΩ
Peak voltage	Primary	＞150V

	Pulse voltage	2V
Resistance of starter relay coil		3Ω～5Ω
Resistance of auxiliary relay		90Ω～100Ω

- **Light / Dashboard / Switch**

Item		**Standards**
Fuse	Main	30A
	Auxiliary	10A×1 15A×5
Light & Bulb	Headlight（Hi / Lo）	12V HS1 35/35W×2
	Front turn light	12V W16W 16W×2
	Front position light	12V 3LED/1.5W×2
	Daytime running light	12V 35W×2
	Brake light/Tail light	12V 21/5W×1
	Rear turn light	12V R10W 10W×2
	License plate lamp	12V 5W W5W
	Dashboard indicator light	LED

- **Valves & Cylinder Head（See 05-Engine）**
- **Cylinder, Piston, Piston Ring & Crankshaft（See 0 5- Engine）**
- **Clutch + CVT + Gearbox（See 0 5- Engine）**

1.5 Tightening Torque for fastener

Attention:

Threads and contact area should be applied by anti-corrosive greese before assembling.

- **Tightening Torque for pointed part- body of vehicle**

Ref. No.	Items	Part number	Qty	Torque（N·m）
1	Mount bolt, front and rear side of engine	GB5789 M12× 1. 25×180	2	60~70
2	Mount bolt, front bracket of engine	GB5789 M12× 1. 25×170	1	60~70
3	Mount bolt, front bracket of engine	GB5789 M10× 20	4	40~50
4	Bolt, front & rear rocker arm	GB5789 M10× 1. 25×70	16	40~50
5	Bolt, front & rear shock absorber	GB5789 M10× 1. 25×50	8	40~50
6	Bolt, bracket of rear wheel axle	GB5789 M10× 1. 25×100	4	40~50
7	Mount nut, rim	901A- 07.00.02	16	70~80
8	Nut, rim shaft	GB/T9459 M24×2	4	320~350
9	Bolt, bracket of front axle	GB5789 M10× 1. 25×110	4	40~50
11	Pin nut, steering rod	9010-100002	4	40~50
12	Bolt, handlebar cover	GB5789 M8×55	4	30~40
13	Bolt, front brake disc	GB5789 M8×25	4	20~30
14	Bolt, front brake disc	9010-080003	8	30-35
15	Bolt, rear brake caliper	GB/T70.1 M10×1.25×22	2	40~50
16	Bolt, rear brake disc	7020-100001	4	30~40
17	Mount bolt, muffler tube	GB5789 M10× 1. 25×70	1	40~50
18	Mount bolt, muffler tube	GB5789 M8×65	1	30~40
19	Nut, exhaust pipe connection	8010-020001	2	25~35
20	Bolt, front knuckle	GB5789 M10× 1. 25×35	2	40~50
21	Mount bolt, trailer bracket	GB5789 M10× 1. 25×70	2	40~50
22	Mount bolt, winch	GB5789 M8×20	4	35~45
23	Mount bolt, cable pulley	GB5789 M10× 1. 25×20	2	40~50
24	Thermo switch	CF250T-420500	1	9~12
25	Mount bolt, fuel pump	GB/T5789 M5×14	6	5~8
26	Oxygen sensor	018B-176000	1	40~60
27	Mount bolt, rim	9010-070002-A000	16	70~80
28	EPS turning axle joint	GB/T5783 M8×30	2	35～45

- **Tightening Torque of Specified parts-Engine(See 05-Engine)**
- **Tightening Torque of Not specified Part**

Item	TorqueN·m	Ite	TorqueN·m
5mm bolt、nut	5	5mm	4
6mm bolt、nut	10	6mm	9
8mm bolt、nut	20~30	6mmSH flange bolt	10
10mm bolt、nut	30~40	6mm flange bolt、nut	12
12mm bolt、nut	40~50	8mm flange bolt、nut	20~30
		10mm flange bolt、nut	30~40

Engine Service Tools（See 0 5- Engine）

Engine Special Service Tools（See 0 5- Engine）

1.6 Lubricants Sealants

Lubrication points	Remarks	Grease
Steering bearing Joint of throttle cable movement areas of accelerator pedal activity place of brake pedal movement areas of arm,inside steering rack movement areas of seat lock movement areas of gearshift		multipurpose lithium grease

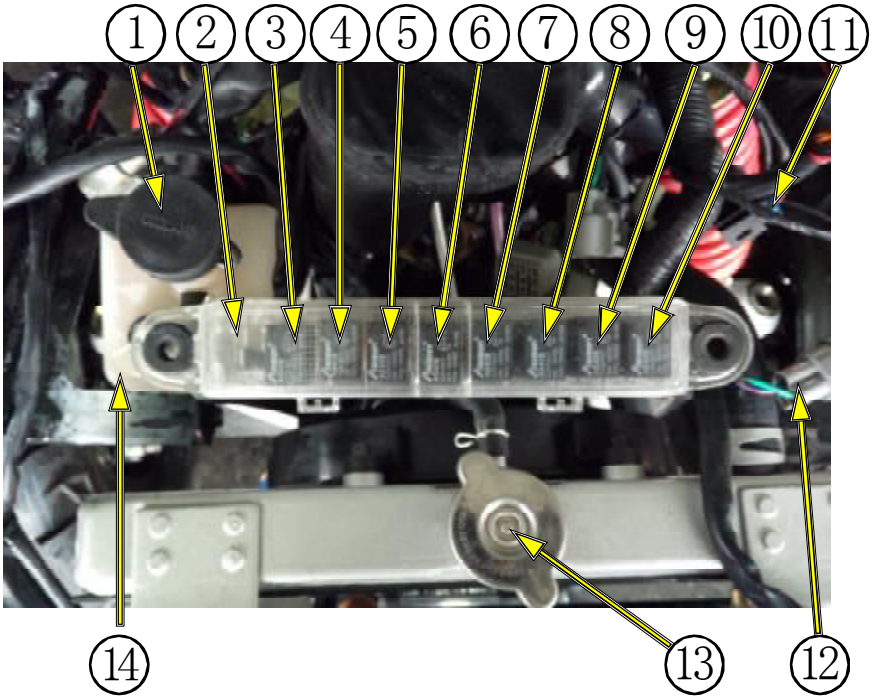
Control cable、Bearing、Other movement parts lubricants

Part	Detail	Material
axle sleeve,steering shaft	Lubrication	General purpose lithium lubricating grease for automobile GB/T5671
rear axle shaft bracket		
knuckle bearing, front & rear absorber		
Throttle control handle shaft&cable joint		
brake lever spindle		
Joint of packing cable		
rotation part of rear brake pedal		
Front, rear drive shaft spline joints	Grease 15g~18g	The Great Wall G-2 universal grease T1

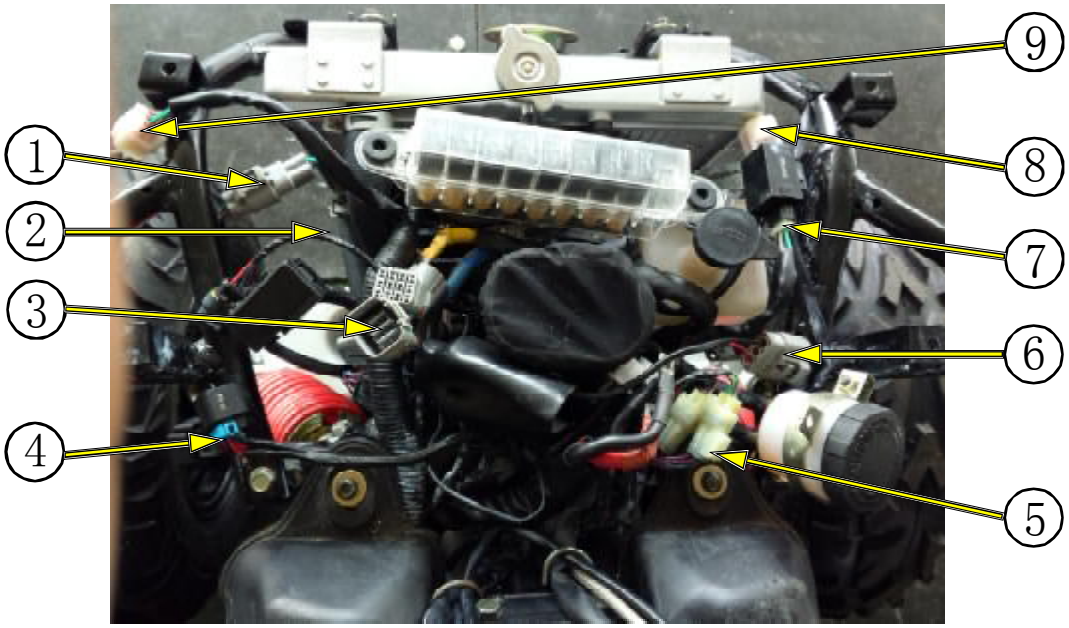
Engine running material & install accessories（See 0 5- Engine）

Engine running material including lubricating oil(engine oil),greese(butter)and cooling liquid;install accessory including sealant,thread lock glue etc…

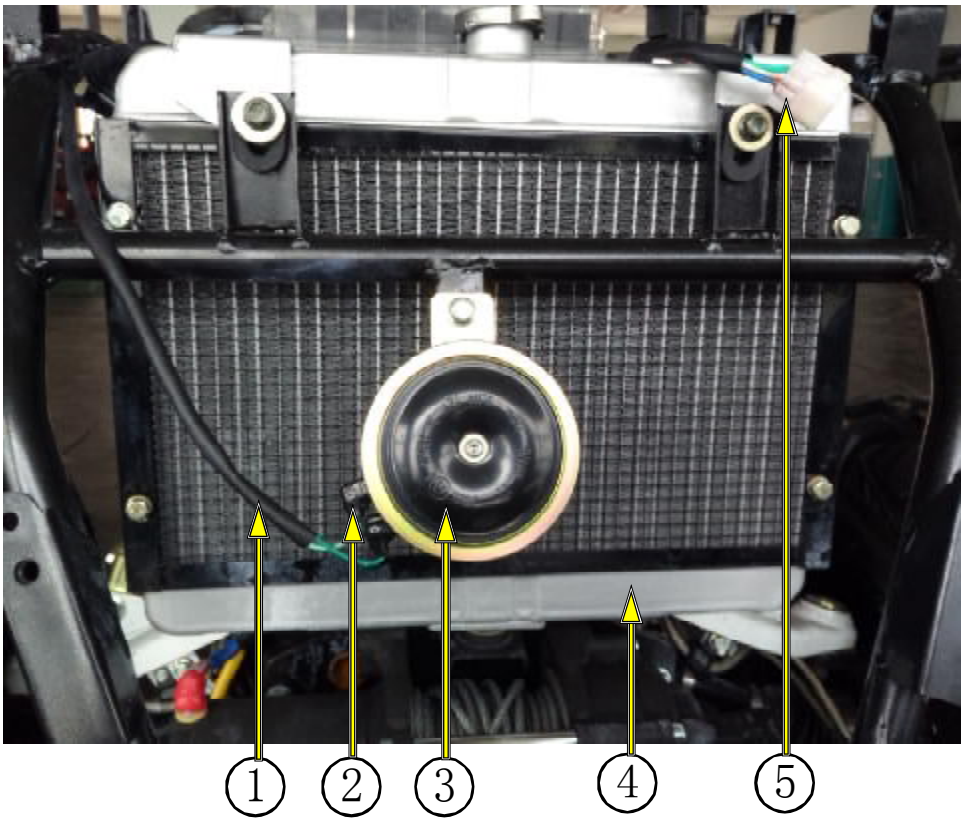
1.7 Wiring , Pipes & Cables



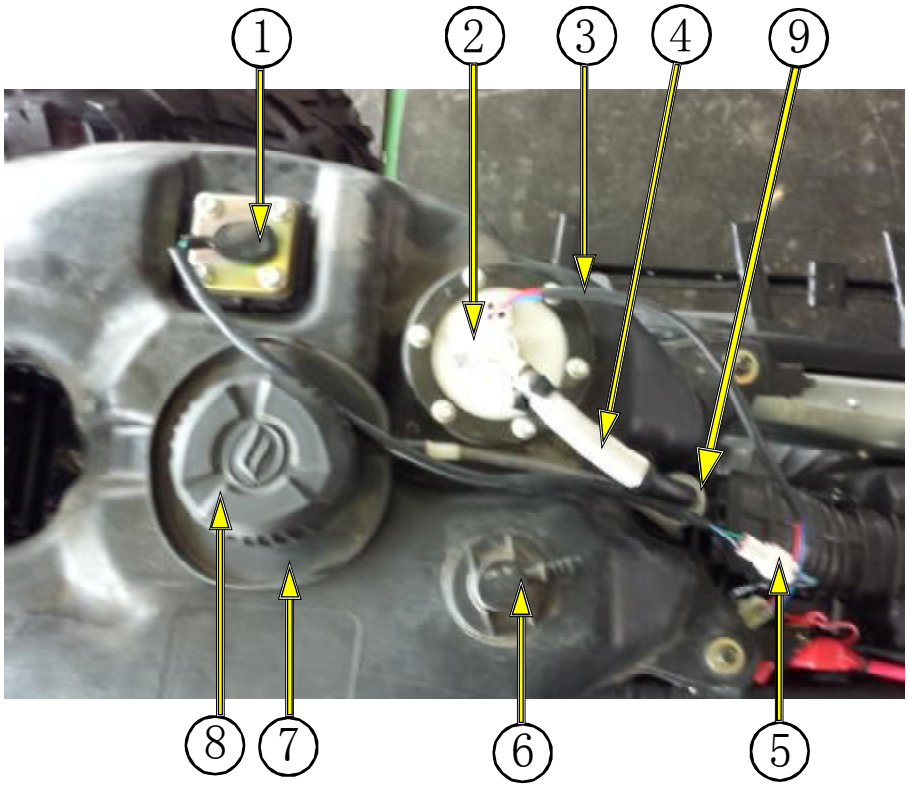
1、Cap, Reservoir Tank 2、Auxiliary Relay 3、Fuel Pump Relay 4、Brake Relay 5、4x4 drive relay 6、2x4 drive relay 7、Fan Relay 8、Low Beam Light Relay 9、High Beam Light Relay 10、Day Running Light Relay 11、EPS connector 12、Fan connector 13、Radiator Cap 14、Reservoir Tank NOTE: Before check or repair above items, rack cover should be removed, see details in Chapter 2 “Body covering parts”



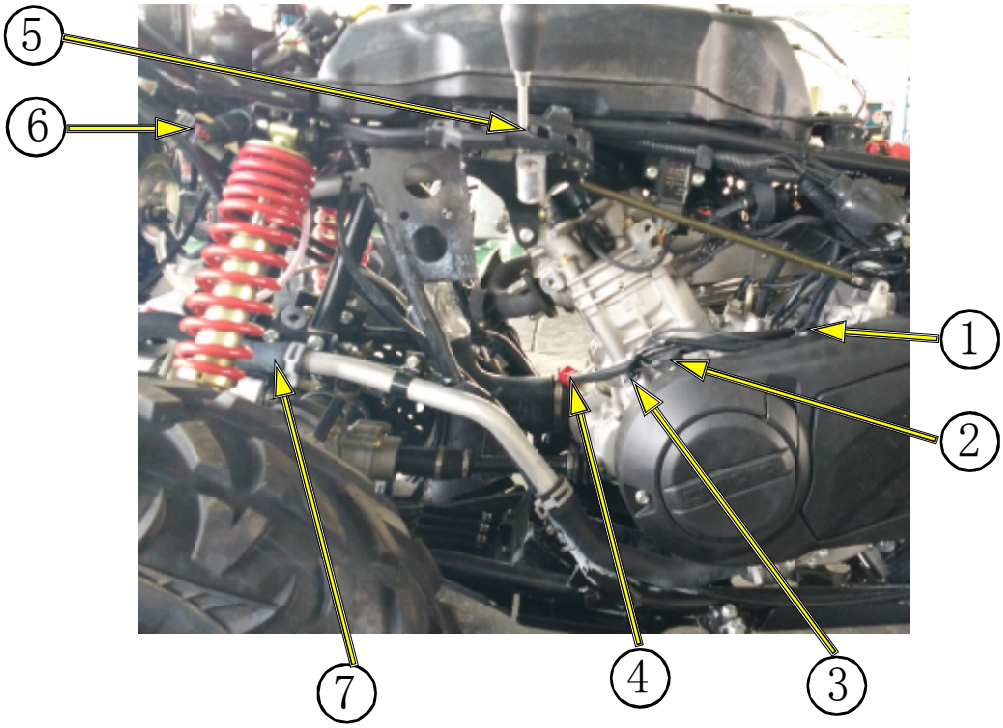
1、Fan Connector 2、EPS diagnostic 3、Dashaboard Connector 4、EPS Connector 5、Connector, Right Handlebar Switch 6 、Connector, Ignition Switch 7、Flasher 8、Connector, Right Front Headlight 9、Connector, Left Front Headlight Note: Before checking above items, Front rack, front rack, front fender, left and right side panel, dashboard cover, etc. should be removed. See details in Chapter 2” Body covering parts”.



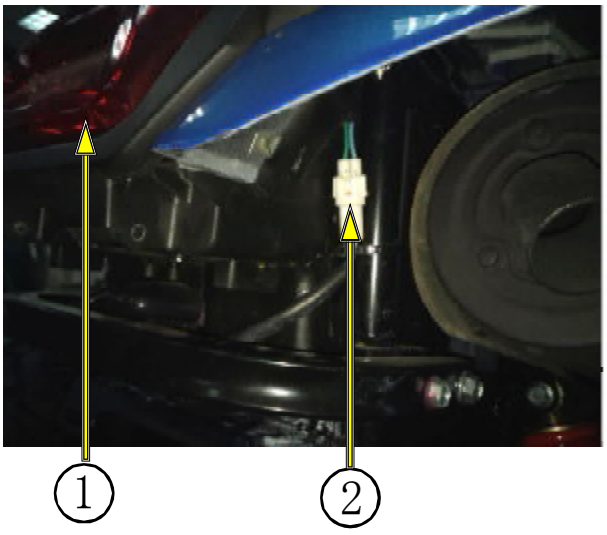
1、Cable,Horn 2 、Connector,Horn 3 、Horn 4 、Radiator 5 、Connector, Left Front Headlight

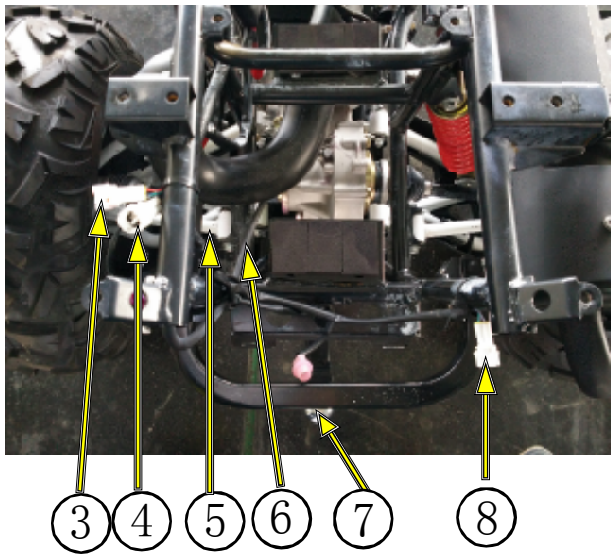


1 、Oil Level Sensor 2 、Fuel Pump 3 、Cable, Fuel Pump 4 、High Tension Pipe 5 、Connector, Oil Level Sensor 6 、Check Valve 7 、Oil Pan 8 、Cap,Fuel Tank 9 、Oil Filter Note: Before checking above items, seat, front rack, left and right side panel, dashboard cover and front fender, etc… should be removed. See details in Chapter 2 ”Body covering parts”.

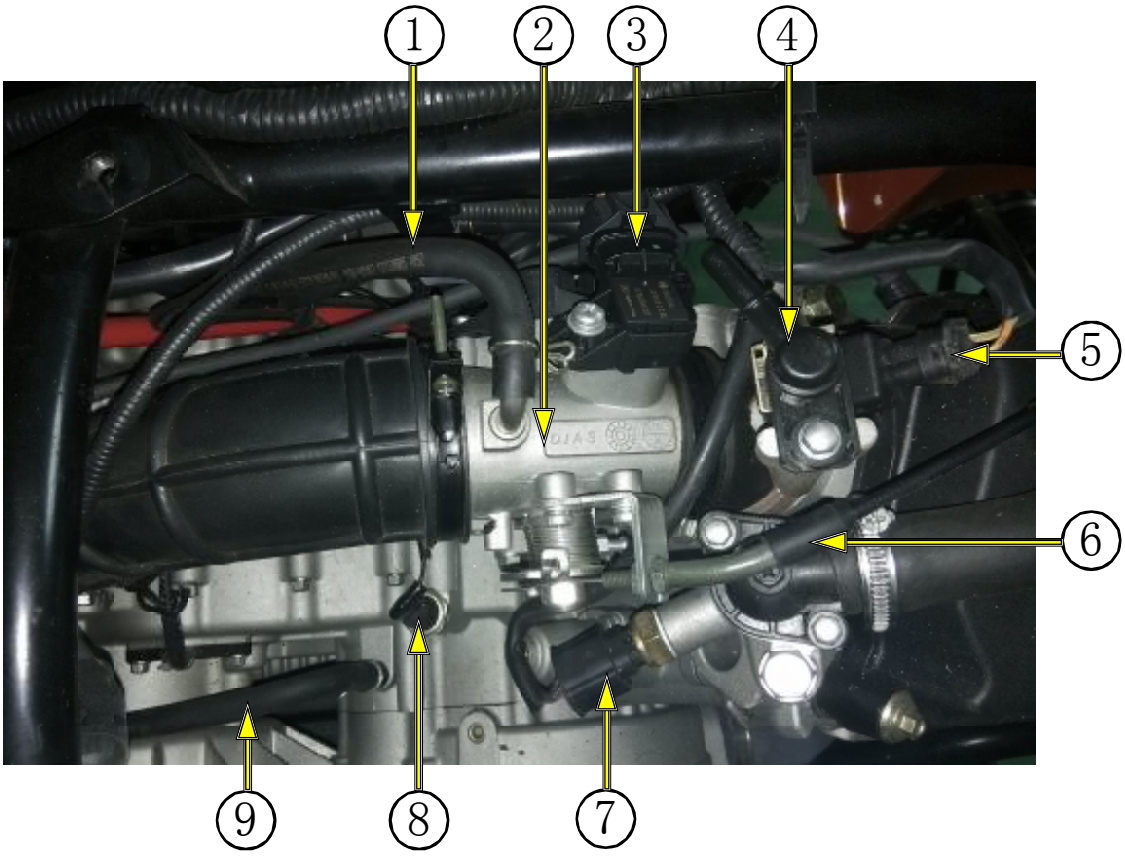


1 、Negative Cable,Stater Motor 2 、Sensor, Igntion Singal 3 、Magnetor Charging Cable 4 、Positive Cable, Starter Motor 5 、Gearshift 6 、Water Inlet Pipe, Radiator 7 、Water Outlet Pipe, Radiator

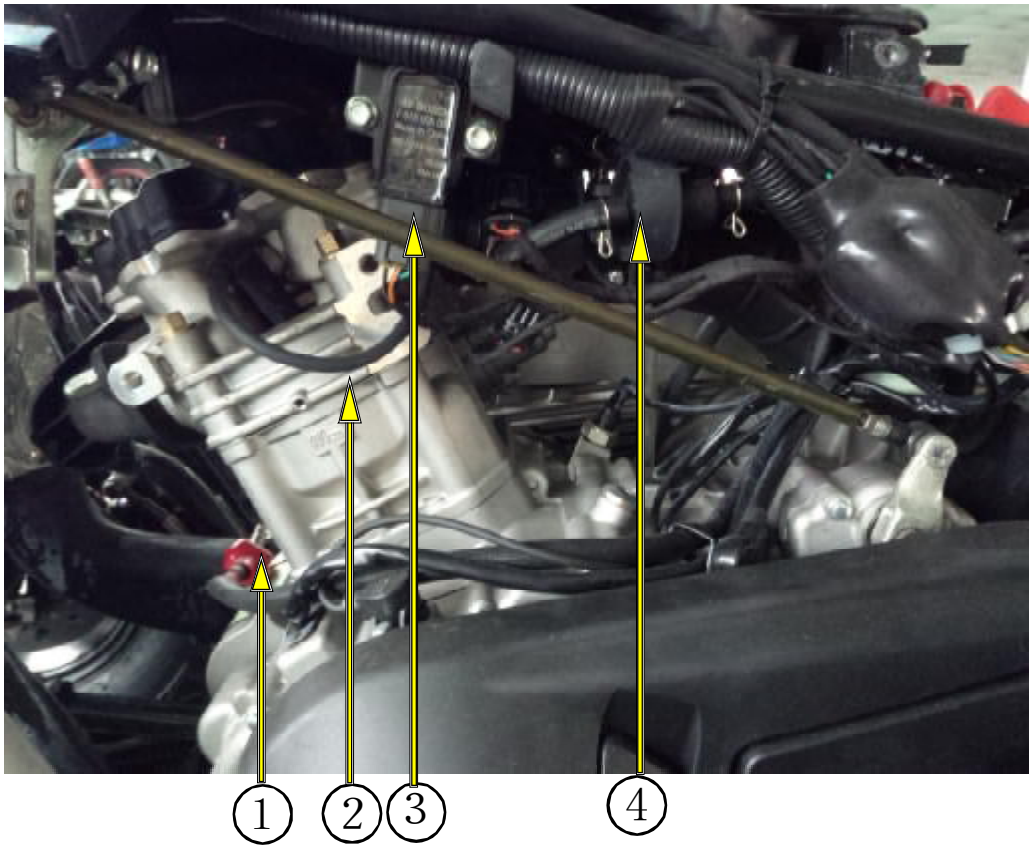




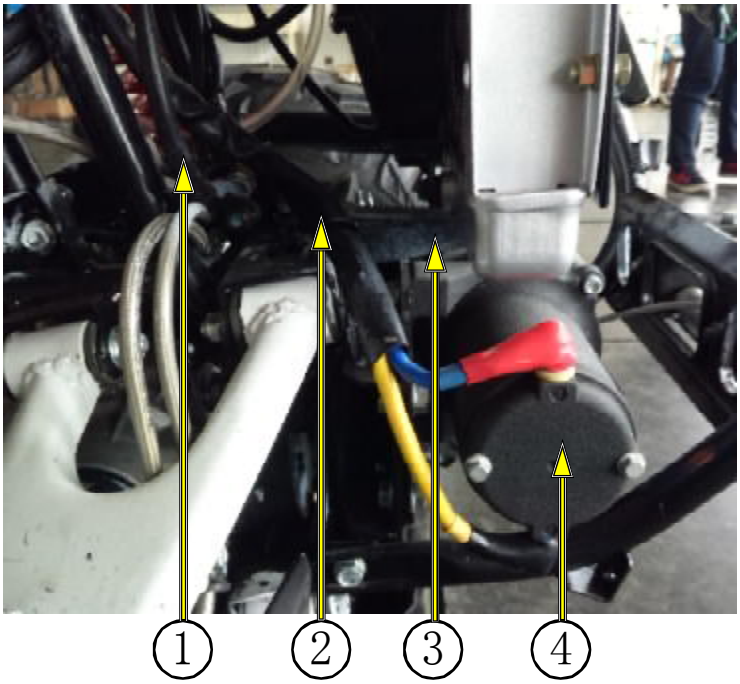
1、Tail Light 2、Connector,Right Turn Light (Symmetrical to Connector, Left Tail Light) 3、Connector, Left Turn Light 4、Connector, Tail Light 5 、Connector,Trailer Power Socket (NOTE: Voltage of trailer power socket (DC12V) Max.current is less than 10A. The power output only supplies rear turn light of trailer, tail light and rear licence light.) 6、Air Pipe, Rear Axle 7、Licence Light 8、Connector, Right Tail Light

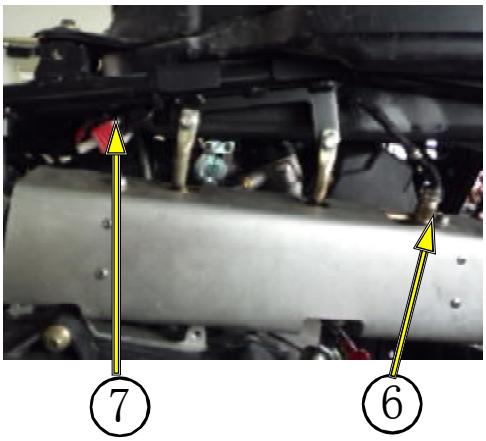


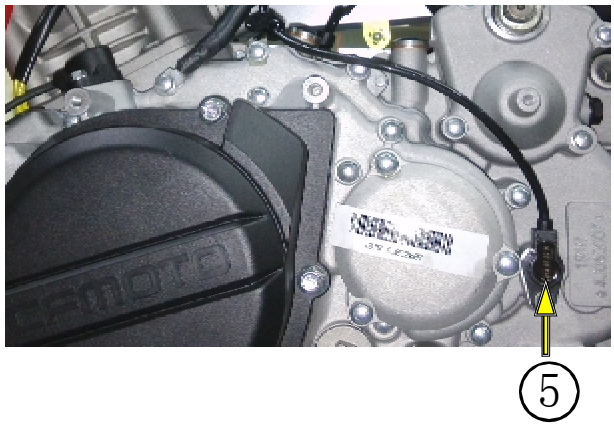
1 、Idling air inlet pipe 2 、Throttle body 3 、Air intake temp. sensor 4 、Fuel injector cap 5 、Connector,fuel injector 6、Throttle cable 7、Sensor. Water temp. 8、Oil pressure sensor 9、9.Exhaust gas pipe, crankcase

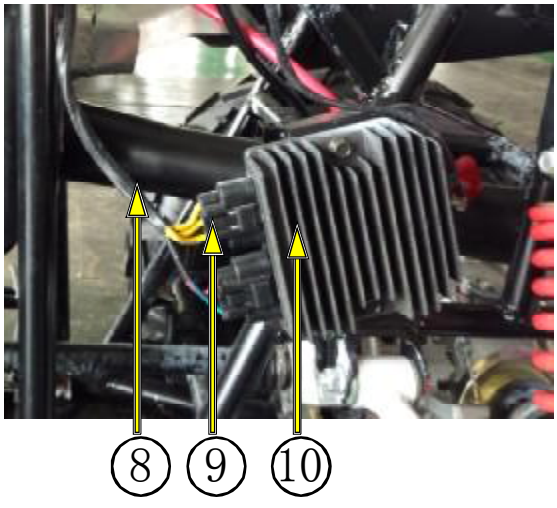


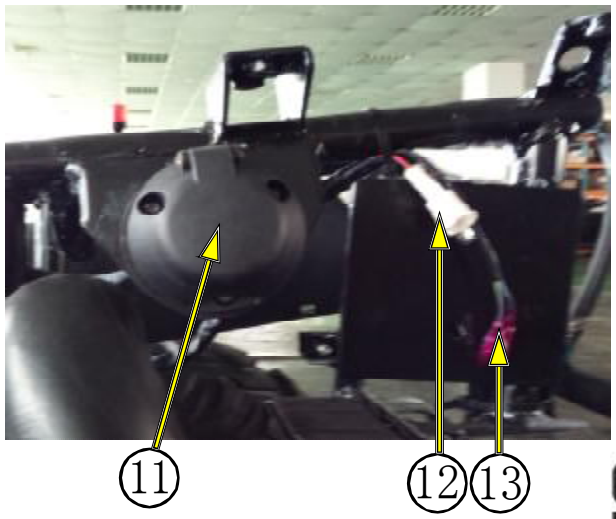
1 、Positive Cable, Starter Motor 2 、High Tension Cable 3 、Ignition Coil 4 、Magneto Valve, Idle



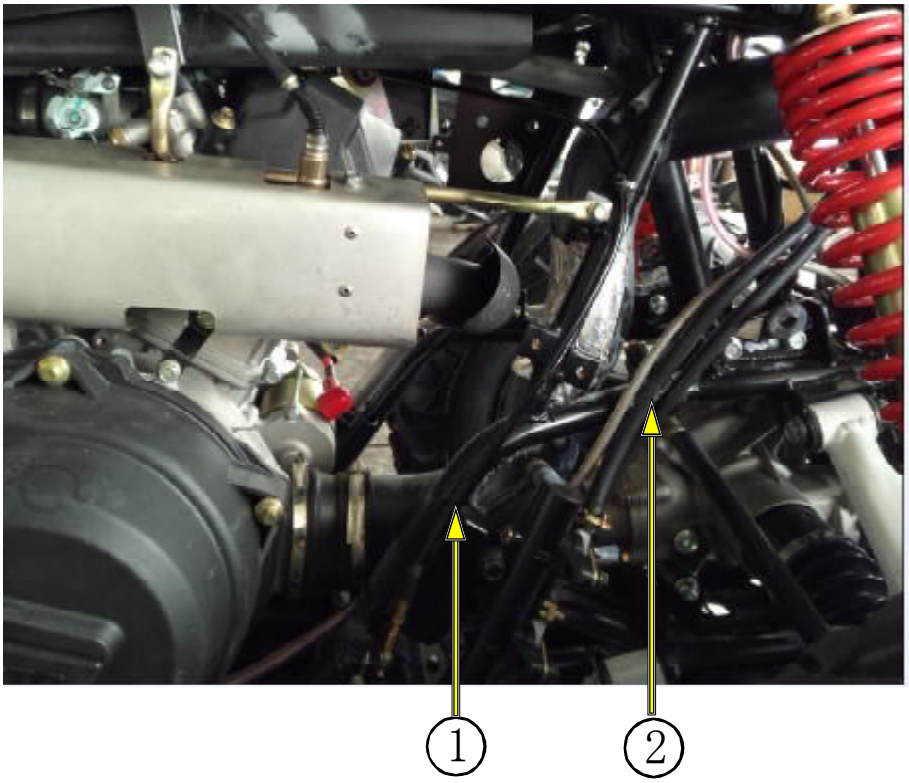








1、Cable, Brake Switch 2、Cable,Winch Motor 3、Water Outlet Pipe 4、Winch Motor 5、Speed Sensor 6、Oxygen Sensor 7、Connector,Oxygen Sensor 8、Cable, Regulator 9、Connector, Regulator 10、Regulator 11、Power Socket, Trailer 12、Connector, Rear Turning Light (LH) 13、Connector,Licence Light



1 、Parking lock cable 2、Fluid Hose 1, Reservoir 2、Fluid Hose 2, Reservoir

2 Vehicle body covering parts

2.1 MAINTENANCE INFORMATION

Operation Cautions

Replace the covering parts with correct sticker if there were. This chapter will describe how to disassemble the body covering parts. Follow this chapter when maintain vehicle.

This chapter will explain how to disassemble rack,seat,backrest and other outer parts.

Install pipe, cables, wires and hoses onto correct position according to their layouts.

2.2 Installation Torque:

M8 Bolt 20 (2.0) Torque N·m(kgf·m)

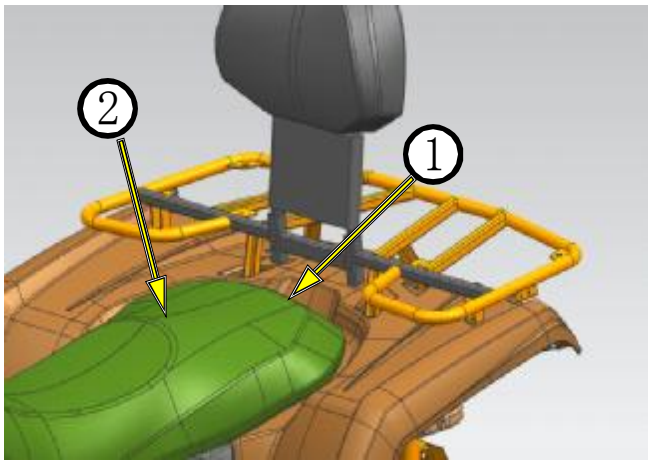
M6 Bolt 10 (1.0) Torque N·m(kgf·m)

M5 Bolt 5 (0.5) Torque N·m(kgf·m)

Self threading pin:4 (0.4) Torque N·m(kgf·m)

2. 3 Seat, Handlebar Cover, Front/ Rear Rack, Backrest, Handgrip

2. 3. 1 Seat



Removing

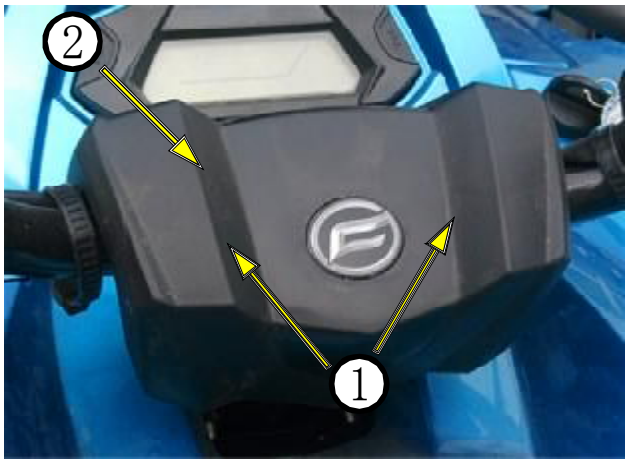
Pull rearward on the latch release No.1 (located under the rear of the seat); Raise the rear of the seat and slide it rearward

Installation

Operate removing procedures in reverse and make sure the seat is locked into position

2.3.2 Handlebar Cover

Removing



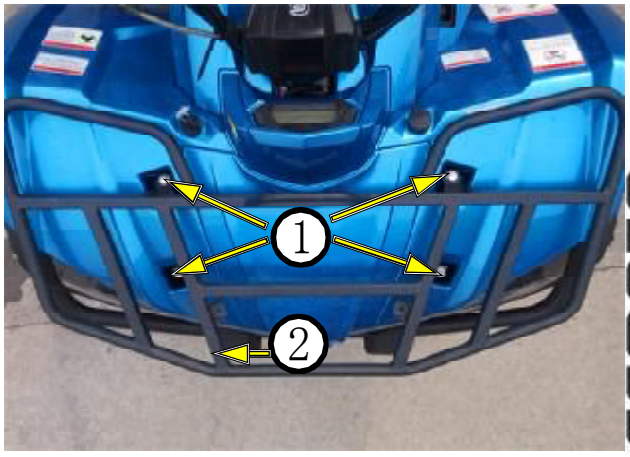
Raise it up and loosen two clamps No.1

Remove handlebar cover NO.2 Installing

Operate removing procedures in reverse.

2.3.3 FRONT RACK

Removing



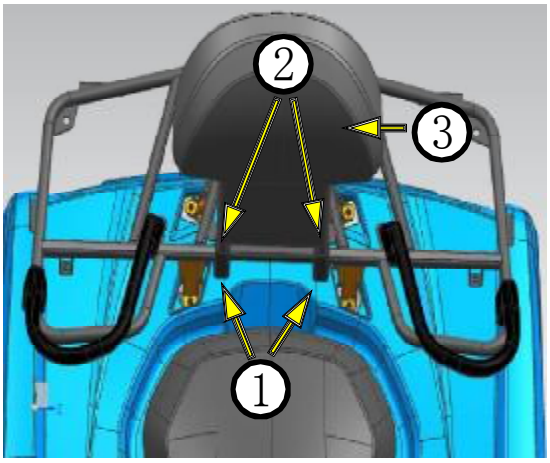
Remove 4 M8 Bolt NO.1

Remove Front Rack NO.2

Installation

Operate removing procedures in reverse.

2. 3. 4 BACK REST



Removing

Remove 2 M6 bolts no. 1

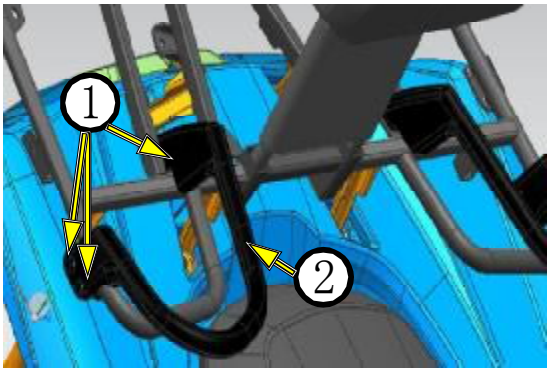
Remove back rest No. 3

Installation

Operate removing procedures in reverse.

Make sure the back rest is secured in position

2. 3. 5 REAR HANDGRIP,RH



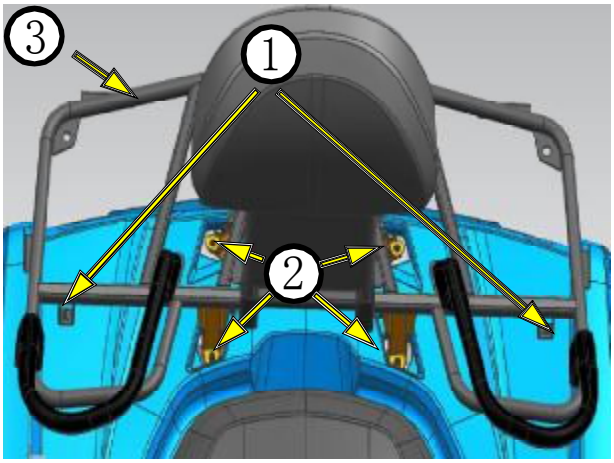
Removing

Loosen 3 M8 bolt No.1 Remove Rear Handgrip.RH NO.2

Installation

Operate removal proecedure in Reverse 2 Rear Handgrip, LH Follow instruction of Rear Handgrip, RH

2. 3. 6 REAR RACK



Removing

Remove backrest（→ 2. 3 .4 ）

Remove LH/RH handgrip →（2. 3. 5）

Loosen two M6 bolts 1

Loosen four M8 bolt 2

Remove Rear Rack 3

Installation

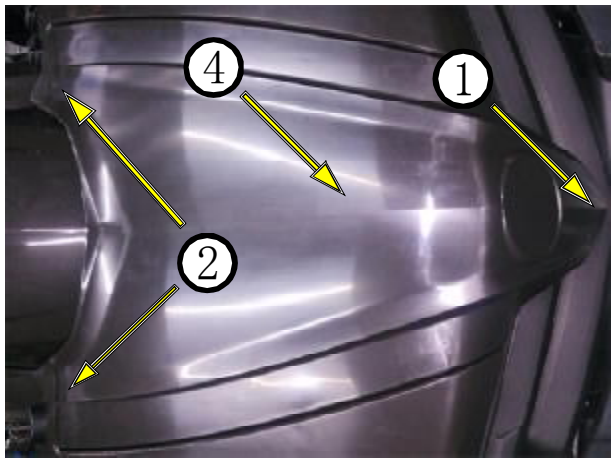
Operate removal proecedure in reverse

2.4 Front Panel, Dashboard Cover, Fuel Tank Top Cover,LH/RH Side Cover,Gearshift Deco Cover, Fuel Tank Lower Cover

2.4.1Front Panel

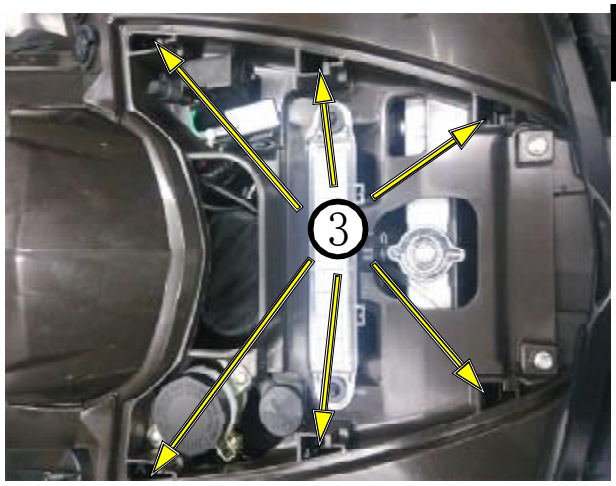
Removing

Loosen clamp through collar NO.1
Raise the rear of the front panel NO.2
Slide front panel NO.4 rearward out from 6 clips No.3



Installation

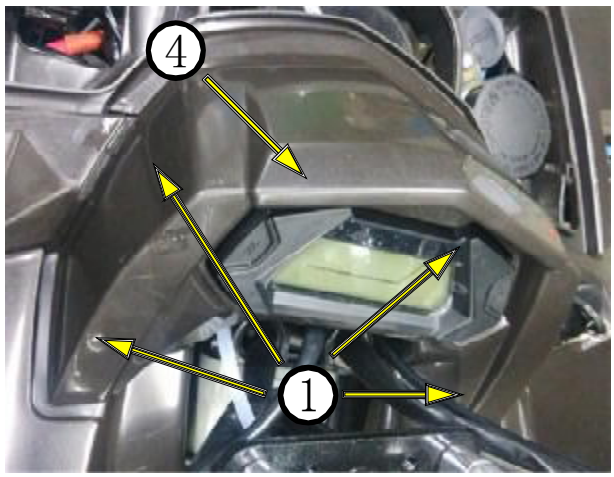
Operate removing proecedures in reverse



2.4.2 DASHBOARD COVER

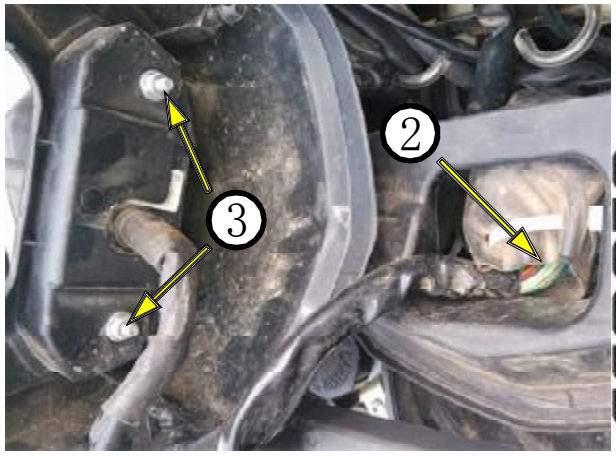
Removing

Remve front panel（→ 2.4.1）
Pull clamps out from 4 collars NO.1 upward with 45’ degree backwards
Disconnector dahsboard connector No.2
Loosen two M6 bolts No.3
Remove dashboard No. 4



Installation

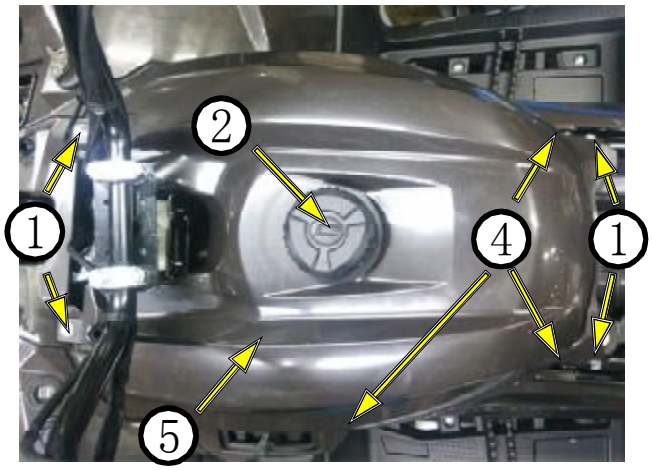
Operate removing proecedures in revers



2.4.3 TOP COVER, FUEL TANK

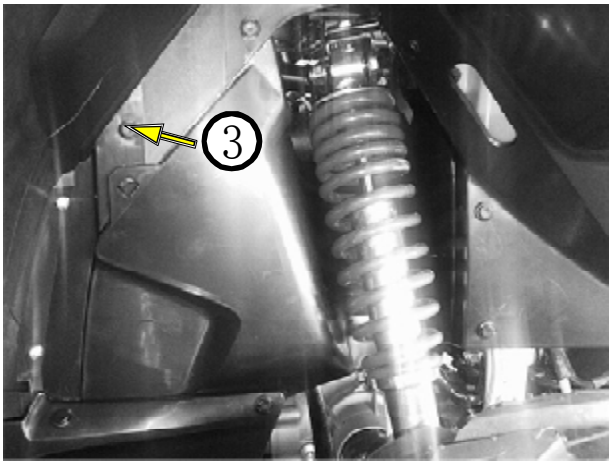
Removing

Remove seat（→ 2 . 3 .1 ）
Remove dashboard（→ 2 . 4 .2 ）
Loosen four M6 bolts No.1
Rotate off fuel tank cap No. 2
Loosen two plastic clip No. 3
Loosen three rubber collar No. 4
Remove top cover No.5



Installing

Operate removal proecedure In reverse



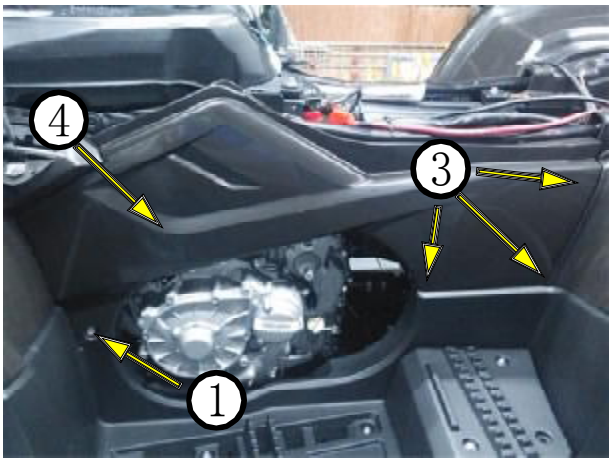
2.4.4 LEFT SIDE COVER

Removing

Remove top cover, fuel tank (2.4.3)
Loosen M6 bolt No.1
Loosen two taping screw NO.2 Remvoe left side cover No.4 from Rubber collar No.3

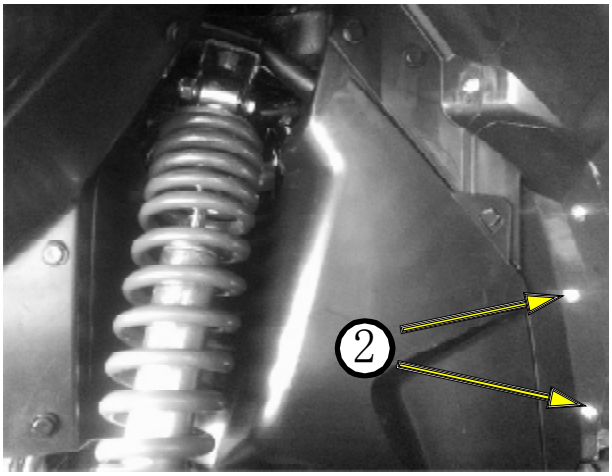
Installing

Operate removal proecedure in reverse

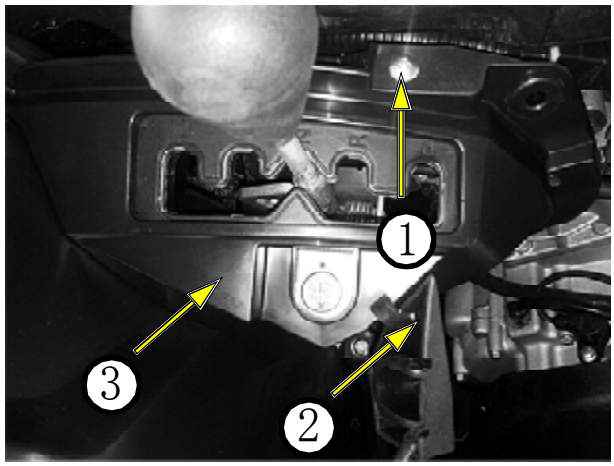


RIGHT SIDE COVER

Follow instruction of rear handgrip,RH



2.4.5 Gear shift cover

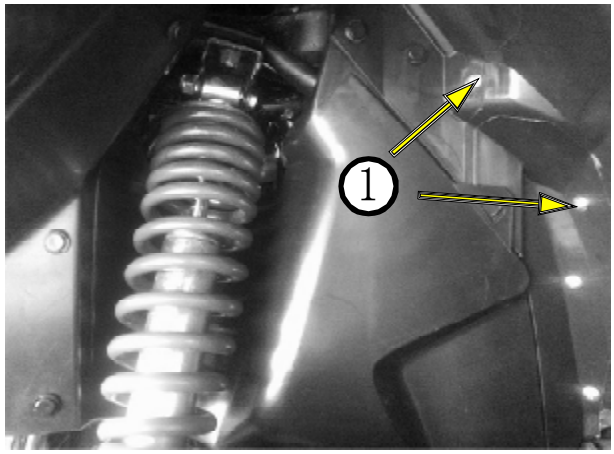


Removal

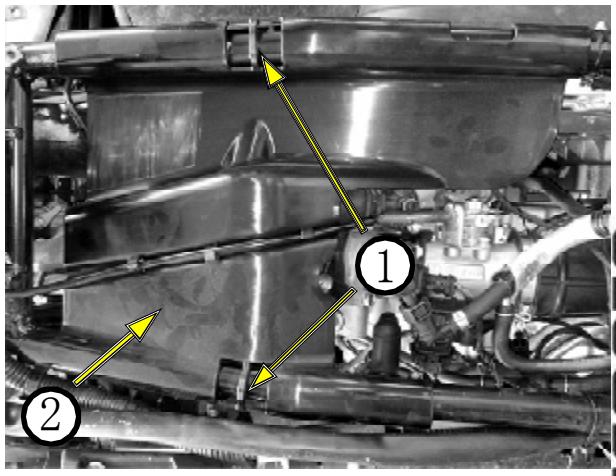
Remove the left side cover （→ 2. 3 .1 ）
Remove three units trapping screw 1
Pull out the lock cover 2
Remove the gear shift cover 3

Installation

Reverse the removal procedure for installation



2.4.6 Fuel Tank Protector Panel (lower)



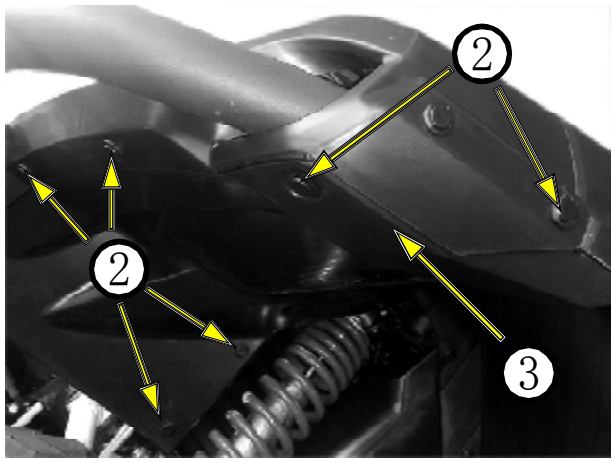
Removal

Remove the Fuel Tank Protector Panel (upper) （→ 2. 3 .1 ）
Remove Fuel tank（→ 4.1 ）
Remove two units rubber gasket1
Remove the g Fuel Tank Protector Panel (lower) 2

Installation

Reverse the removal procedure for installation

2.5 Left and right headlight cover, left &right front inner fender(lower), left &right front inner fender(upper), left&right hand protector,front fender.



2.5.1 Left and front headlight cover

Removal

Remove 1 units tapping screw 1

Remove 8 units plastic block 2

Remove the left and front headlight cover 3

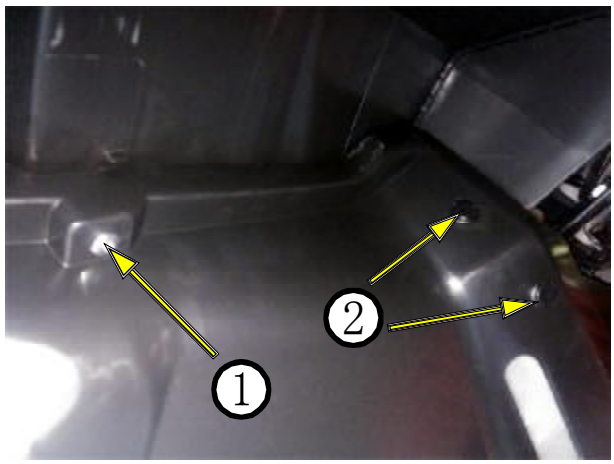
Installation

Reverse the removal procedure and direction for installation

Right and front headlight cover

Removal

It is same removal process as right and front headlight cover



2.5.2 Left and front inner fender(lower)

Removal

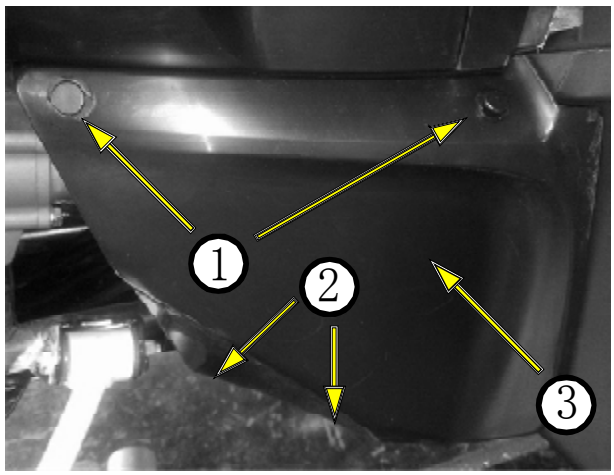
Remove 2 units plastic block 1

Remove 2 units snap joint 2

Remove the left and front inner fender (lower) 3

Installation

Reverse the removal procedure and direction for installation.

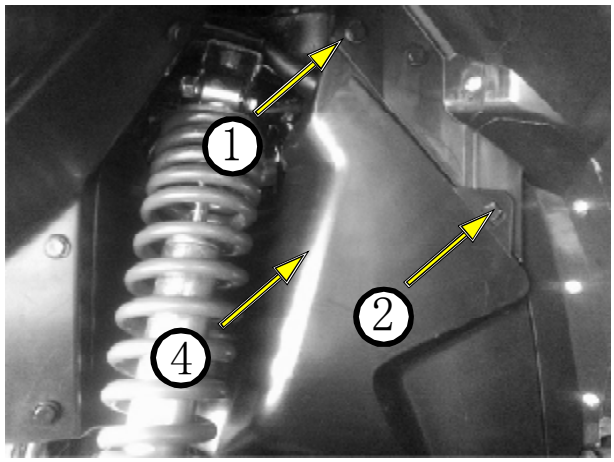


Right and front inner fender (lower)

Removal

It is same removal process as left and front inner fender(lower)

2.5.3 Left and front inner fender (Upper)



Removal

Remove left and front headlight cover （→ 2 .5.1 ）

Remove left and front inner fender(lower) （→ 2.5.2 ）

Remove 1 unit plastic block 1

Loosen snap joint 2

Pull out snap joint from rubber sleeve 3

Remove left and front inner fender (upper)

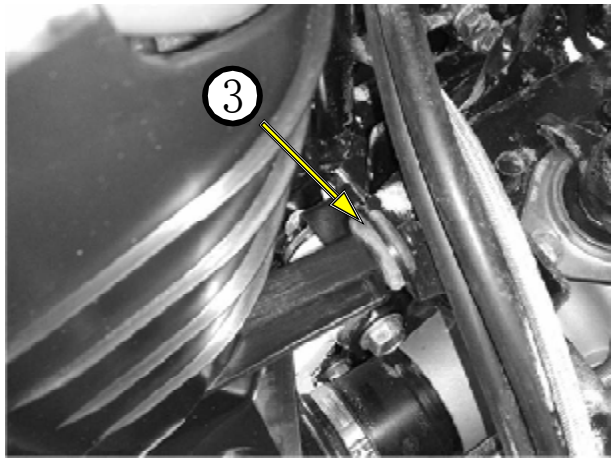
Installation

Reverse the removal procedure for installation.

Right and front inner fender(upper)

Removal

It is same removal process as left and front inner fender (upper)



2.5.4 Left hand protector

Removal

Remove 2 units M5 bolts 1

Remove 1 unit M8 bolts 2

Remove the left hand protector cover

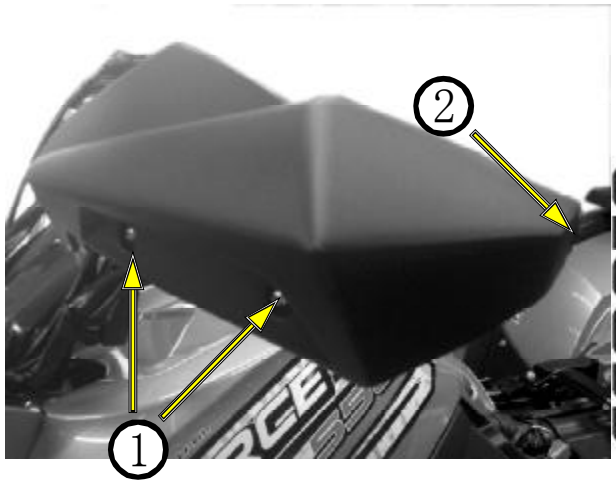
Installation

Reverse the removal procedure for installation.

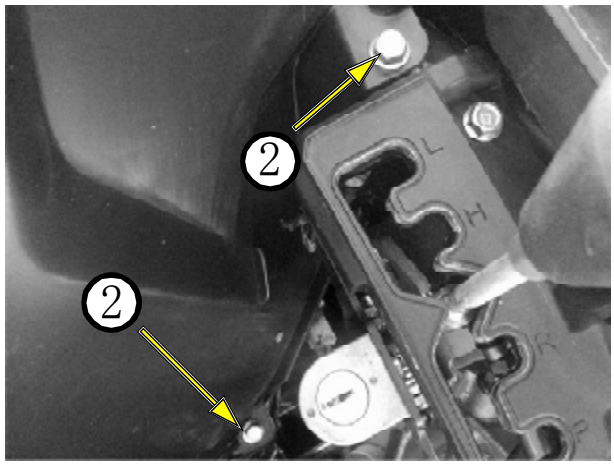
Right hand protector

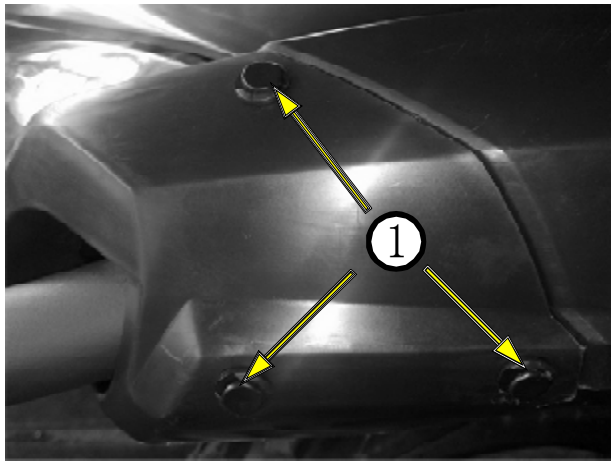
Removal

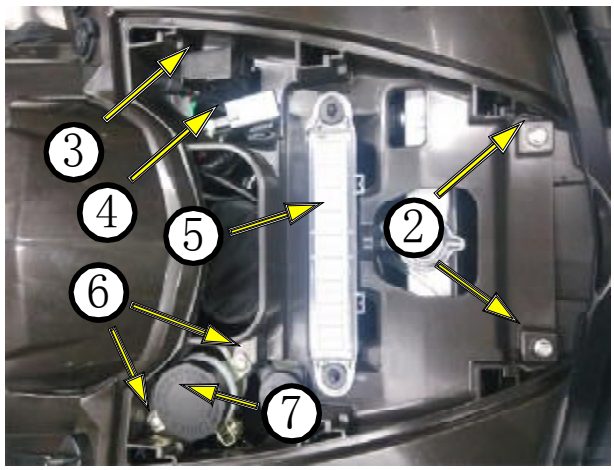
It is same removal process as left hand protector

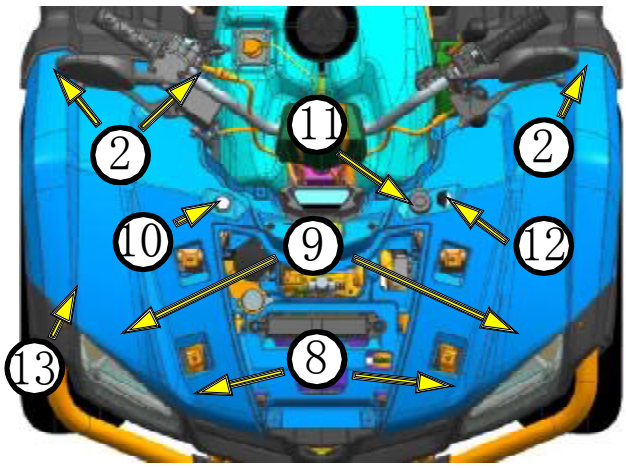


2. 5. 5 Front Fender









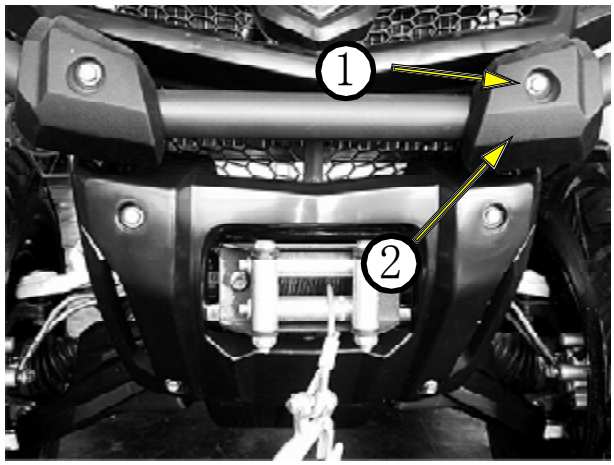
Removal

Remove front rack（→ 2. 3 .3 ）;
Remove gear shift cover(→ 2.4.5)
Remove the left and front headlight cover (→ 2.5.1)
Remove the left&right and front inner fender (→ 2.5.3)
Remove 6 units left and right plastic block1
Remove 7 units M6 bolt 2
Remove fuse 3
Remove flasher 4
Remove relay 5
Remove 2 units tapping screw 6
Remove oil cup 7
Pull out 2 units snap joint from rubber sleeve 8
Pull out front fender from 2 sockets 9
Remove electric door lock 10
Remove USB 11
Remove external electric supply socket 12
Remove front fender 13

Installation

Reverse the removal procedure for installation.

2. 6 Left &right bumper block, Front fender(lower),bumper, Headlight panel



2. 6. 1 Left bumper block

Removal

Remove 1 units bolt 1

Remove left bumper block 2

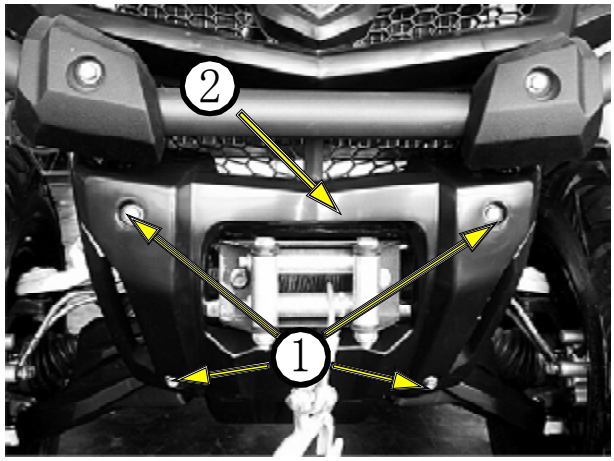
Installation

Reverse the removal procedure for installation.

Right bumper

Removal

It is same removal process as left bumper



2. 6. 2 Front fender (lower)

Removal

Remove 4 units bolt 1

Remove front fender (lower) 2

Installation

Reverse the removal procedure for installation.

Bumper

Removal

Remove left and right bumper block (→ 2. 6.1)

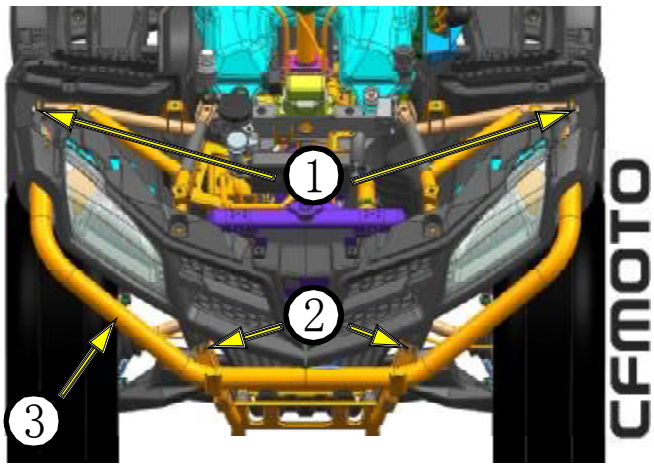
Remove left and right 2 units M8 bolt 1

Remove front 2 units M8 bolt 2

Remove bumper 3

Installation

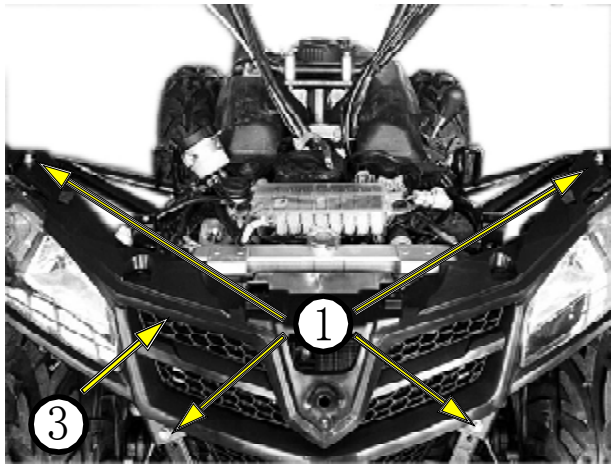
Reverse the removal procedure for installation



2. 6. 3 Headlight panel

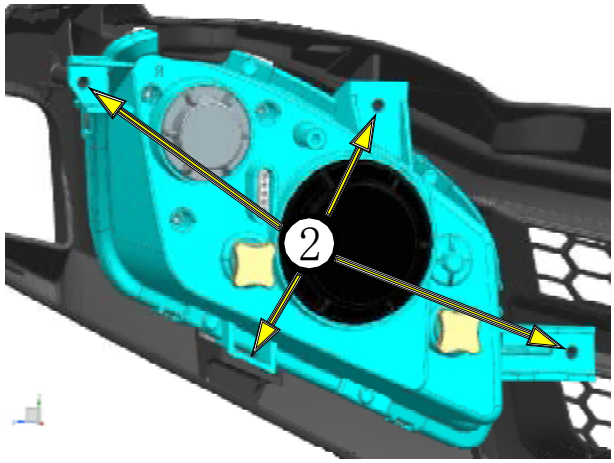
Removal

Remove left and right headlight cover (→ 2.5.1)
Remove front fender (→ 2.5.5)
Remove bumper(→ 2.6.3)
Remove 4 units M6 bolt 1
Remove 8 units tapping screw 2
Remove front fender 3



Installation

Reverse the removal procedure for installation

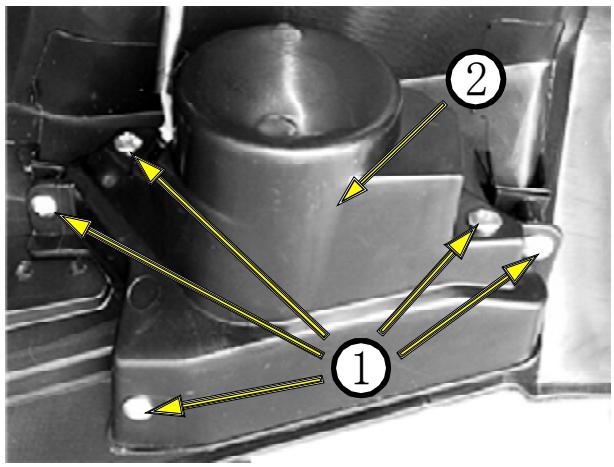


2. 7 Left& right turning light cover,left& right rear panel, Rear light panel,rear fender,rear box, left& right turning light trim cover

2. 7. 1 Left turning light cover

Removal

Remove 5 units tapping screw 1
Remove left & rear turning light cover 2



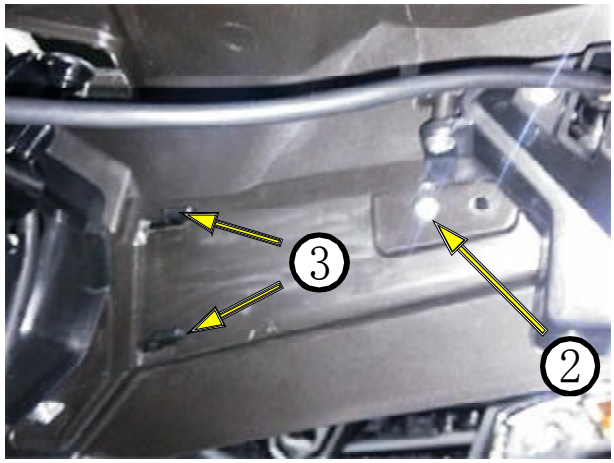
Installation

Reverse the removal procedure for installation

Right turning light cover

Removal It is same removal process as left turning light cover

2.7.2 Left& Rear Panel



Removal

Pull open drawstring 1 and open rear light panel Remove tapping screw 2

Push out left &rear panel from snap joint 3

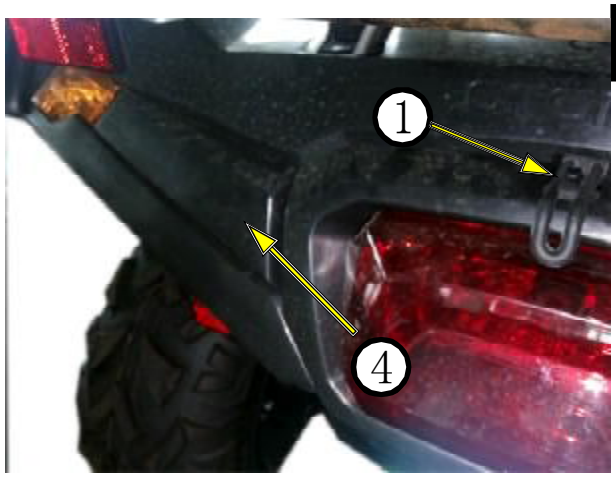
Installation

Reverse the removal procedure for installation.

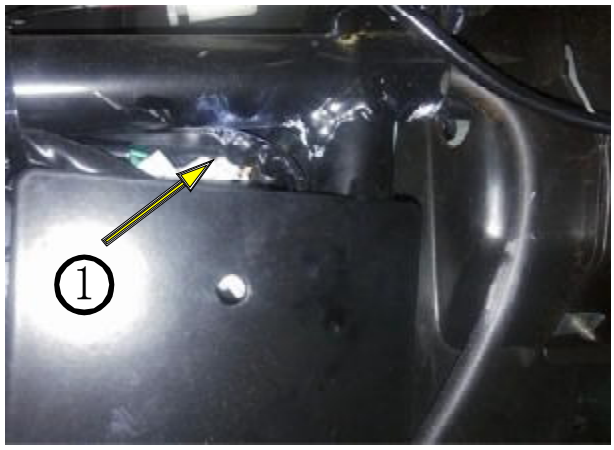
Right&rear panel

Removal

It is same removal process as left&rear panel



2.7.3 Rear light panel



Removal

Open rear storage box

Remove rear light connector 1

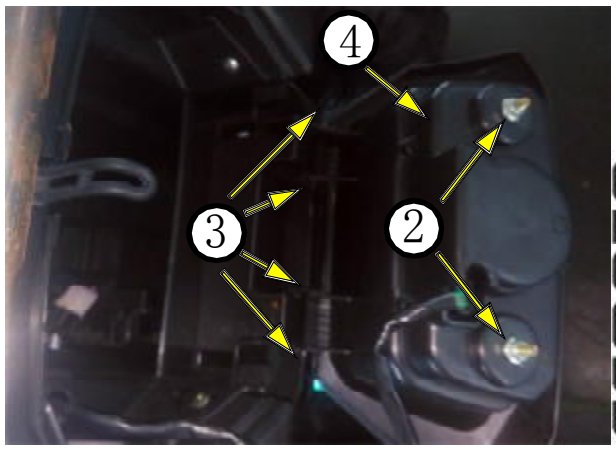
Remove M6 bolt 2

Come away spindle 3

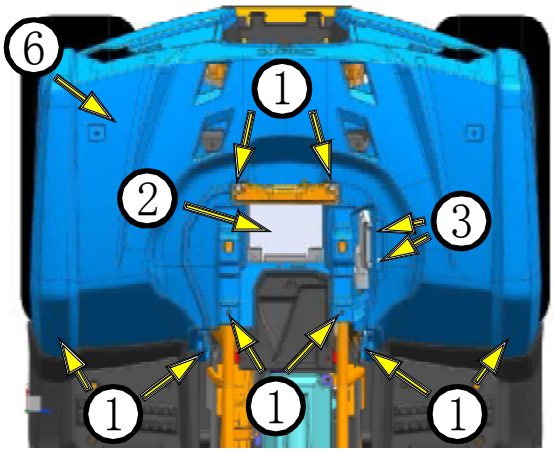
Remove rear light panel 4

Installation

Reverse the removal procedure for installation.



2. 7. 4 Rear fender

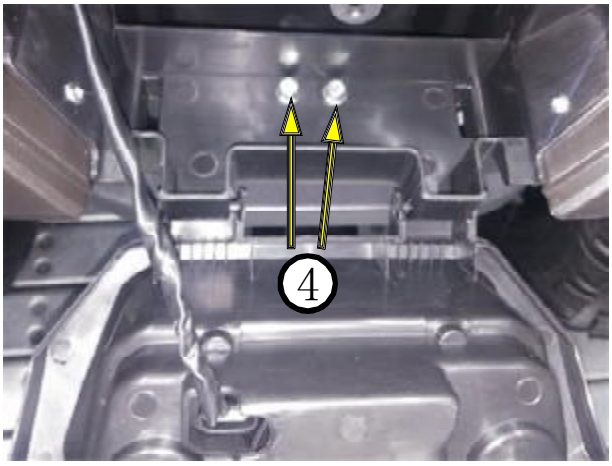


Removal

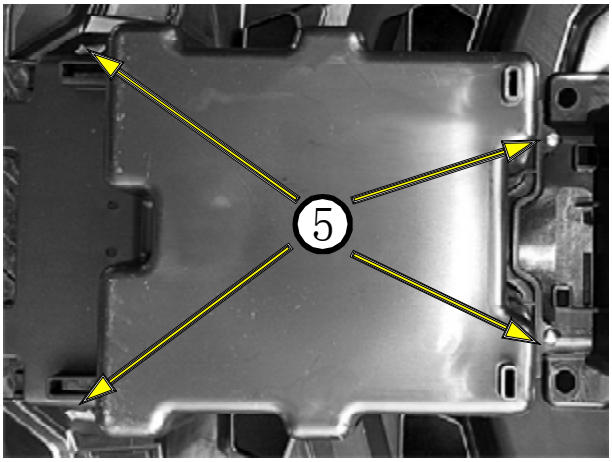
Remove rear rack(→ 2.3.6)
Remove left& right side cover (→ 2.4.4)
Remove left& right rear turning light cover (→ 2.7.1)
Remove left & right rear panel(→ 2.7.2)
Remove rear light panel(→ 2.7.3)
Remove 8 units M6 bolt 1
Remove battery 2 Remove 2 units plastic snap joint 3
Remove 2 units M6 bolts 4
Remove 4 units tapping screw 5
Remove rear fender 6

Installation

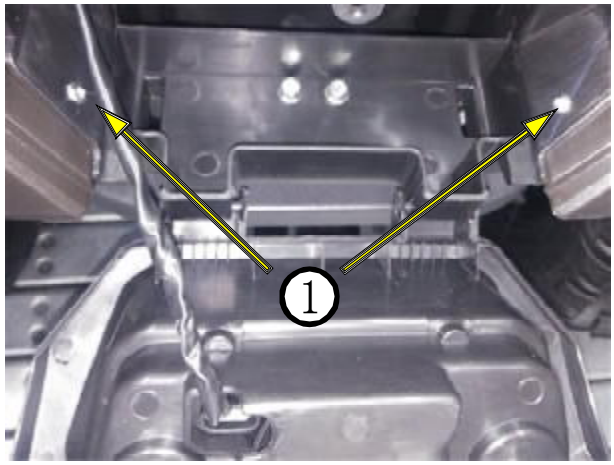
Reverse the removal procedure for installation.



Right and front headlight cover



2.7.5 Rear Box



Removal

Remove rear fender (¡ú 2.7.4)

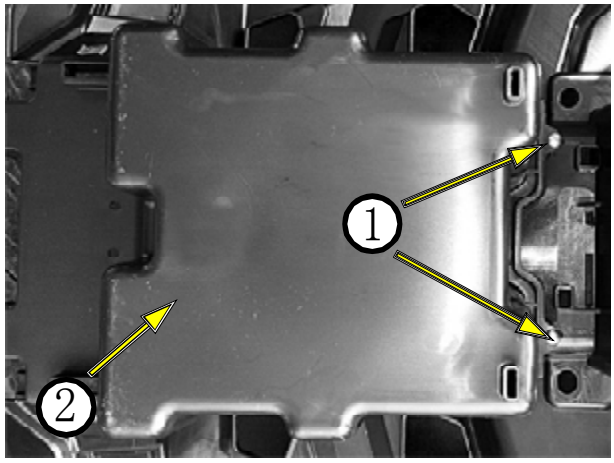
Remove 4 units tapping screw 1

Remove rear box 2

Installation

Reverse the removal procedure for installation.

2.7.6 Left turning light trim cover



Removal

Remove 2 units tapping screw 1

Remove left turning light trim cover 2

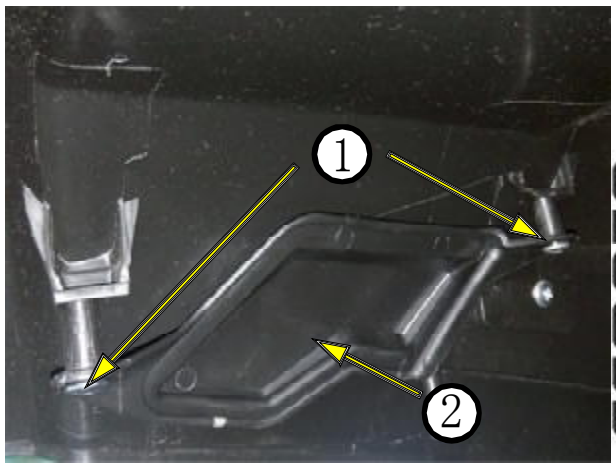
Installation

Reverse the removal procedure for installation.

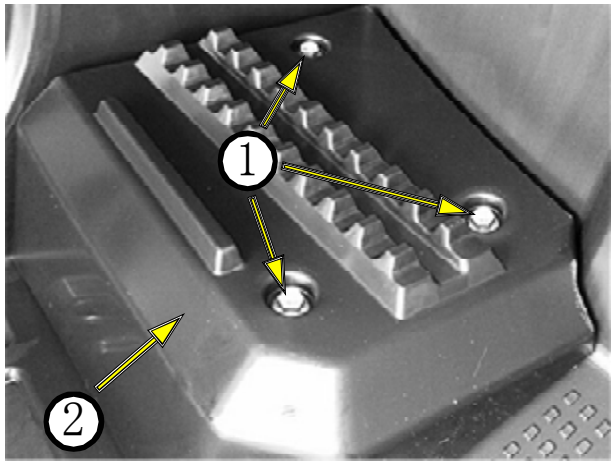
Right turning light trim cover

Removal

It is same removal process as left turning light trim cover



2.8 Left& right pedal, left&right foot rest, tool box Engine oil covering cap, left engine cover, recoil start



2.8.1 Left pedal

Removal

Remove 3 units M6 blot 1

Remove left pedal

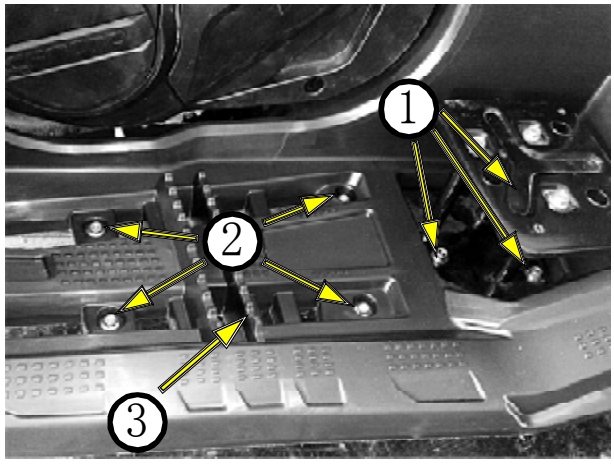
Installation

Reverse the removal procedure for installation.

Right pedal

It is same removal process as left pedal

2.8.2 Left foot rest



Removal

Remove front fender (→ 2.5.5)

Remove rear fender(→ 2.7.4)

Remove left pedal(→ 2.8.1)

Remove 3 units M8 bolts 1

Remove 4 units M6 bolts 2

Remove left pedal 3

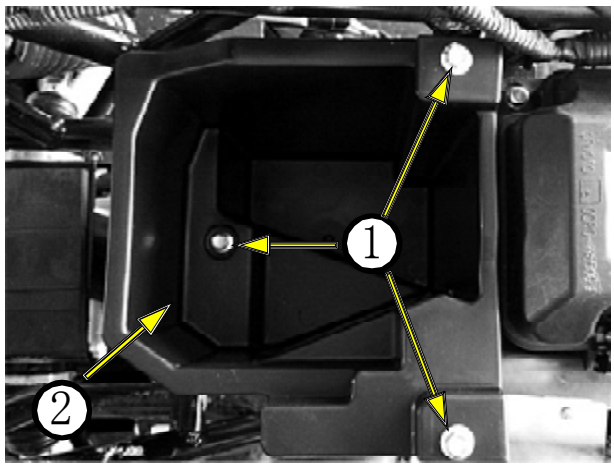
Installation

Reverse the removal procedure for installation.

Right foot rest

It is same removal process as left foot rest

2.8.3 Tool box



Removal

Remove rear fender(→ 2.7.4)

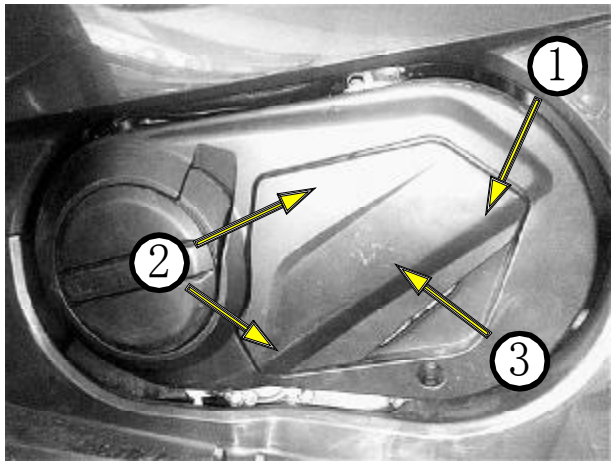
Remove 3 units M6 bolts 1

Remove tool box 2

Installation

Reverse the removal procedure for installation.

2.8.4 Engine oil covering cap



Removal

Remove rubber sleeve 1

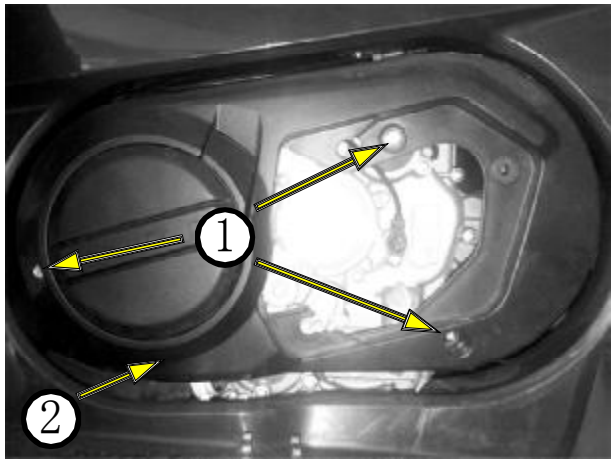
Remove rubber sleeve 2

Remove engine oil covering cap 3

Installation

Reverse the removal procedure for installation.

2.8.5 Left engine cover



Removal

Remove engine oil covering cap (→ 2.8.4)

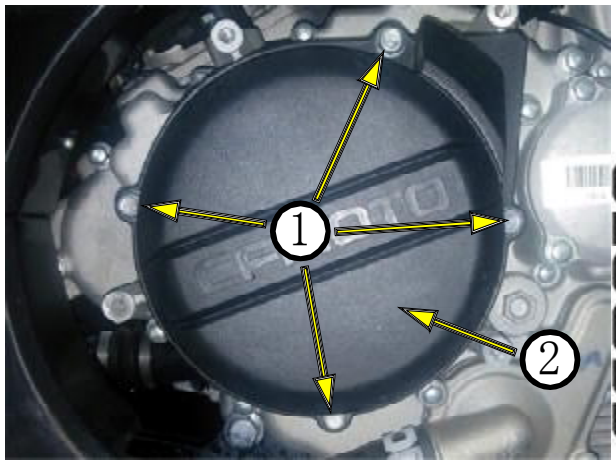
Remove 3 units M6 bolts 1

Remove left engine cover 2

Installation

Reverse the removal procedure for installation.

2.8.6 Recoil start cover



Removal

Remove engine oil covering cap (→ 2.8.4)

Remove left engine cover(→ 2.8.5)

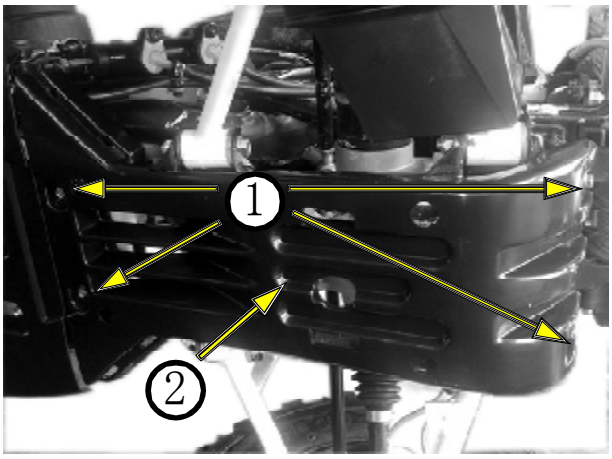
Remove 4 units M6 bolts 1

Remove recoil start cover 2

Installation

Reverse the removal procedure for installation.

2.9 Engine front/middle/rear protection plate, left/right front suspension fender, left/right rear suspension fender, base board



2.9.1 Engine front protection plate

Removal

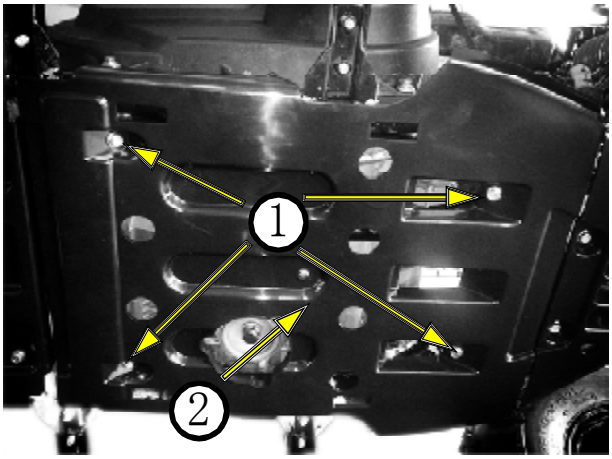
Remove 4 units M6 bolts 1

Remove engine front protection plate 2

Installation

Reverse the removal procedure for installation.

2.9.2 Engine middle protection plate



Removal

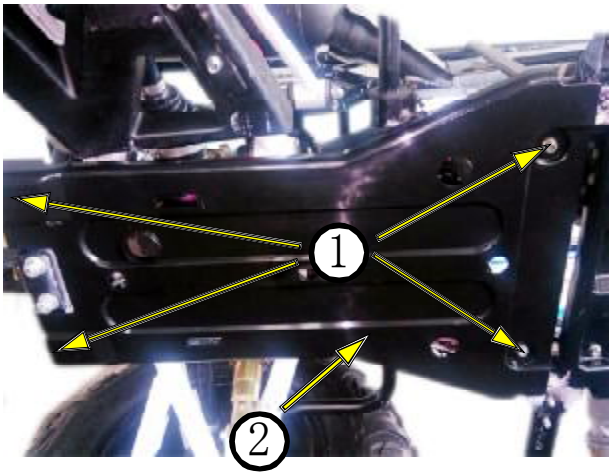
Remove 4 units bolts 1

Remove engine middle protection plate 2

Installation

Reverse the removal procedure for installation.

2.9.3 Engine rear protection plate



Removal

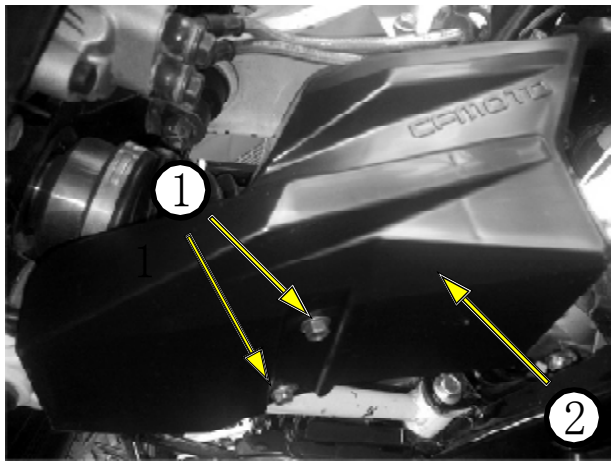
Remove 4 units bolts 1

Remove engine rear protection plate 2

Installation

Reverse the removal procedure for installation.

2.9.4 RH PROTECTOR, FRONT SUSPENSION



Removal

Remove M6 bolts No.1

Remove LH protector, front suspension No.2

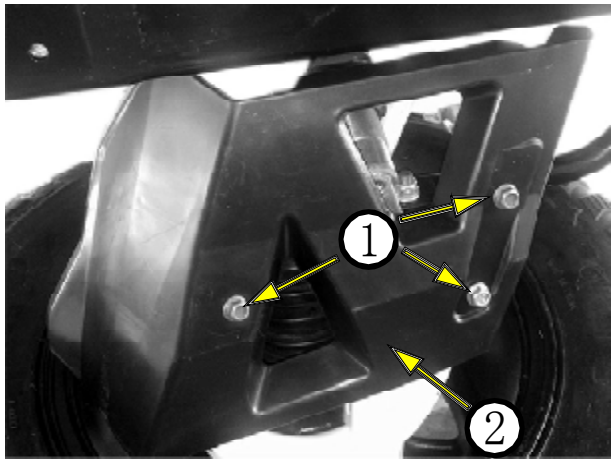
Installation

Reverse the removal procedure for installation.

LH PROTECTOR, FRONT SUSPENSION

The way of removal and installation is the same as RH protector, front suspension.

2.9.5 LH PROTECTOR, REAR SUSPENSION



Removal

Remove bolts M6 No.1

Remove LH protector,rear suspension No.2

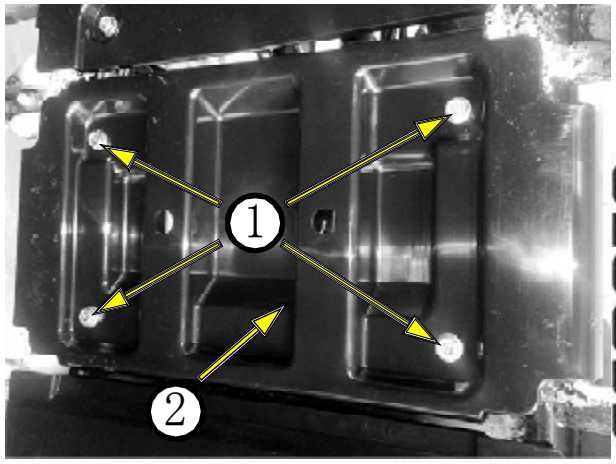
Installation

Reverse the removal procedure for installation

RH PROTECTOR, REAR SUSPENSION

The way of removal and installation is the same as LH protector,rear 2 suspension.

2.9.6 BASE PLATE EXTENSION



Removal

Remove bolts No.1

Remove base plate extension No.2

Installation

Reverse the removal procedure for installation.

2.10 LH & RH SIDE PANEL, LH & RH FOOTREST, SHORT VERSION

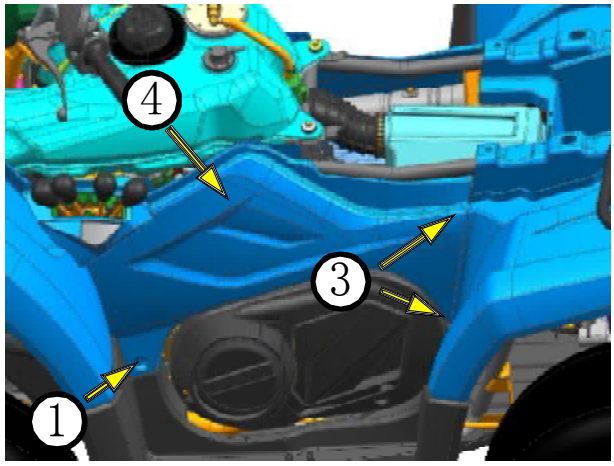
2. 10. 1 LH SIDE PANEL

Removal

Remove top cover,fuel tank(→ 2 . 4 .3)
Remove bolts M6 No.1 3
Remove tapping screws No.2
Remove LH side panel No.4

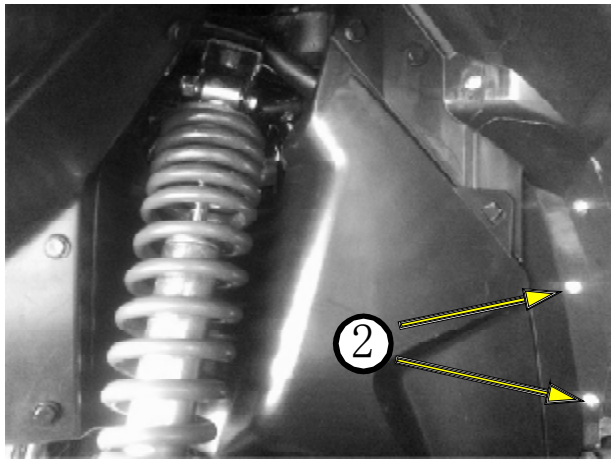
Installation

Reverse the removal procedure for installation.



RH SIDE PANEL Removal & Installation

Refer to LH side panel, Process it symmetrically



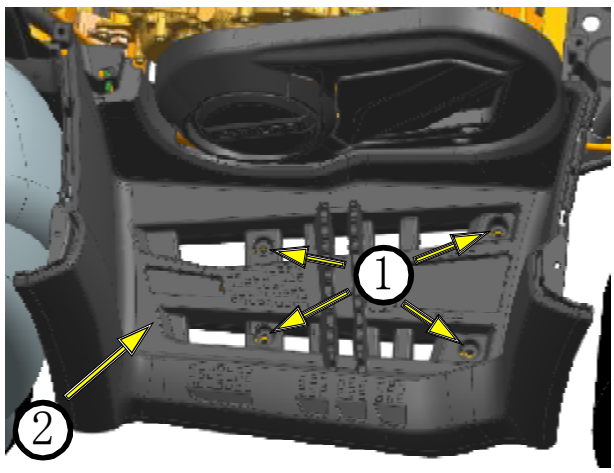
2. 10. 2 LH FOOTREST

Removal

Remove rear fender(→ 2. 5.5)
Remove rear fender(→ 2. 7.4)
Remove bolt M6 No.1
Remove LH footrest No.2

Installation

Reverse the removal procedure for installation



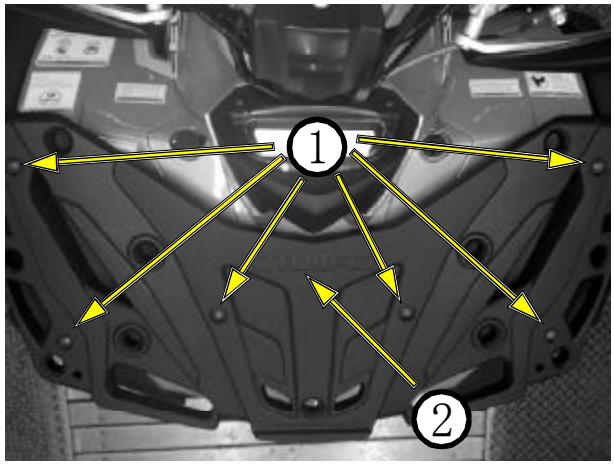
RH FOOTREST

Removal & Installation

Refer to LH side panel, Process it symmetrically

2.11 OPTIONAL RACK COVER, RACK, HANDRAIL

2.11.1 FRONT RACK COVER



Removal

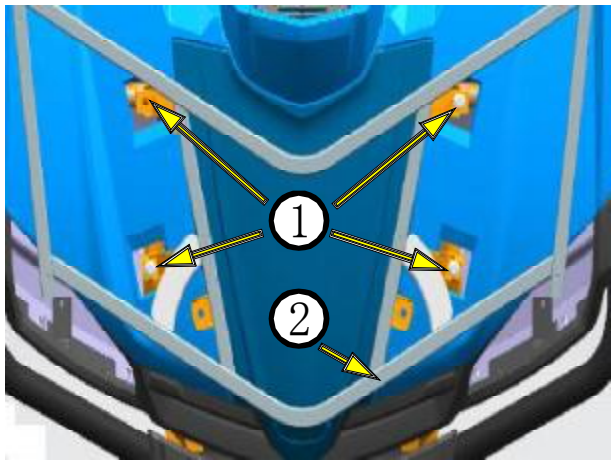
Remove bolts M6 No.1

Remove front rack cover No.2

Installation

Reverse the removal procedure for installation

2.11.2 FRONT RACK



Removal

Remove front rack cover(→ 2 . 11 .1)

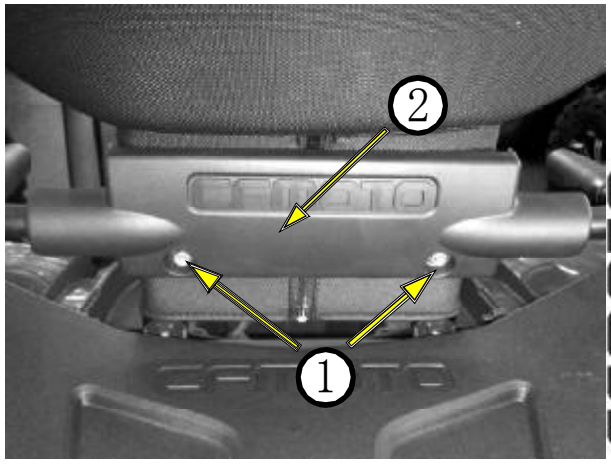
Remove bolts M8 No.1

Remove front rack No.2

Installation

Reverse the removal procedure for installation

2.11.3 DECO COVER, BACKREST



Removal

Remove bolts M6 No.1

Remove deco cover, backrest No.2

Installation

Reverse the removal procedure for installation

2.11.4 REAR HANDRAIL

Removal

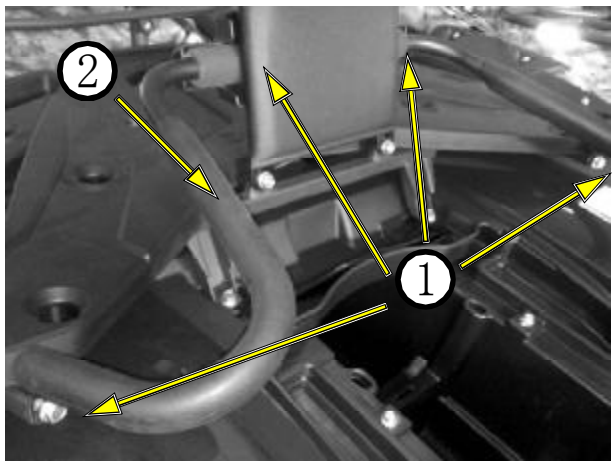
Remove deco cover, backrest(→ 2.11.3)

Remove bolts M8 No.1

Remove rear handrail No.2

Installation

Reverse the removal procedure for installation



2.11.5 REAR RACK COVER

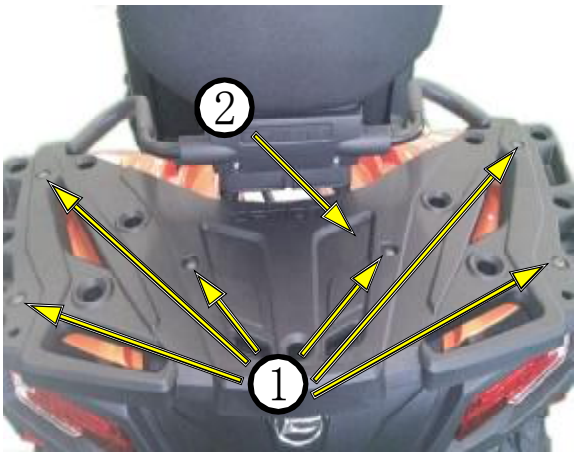
Removal

Remove bolts M6 No.1

Remove rear rack cover No.2

Installation

Reverse the removal procedure for installation



2.11.6 REAR RACK

Removal

Remove deco cover, backrest (→ 2.11.3)

Remove rear handrail(→ 2.11.4)

Remove rear rack cover(→ 2.11.5)

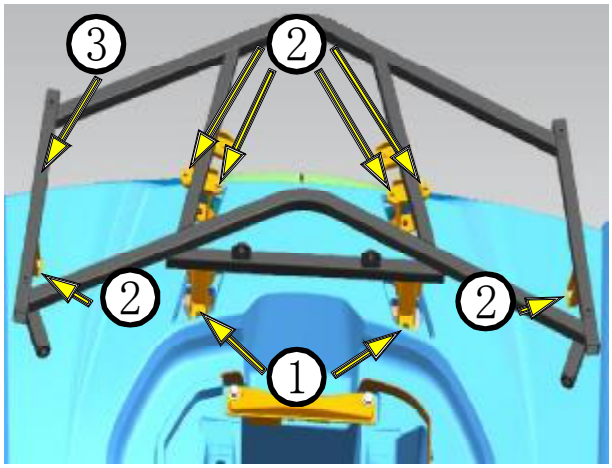
Remove bolts M8 No.1

Remove bolts M6 No.2

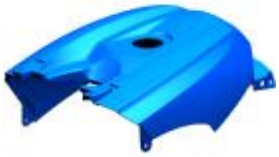
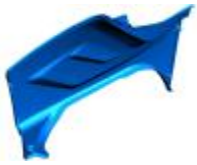
Remove rear rack No.3

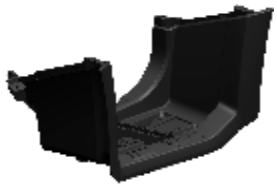
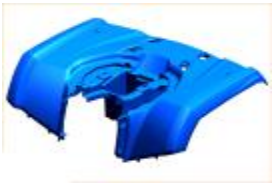
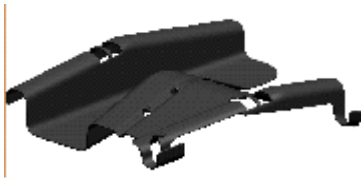
Installation

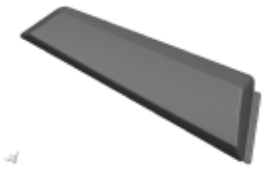
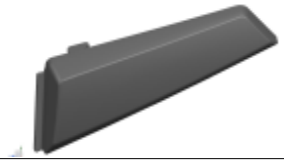
Reverse the removal procedure for installation

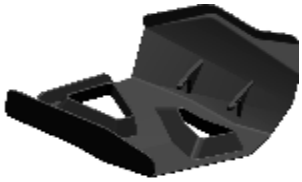
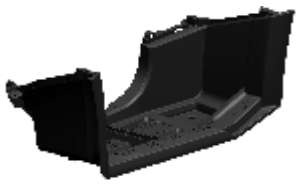


2.12 ACCESSORIES

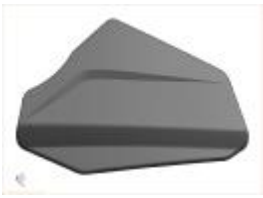
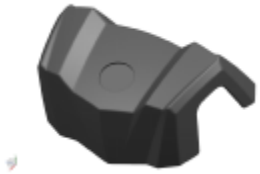
REF NO.	PART NO.	NAME	PIC.
1	9GQ0-041011	FRONT FACE	
2	9GQ0-041023	Front top cover	
3	9GQ0-041021	Front fender	
4	9GQ0-041013	Headlight guard, LH	
5	9GQ0-041014	Headlight guard, RH	
6	9GQ0-041022	Dashboard cover	
7	9GQ0-041041	Front down fender	
8	9GQ0-042011	Top cover, fuel tank	
9	9GQ0-042021	side panel, LH	
10	9GQ0-042022	side panel, RH	

REF NO.	PART NO.	NAME	PIC.
11	9GQ0-042023	Deco cover, gearshift	
12	9GQ0-042031	Footrest board, LH	
13	9GQ0-042032	Footrest board,RH	
14	9GQ0-043021	Rear fender	
15	9GQ0-043022	Rear box	
16	9GQ0-043023	Guard,LH tail light	
17	9GQ0-043024	Guard,RH Tail light	
18	9GQ0-043011	Panel,tail light	
19	9GQ0-044011	Lower panel，Fuel tank	

REF NO.	PART NO.	NAME	PIC.
20	9GQ0-043025	Rear deco Panel,LH	
21	9GQ0-043026	Rear deco panel, RH	
22	9GQ0-044021	Engine skid plate,FR	
23	9GQ0-044022	Middle skid plate	
24	9GQ0-044023	Rear skid plate	
25	9GQ0-044031	Front upper inner Fender,LH	
26	9GQ0-044032	Front upper inner fender,RH	
27	9GQ0-044033	Front lower inner fender,LH	
28	9GQ0-044034	Front lower Inner fender, RH	

REF NO.	PART NO.	NAME	PIC.
29	9GQ0-044041	Front LH suspension protector	
30	9GQ0-044042	Front RH Suspension protector	
31	9GQ0-044044	Rear RH suspension protector	
32	9GQ0-044043	Rear LH suspension protector	
33	9GQL-042021	Left side panel	
34	9GQL-042022	Right side panel	
35	9GQL-042032	Footrest Board,RH	
36	9GQL-042031	Footrest board,LH	
37	9GQL-042033	Left foot pedal	

REF NO.	PART NO.	NAME	PIC.
38	9GQL-042034	Right foot pedal	
39	9GQL-044024	Base plate extension	
40	9GQL-044025	Tool box	
41	9GQ0-041042	Damper block, LH	
42	9GQ0-041043	Damper block, RH	
43	9CR6-044061	Deco cover, backrest	
44	9CR6-101211	Hand guard, LH	
45	9CR6-101221	Hand guard, RH	
46	9CR6-044051	Left side cover, engine	

REF NO.	PART NO.	NAME	PIC.
47	9CR6-044052	Cap,oil filter	
48	9CR6-044053	Deco cover, Recoil start	
49	9CR6-140001	Cover,Rack	
50	9CR6-101001	Cover， dashboard	

3 Maintenance and adjustment

MAINTENANCE INFORMATION

Operation Cautions

WARNING

• Engine exhaust contains poisonous carbon monoxide and can cause loss of consciousness resulting in severe injury or death.Never run an engine in an enclosed area

• Don’t perform the maintenance immediately after the engine stops,as the exhaust system and engine become very hot.Serious burns could result from the contact with the exhaust system or engine.Wear long-sleeved uniform and gloves to operate when necessary.

• Gasoline is highly flammable, therefore smoke and fire are strictly forbidden in the work place. Special attention should also be paid to sparks.Gasoline may also be explosive when it is vaporized, so operation should be done in a well-ventilated place.

• Don’t get pinched by the drive system and other rotational parts.

ATTENTION

Always put the vehicle on level ground.

3.1 Maintenance Intervals

The maintenance of engine is a regular work. It is very important to have the periodic maintenance. Careful periodic maintenance will assure your vehicle having a good performance., reliability, economy and durability. Details of 191R engine are expained in periodic maintenance chart below.:

ATTENTION：Maintenance intervals in the following chart are based upon average ridir conditions.Vehicles subjected to severe use must be inspected and serviced more frequently.

A：Adjust C：Clean I：Inspect L：Lubricate R：Repalce	10 h or 300 km	20 h or 750 km	Every 50 h or 1500 km	Every 100 h or 3000 km or 1 year	Every 200 h or 6000 km or 2 years	Remarks
Engine						
Engine oil and filter		R		R		
Valve clearance adjustment		I，A		I，A		
Engine sealing	I			I		
Engine mounting	I			I		
Air filter		C	R			
Coolant		I	I		R	
Radiator cap, cooling system pressure	I				I	
Spark plug		I		I	R	
Fuel system						
Throttle body	I			I，L		
CVT						
Belt			I	R		
Drive and driven pulley				I，C		
Clutch				I		

3.2 MAINTENANCE PROCEDURE

○: Maintenance interval

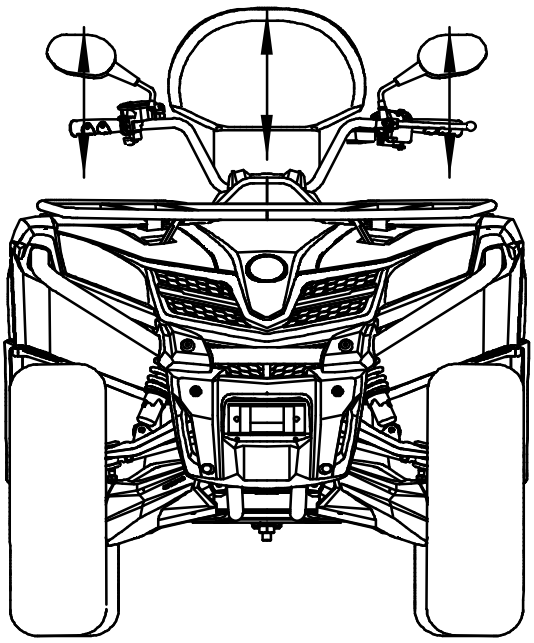
Inspection item			Maintenance interval			Criteria
Task		Inspection item	Daily	Every 6 months	Yearly	
Steering system	Handle bar	Agility	○			
	Steering system	Damage	○			
		Installing condition	○			
		Free play of ball joint pin	○			
Brake system	Brake lever	Free play	○	○		
		Braking performance	○	○		
	Brake lines&fittings	Looseness&damage	○		○	
	Brake fluid&disc	FR&RR brake fluid level	○	○		Brake fluid should be between “Lower” and “Upper”
		Brakedisc& pads wear&damage	○	○		If front brake disc thickness is less than 2.5mm or rear brake disc thickness is less than 4mm ,replace the disc
Running Device	Wheel	Tire pressure	○	○		Front tire：56kPa（0.56kgf/cm^2） Rear tire：42kPa（0.42kgf/cm^2）
		Crack&damage	○		○	
		Tread depth&abnormal wear	○		○	Tread depth should be more than 3.0mm.
		Looseness of wheel nuts&axle	○	○		
		FR wheel bearing free play	○		○	
		FR wheel bearing free play	○		○	
Suspension Device	A-arm	Free play&damage	○		○	
	Shock	Leaks&damage	○		○	
		Function			○	
Transimission Device	FR Diff	Drive&lubrication	○		○	
	FR gearcase	Drive&lubrication	○		○	
	Gearcase/Diff	Leaks&oil level	○		○	Keep the oil level even with the bottom threads of fill plug hole.

Check item			Check interval			Criteria
Component		Item	Daily	Every 6 months	Annually	
Drive system	Drive axle	Connection looseness	○	○		
		Free play of splines			○	
Electricals	Ignition	Spark plug conditions		○		Spark plug clearance：0.8mm~0.9 mm
		Ignition timing		○		
	Battery	Connections of terminals			○	
	Wiring	Connections and looseness			○	
Fuel system		Fuel leakage		○		
		Throttle conditions			○	Throttle grip free play: 3mm~5mm
Cooling system		Coolant level	○	○		
		Leakage			○	

Check item		Check interval			Criteria
Component	Item	Daily	Every 6 months	Annually	
Lighting and indicators	Function	○	○		
Alarming and locking system	Function			○	
Dashboard	Function			○	
Exhaust and muffler	Looseness and damage			○	
	Function			○	
Frame	Looseness and damage			○	
Others	Lubrication conditions in other			○	
Components with recognizable abnormal damage in operation	Check if the suspect components are normal	○			

3.3 Steering column, braking system

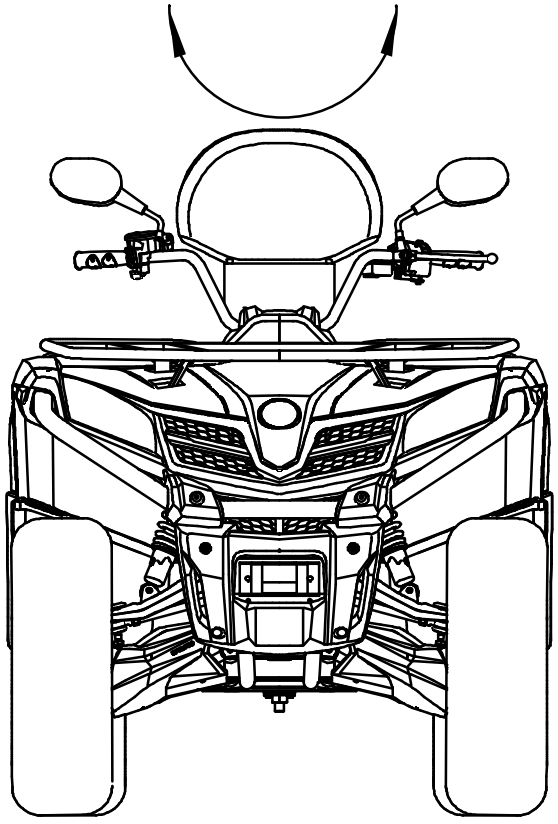
Place the vehicle on a level surface. Hold the handlebar as illustrated in the figure. Check for the free play.



If a free play is found, determine wether the free play is from handlebar or other components and do repairs when necessary.

If handlebar has free play, tighten the steering column locking nut or remove the steering column to do further inspection and repairs.

Place the vehicle on a level surface. Turn the handlebar slowly and check for smoothness. If any binding is checked at any point, check the handlebar interference with main harness and cables. If the handlebar doesn't interfere with harness and cables, check the ends of steering rod for interference with other parts and to see the steering bearing is damaged.



CAUTION: Always check the steering smoothness. The vehicle may be out of control and result in accident with faulty steering.

Front brake lever free play:

Operate front brake lever. Check for brake performance and free play.

Front brake master cylinder

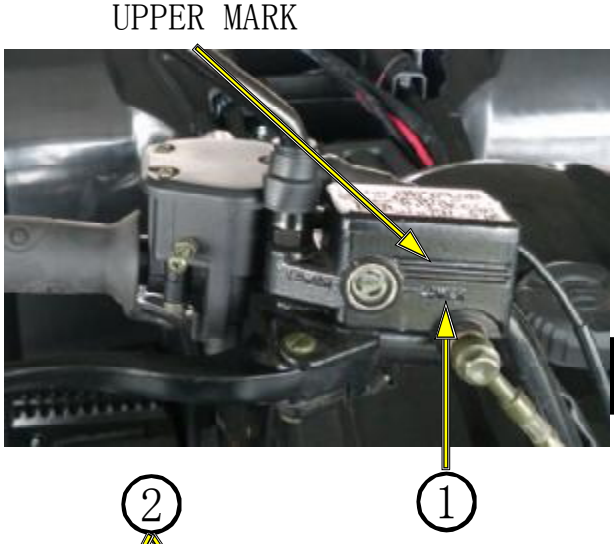
(Fluid level)

Check the brake fluid level.

Check the leakage of master cylinder,brake line and connections for leakage when brake fluid level is at LOWER mark.

Remove the 2 brake fluid reservoir screws 2. Remove brake fluid reservoir cover.

Add DOT 3 or DOT 4 brake fluid to UP-PER mark.

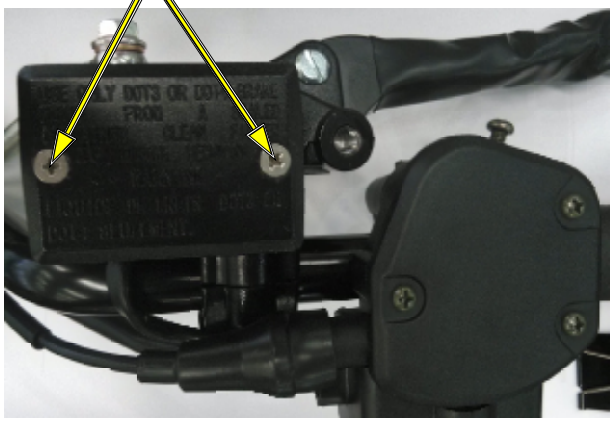


žNo dust or water entrance when adding brake fluid.

žTo avoid chemical changes, always use specified brake fluid.

žDo not splash brake fluid on plastics and rubber as it will damage them.

žMove the handlebar to left or right to keep the master cylinder lever prior to the reservoir cap removal.



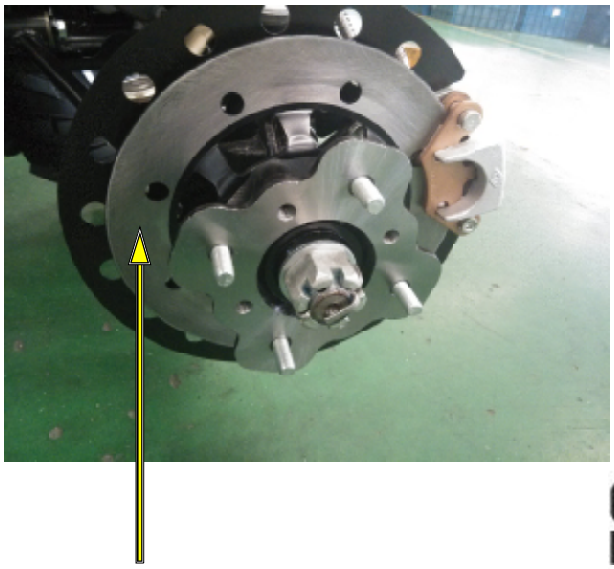
Brake disc, brake pads

(Brake pads wear)

Check the brake pads wear from the marked place. If the wear reaches the service limit, replace the brake pads.

NOTE

Always replace brake pads in a set.



Brake disc inspection and replacement

Check the brake disc sliding surface for wear and tear. When front brake disc thickness =2.5mm, replace the brake disc.

Front brake disc thickness service limit: 2.5mm

BRAKE FLUID

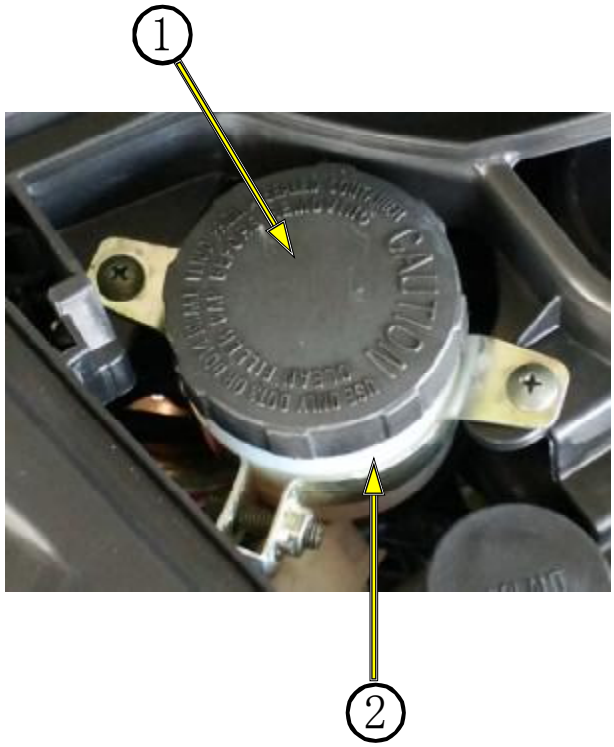
(Brake fluid change)

Change the brake fluid every year.

Rear brake master cylinder
(Fluid level)

Check the rear brake fluid level
Check rear master cylinder, brake line and connections for leakage when rear brake fluid level reaches LOWER mark. Remove the rear brake reservoir cover 1. Add DOT3 or DOT 4 brake fluid to UPPER mark.

*No dust or water entrance when adding brake fluid.
*To avoid chemical changes, always use specified brake fluid.
*Do not splash brake fluid on plastics and rubber as it will damage them.



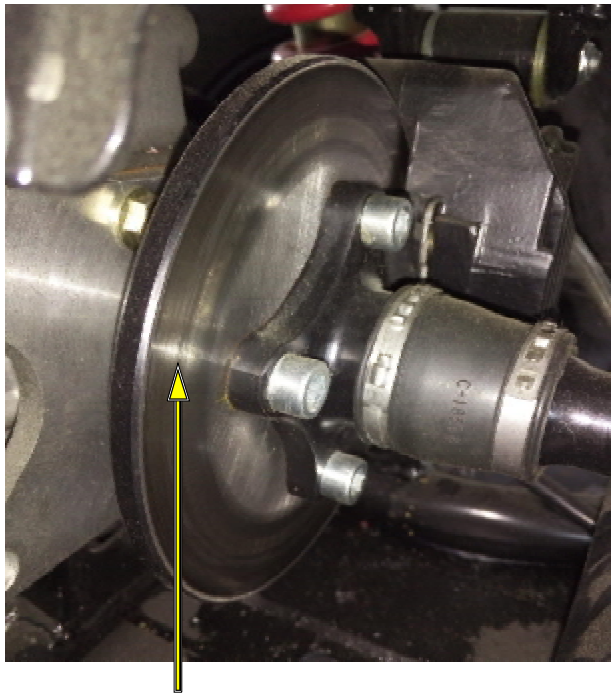
Brake disc,Brake pads
(Brake pads wear)

Check the brake pads wear from the marked place. If the wear reaches the service limit, replace the brake pads.

NOTE:
Always replace brake pads in a set.

Brake disc inspection and replacement
Check brake disc 3 sliding surface for wear and damage. When the rear brake disc thickness≤ 4mm, replace the brake disc.

Rear brake disc thickness service limit：
4 mm



Rear Disc

Brake fluid
(Brake fluid replacement)

Replace brake fluid every year.

3.4 Wheels

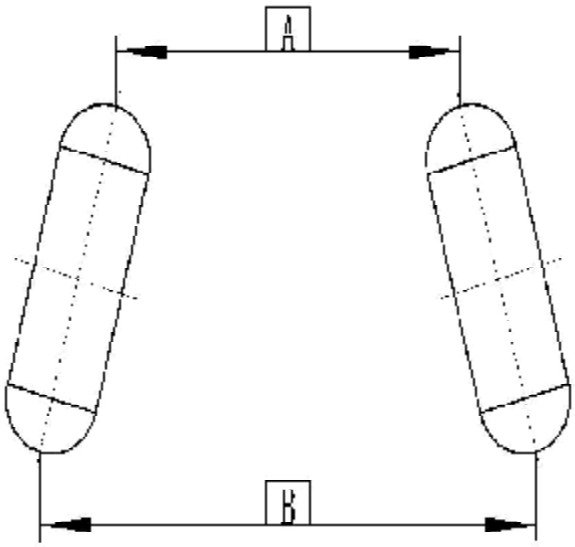
Lift the front part of the vehicle.

Ensure there is no any force exerted on the wheels. Push and pull front wheels to check if they are mounted firmly and without any play.

Check and tighten the bolts and nuts of swing arms, axles and rims

If the play remains, inspect and replace the bearing, swing arm bushings and ball end pin

Front wheel toe-in



Place the vehicle on a level surface and measure the front wheel toe-in.

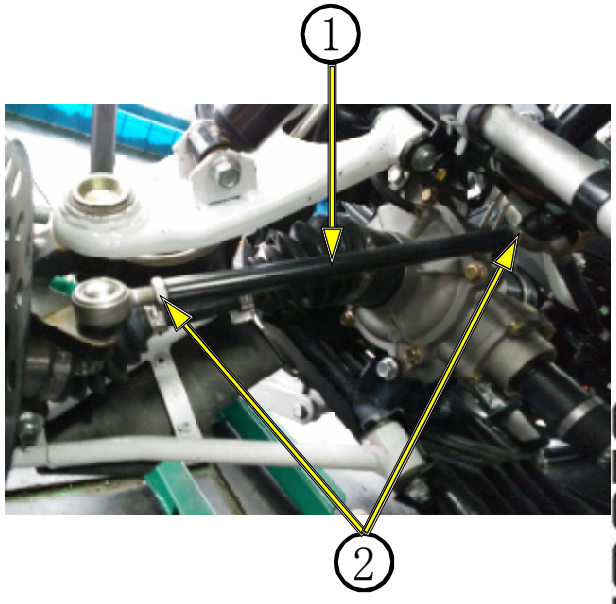
The distance between the leading edges of the front wheels: A

The distance between the trailing edges of the front wheels:B

Toe-in:B-A=4mm~10mm

If the toe-in is out of specification, adjust the locking nut 2 of the steering rod 1.

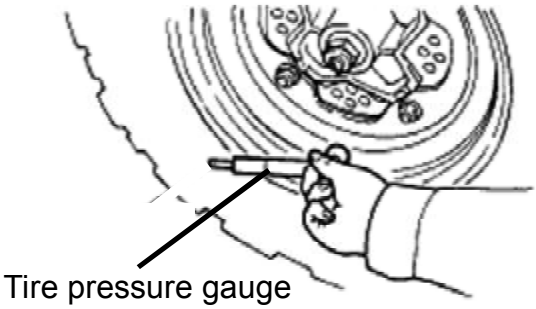
CAUTION: Drive the vehicle slowly after toe-in is adjusted and ensure that the being can control the vehicle properly.



Tire pressure

Check the tire pressure using atire pressure gauge.

CAUTION: Measure tire pressure when the tire is cold. Maintain proper tire pressure. Improper inflation may affect ATV maneuverability, comfort, or uneven wear to different tires.



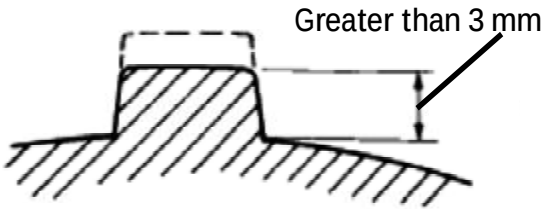
Specified tire pressure/tire

	Front wheel	Rear wheel
Pressure	56kPa (0.56kgf/cm^2)	42kPa (0.42kgf/cm^2)
Tire size	See chapter 1	See chapter 1

Tire tread

Check the tire tread.Replace the tire when tread depth is less than 2 mm.

NOTE:When tire tread depth is less than 3 mm, replace the tire immediately.



Wheel nuts and axles

Check front axle, rear axle nuts 1 and lock pin for looseness. Tighten the axle nuts to specified torque when loose.

Torque:

Front axle nut：320 N·m ~350 N·m
(32. 65 k g f·m~35 . 7 k g f·m)
Rear axle nut:320 N·m~350 N·m
(32 . 65 k g f·m~35. 7 kg f·m)

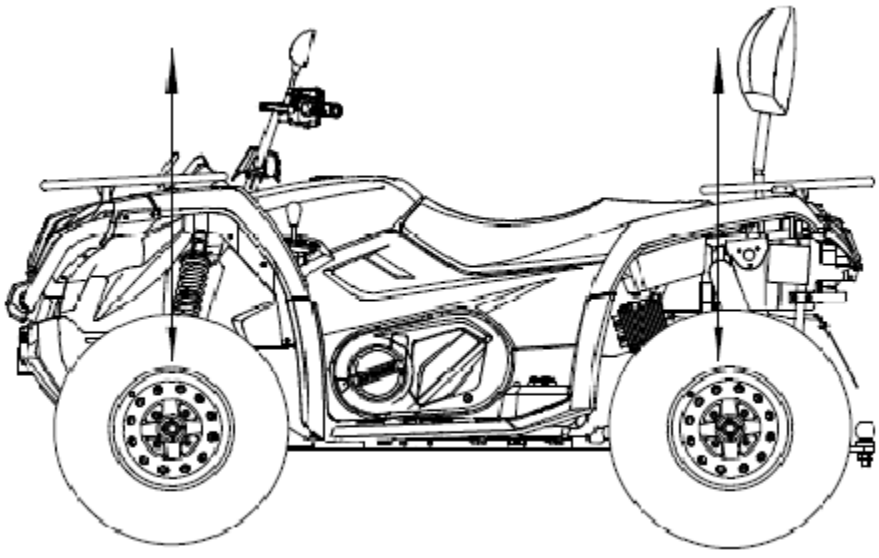
Wheel bearing play

Lift the front part of the vehicle. Ensure that there is no any force exerted on the front wheels. Push and pull the wheel in axle direction.

If any play is detected, remove the front wheel to check the wheel bearing.

3.5 Suspension system

Place the vehicle on a level surface.
Press the vehicle in the illustrated direction as showing in the right figure for a few times.
If there is play or abnormal noise, check the shocks for damping oil leakage and the connections for looseness.

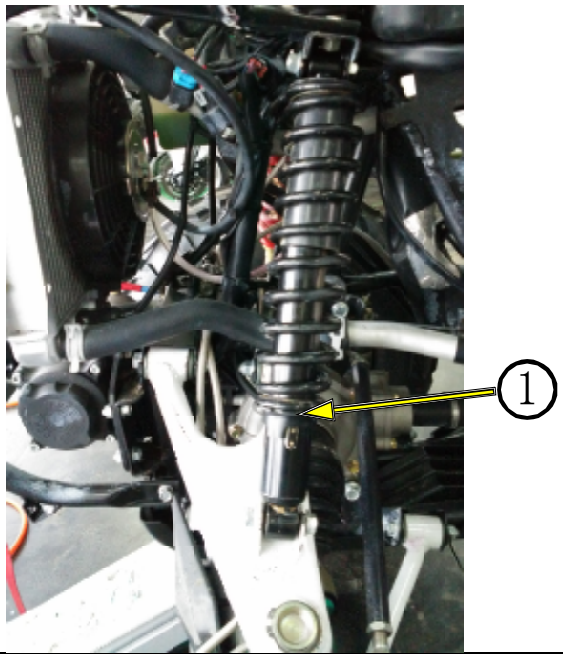


Suspension adjustment

Using a tool, adjust the spring cam 1 to adjust the shock preload.

Turn the cam clockwise to lower the cam and turn the cam counterclockwise to lift the cam. This vehicle has a few shocks for customers' option.

This shock is the regular figuration. Refer to 3.10 for other shocks' adjustment.

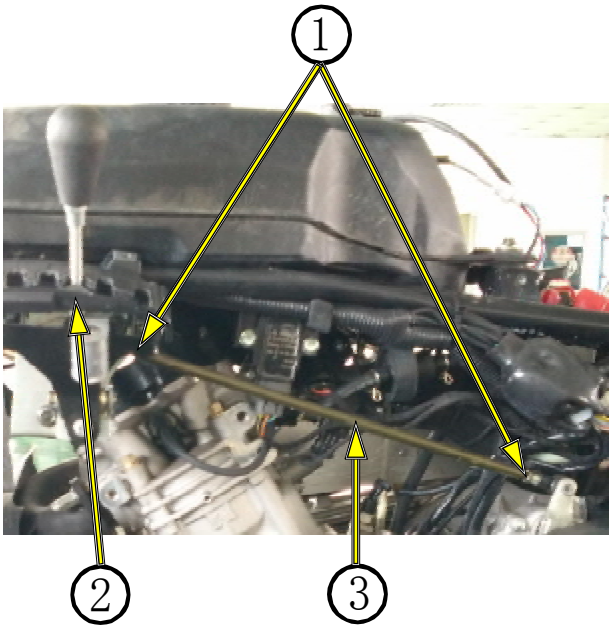


3. 6 Shift linkage, fuel system

Shift linkage

Shift to check the shift linkage 2 for smoothness and gear engagement. If shifting is not smooth, adjust the length of shift rod.

Loose the locking nut 1 and adjust the length of shift rod.



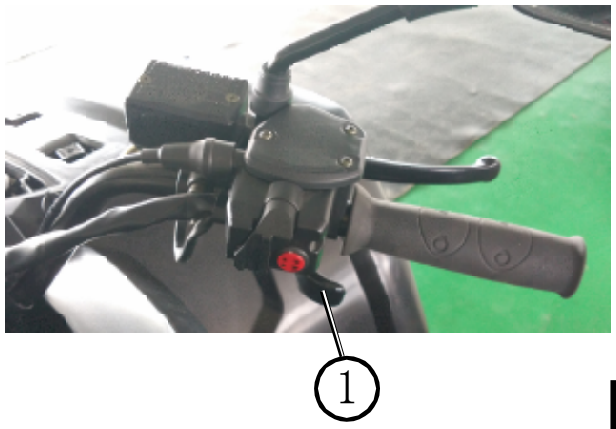
Fuel system

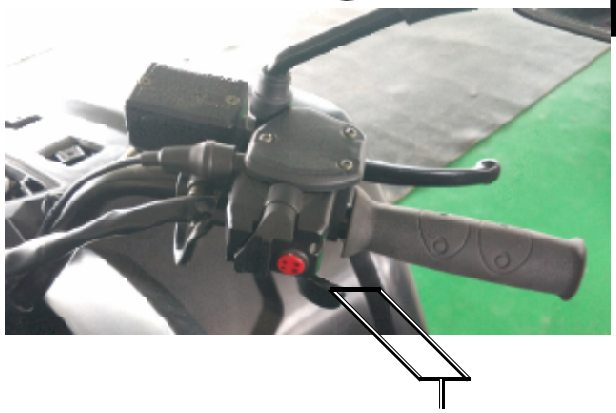
Fuel system conditions

Remove the seat (→ 2-3)

Check the fuel line for aging, damage. If fuel line is aged and damaged, replace the fuel line with new one. Check fuel tank breather hose or EVAP hose for cracks, kinking. If they are damaged, replace with new ones.

3.7 Throttle inspection



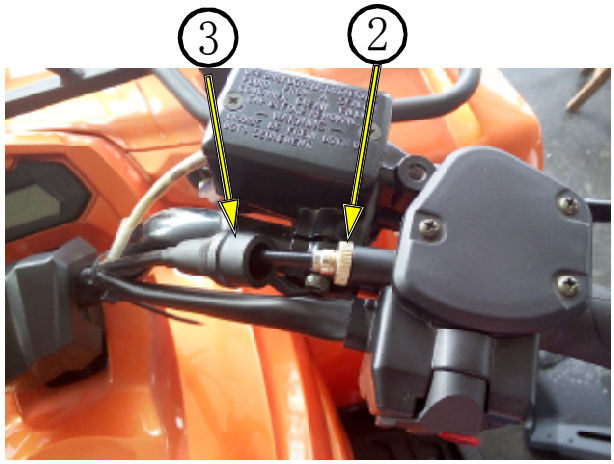


Check the throttle lever 1 for free play

Free play:3mm~5mm

If the free play is out of specification, adjust the free play.

Slide out the sleeve 3. Loose the throttle cable locking nut 2. Turn the adjuster to adjust the throttle lever free play. Lock the locking nut 2 after adjustment. Slide back the sleeve 3. If the free play is still not within the specification or throttle cable is binding at some point, replace with new throttle cable.



Speed limiter

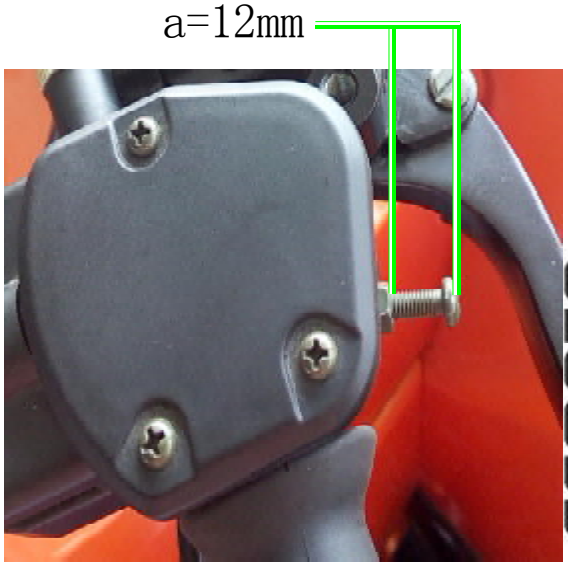
Speed limiter is designated to limit the opening of throttle valve. Check the speed limiter maximal threads length.

Threads maximal length:a=12mm

Adjustment procedure:Loose the locking nut.Using a cross screw driver,adjust the length of the speed limiter screw.

NOTE:Speed limiter screw should be turned in all the way for beginners. Only adjust the speed limiter when driving skills reach a certain level.

In addition, 12 mm is the maximal length of the speed limiter. Basically the speed limiter screw length is adjusted to be 3mm~5mm.



3.8 Cooling system

CAUTION

*Check the coolant level in reservoir tank. If the radiator cap is removed when en gine is hot（above 100℃), the pressure in cooling system would decrease sharply. Therefore radiator cap must be removed when coolant temperature is down.

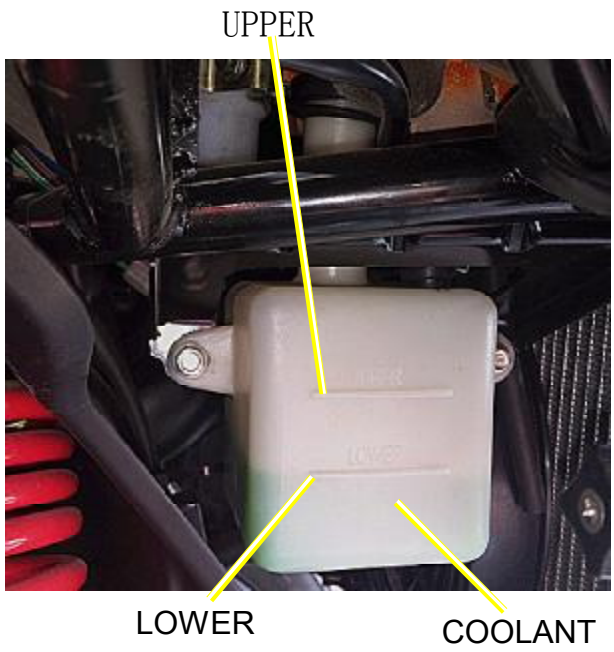
*Coolant is toxic. Don't drink nor spill on skin, eyes,clothing.

* If you spill coolant on your skin or clothing, immediately wash it off with soap.

* If you get coolant in your eyes, immediately wash it off before medical attention.

* If you swallow coolant, immediately spit it out and gargle before medical attention.

Coolant must be kept out of reach of children.



Coolant level

Coolant would decrease due to evaporation, etc. Inspect coolant level periodically.

NOTE

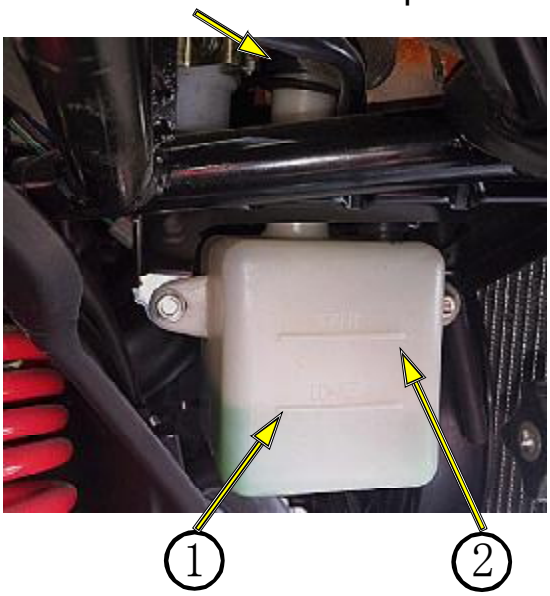
- **Coolant is anti-rust and anti-freezing. Using tap water will rust the engine, and may crack the engine when it's freezing.Thus, Always using specified coolant is better.**
- **Position the vehicle on a level ground before cooling system inspection.**
- **Start the engine and warm it up before inspecting the cooling system.**

Start the engine and warm it up. Shut off the engine.

Check the coolant level in reservoir tank. Ensure that the level is between "LOWER" and "UPPER".

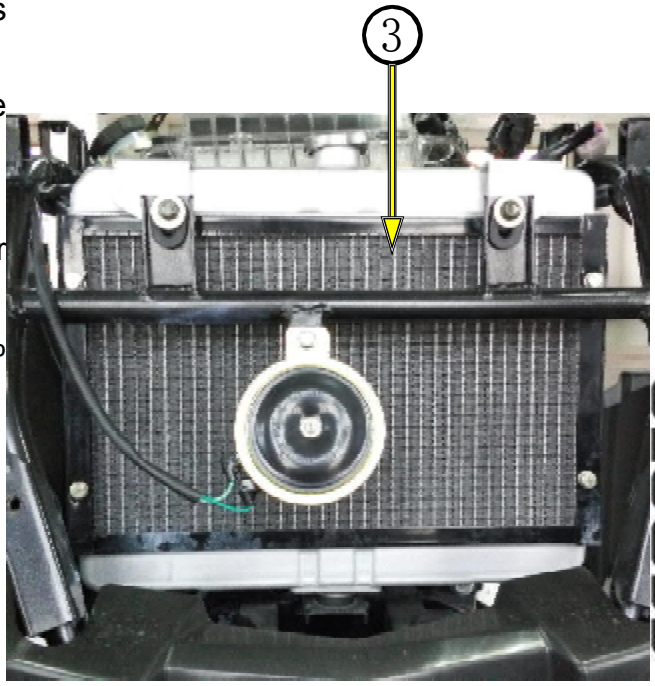
When coolant level is lower than the “LOWER” mark 1, remove the reservoir tank cap and add coolant to “UPPER” mark 2. Recommended coolant: **Recommended Coolant: CFMOTO premixed coolant. Standard Mixture Ratio: 50% (The freezing temperature varies according to the mixture ratio.**
Adjust the mixture ratio according to freeze protection required in your area.)

Reservoir tank cap



When coolant is reduced significantly, check the cooling system for leaks. If no coolant remains in the reservoir tank, there may be air in the cooling system. Purge the cooling system of air.

Coolant Leakage
Inspect radiator, water pump, coolant hoses and connections for leaks.
If any leaks are found, repair the cooling system (→ 4 .4).
Check radiator hoses for aging,damages and cracks.
Hoses ages over time due to special working conditions and may crack.Bend a hose to check for cracks.If any damages or cracks are found,replace it with a new hose.
Check coolant hose clamps and tighten the loose ones.
Check radiator fins for mud or damages.
Correct the fin bending. Use tap water or compressed air to clean off the mud.
The radiator should be replaced when 20% fins are damaged.



3: Coolant Radiator

Checking the coolant temperature gauge

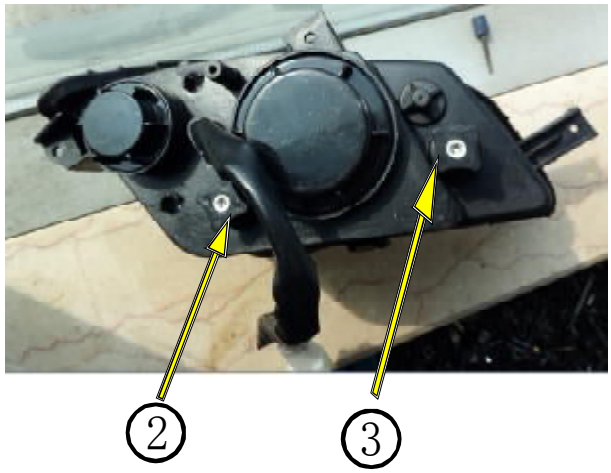
Coolant gauge indicator should point to 0 position when engine is not started. Coolant temperature varies after the engine is started. If the coolant temperature doesn¡¯t vary, a further inspection should be taken in time.

3. 9 Lighting system

Headlight aiming

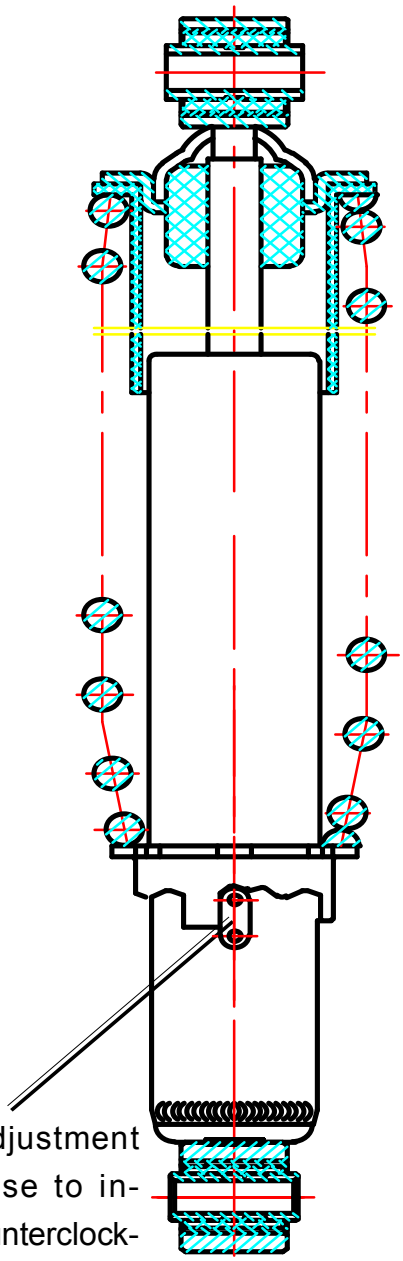
Remove the headlight cover (→ 2. 6 .3). (take left headlight for example)

Using a cross screwdriver or wrench, adjust the headlight aiming up and down or left and right.



3.10 Optional front shock absorber

View of the optional front shock



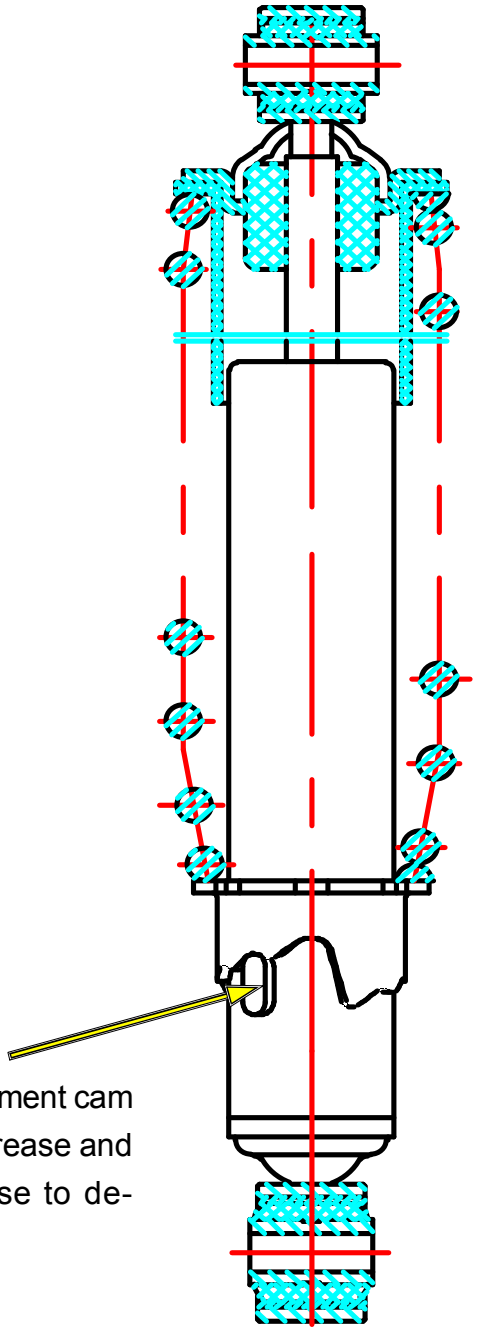
Spring preload adjustment cam Turn clockwise to increase and turn counterclockwise to decrease spring preload.

Adjustment of optional front shock

Spring preload adjustment: Remove the inner hex bolt, Loosen the locking nut 1, Turn to adjust shock spring preload to requirement. Tighten the locking nut 1.

NOTE: The left and right shock absorber should have the same setting.

View of optional rear shock



Spring preload adjustment cam
Turn clockwise to increase and turn counterclockwise to decrease the preload.

Adjustment of optional rear shock 2

Spring preload adjustment: Remove the inner hex bolt, Loosen the locking nut 1, Turn to adjust shock spring preload to requirement. Tighten the locking nut 1.

NOTE: The left and right shock absorber should have the same setting.

4 Engine Surroundings

Service information

Operation cautions

- **Ensure that the repair is carried out at least 1 hour later after the engine is shut off. To avoid burns to mechanics. repair it after hot parts cooling down.**
- **Do not damage frame, engine, bolts and wiring.**
- **To protect frame, wrap the frame before engine removal and installation.**
- **To protect environment, using a container to collect coolant, engine oil, fuel after engine is removed. Add coolant, engine oil as per the requirements when installing the engine.**

The following operations can be completed without engine removal from chassis:

- oil pump
- thermostat, air filter
- Cylinder valve cover, cylinder head, cylinder, camshaft
- CVT case cover, CVT system
- Left engine cover, AC magneto, water pump
- piston, piston rings, piston pin

The following operation should be carried out with engine removed from chassis:

- crankshaft

Tightening torque

Rear engine mounting bolts	GB5789 M12 × 1.25 × 170	(60～70)N・m
Front engine mounting bolts	GB5789 M12 × 1.25 × 180	(60～70)N・m
Engine bracket mounting bolts	GB5789 M10 × 20	(40～50)N・m

4. 1 Fuel system

Removal

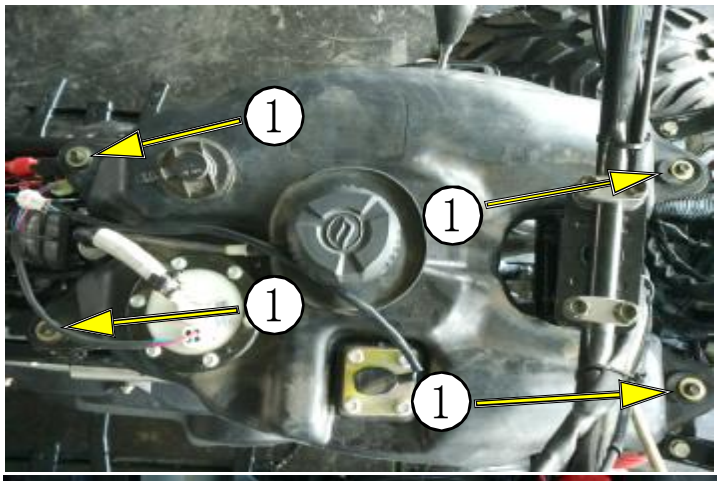
WARNING:

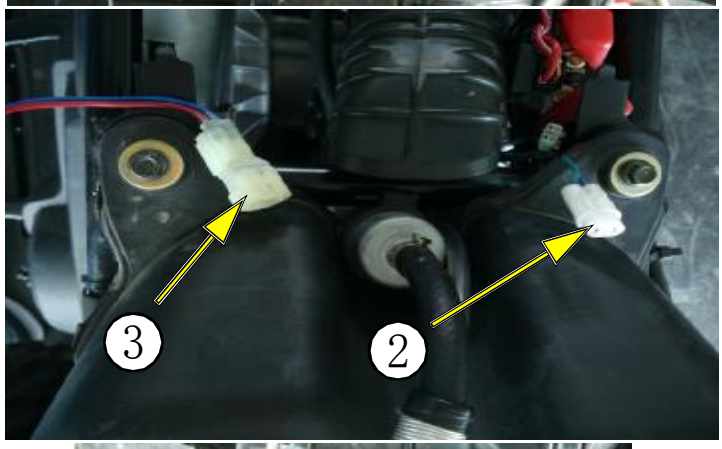
Gasoline is very flammable. Smoking and firing is forbidden in the operation area. Pay attention to not only open fire but also spark. Since gasoline vapor is explosive, always perform the service in a well ventilated area.

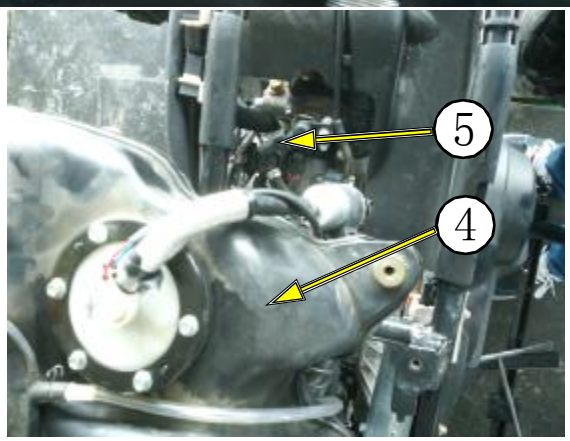
Remove the seat, fuel tank cover, dashboard cover, left side panel, right side panel (→Chapter 2 Body and Panels Remove the bolt 1. Disconnect the fuel level connector 2, Fuel pump connector 3. Move the fuel tank 4 aside.

Remove the fast snap-on connector 5.

Remove the fuel tank 4.







Installation

Reverse the removal procedures for Installation. Ensure that each connector Is fully engaged. Fast snap-on connector Clicks when it¡¯s engaged properly. Check each hose for integrity during installation.

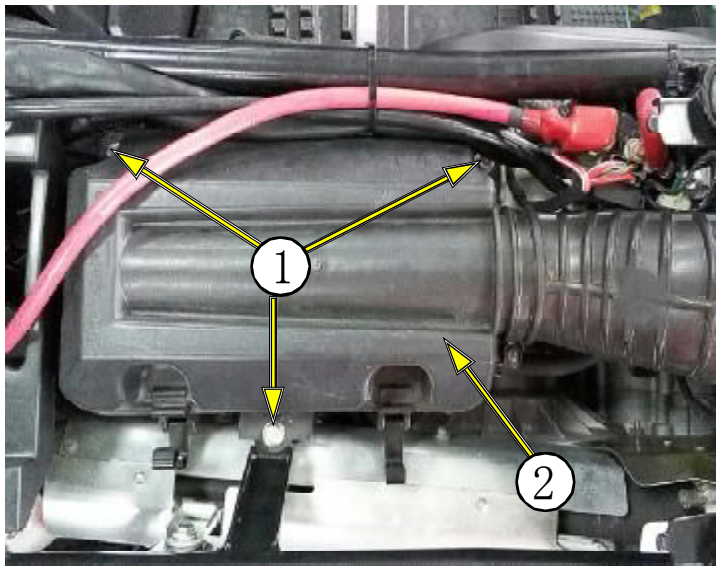
4.2 Intake system

Removal

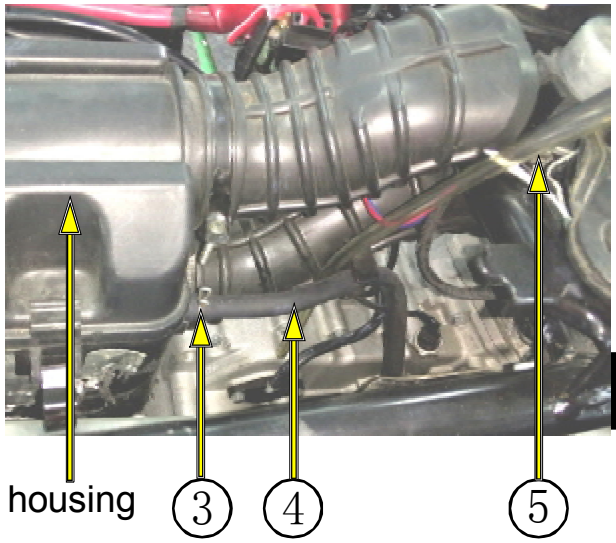
Remove the seat (Chapter 2 Body and Panels).

Remove the 3 bolts 1.

Remove the air filter housing 2. (Air filter can be cleaned or replaced, refer to （→ 3.1) Maintenance Interval Determination for the frequency.)



Remove the fuel tank(→4.1 fuel tank removal and installation)
Remove the clamp 3.
Remove the breather hose 4.
Loose the clamp 5.
Remove the air filter box.



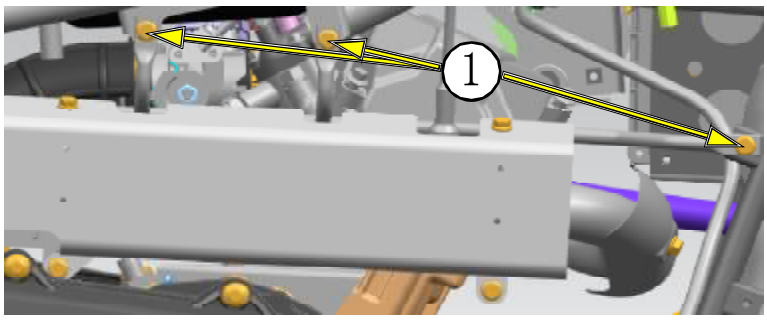
Installation

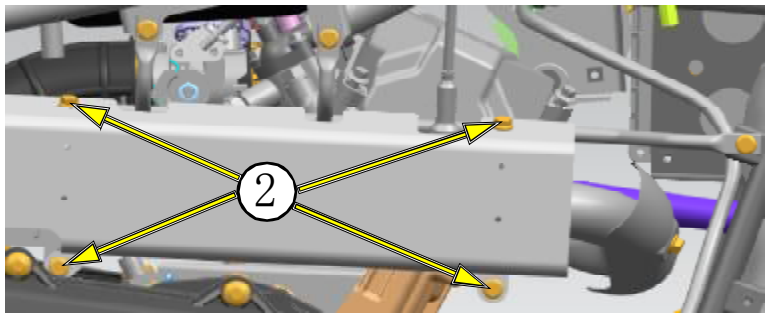
Reverse the removal Procedures for installation.

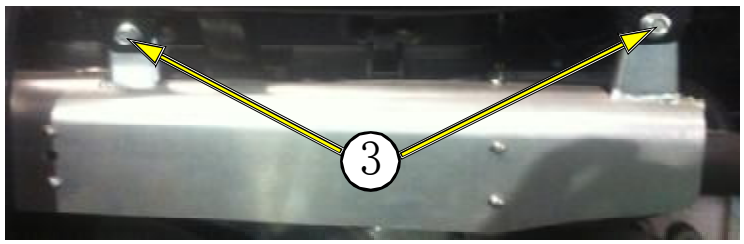
4.3 Exhaust system

Removal

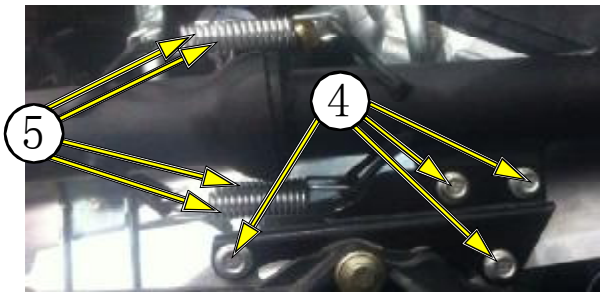
Remove the seat, fuel tank cover, dashboard cover, right side panel(Chapter 2 Body and Panels) Remove the 3 bolts 1.
Remove the exhaust Pipe heat shield.



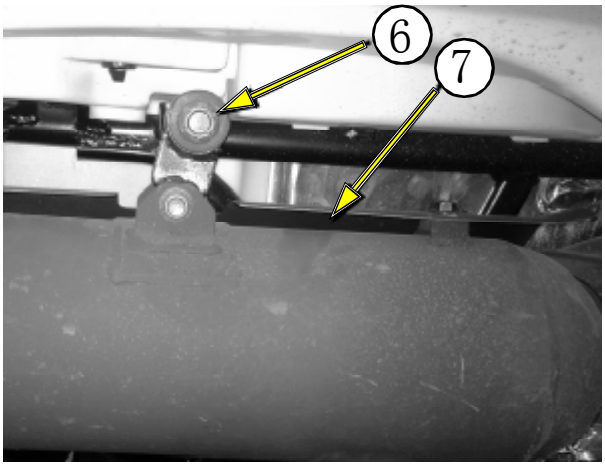




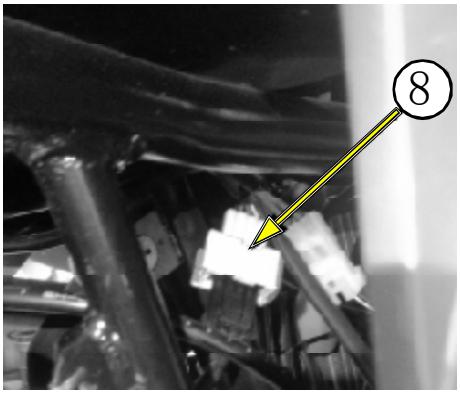
Remove the 4 bolts 4.
Remove the exhaust head pipe bracket.
Remove the exhaust pipe springs 5.



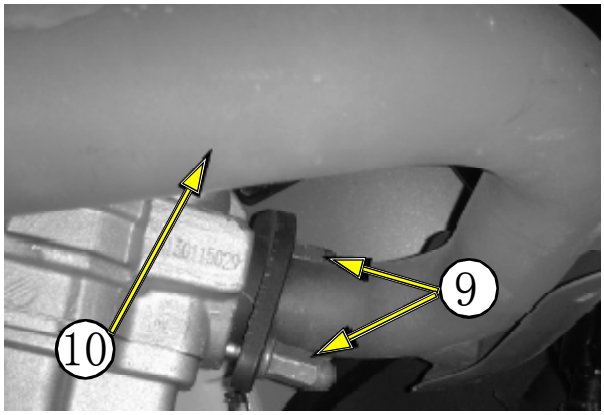
Remove the bolt 6.
Remove the silencer 7.



Disconnect the oxygen sensor connector 8.



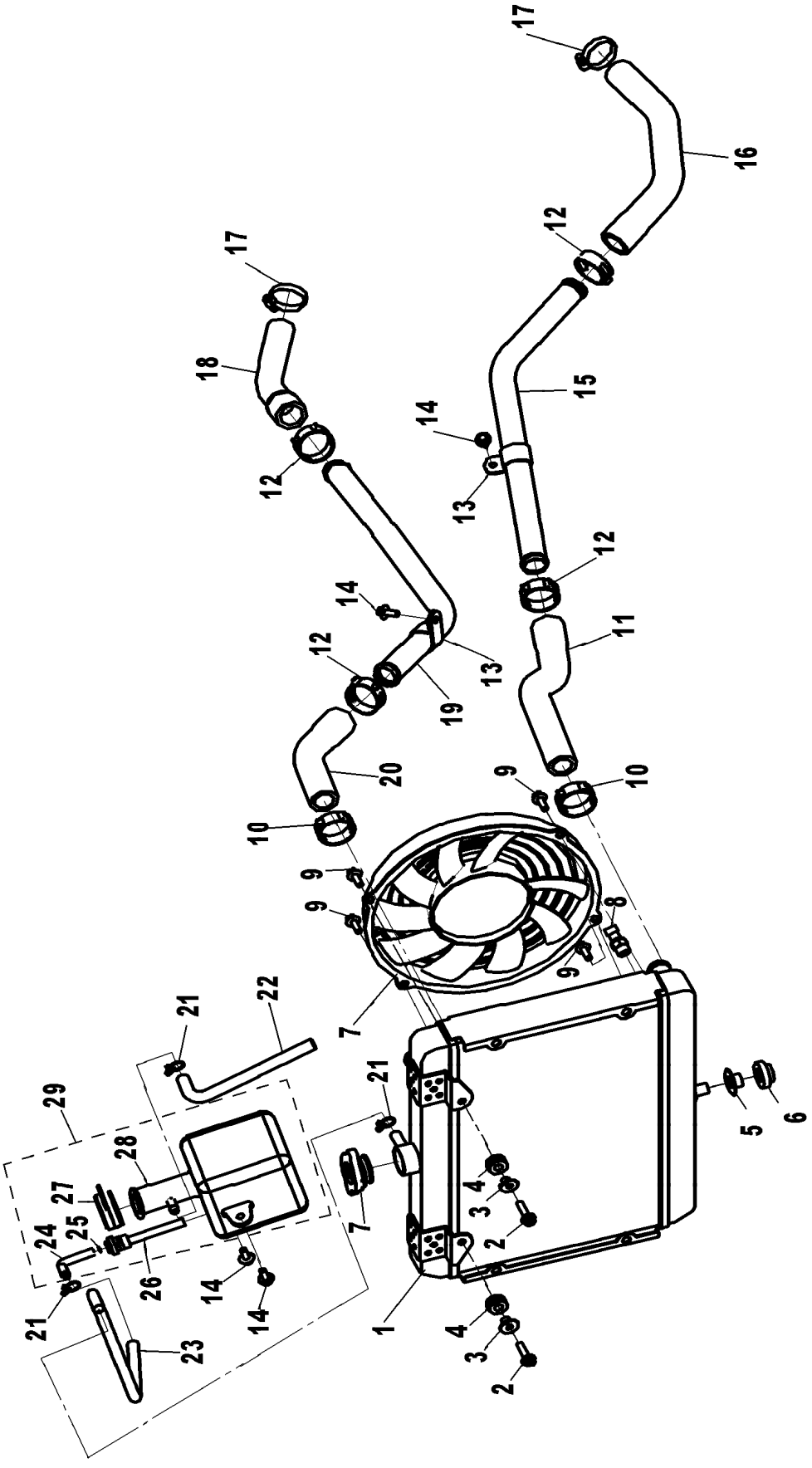
Remove the head pipe nuts 9.
Remove the head pipe 10.



Installation

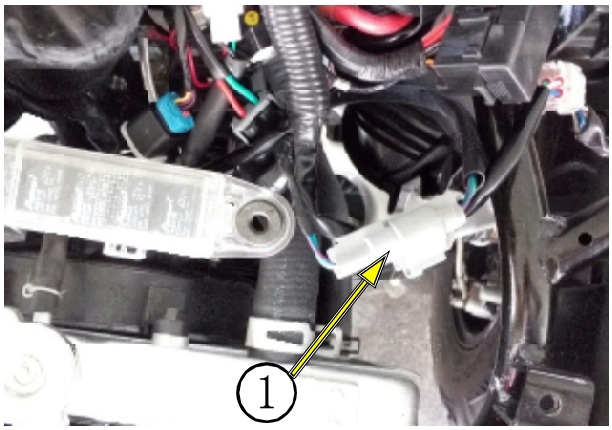
Reverse the removal procedures for installation. Check the exhaust gasket for sealing function during installation process. Move the vehicle to a well ventilated area to run the engine for at least 0.5 hour to allow the anti-rust oil to evaporate completely.

4.4 Cooling sysytem



Removal

Remove the seat, fuel tank cover, dashboard cover, left side panel, left headlight cover (→Chapter 2 Body and Panels) Disconnect the fan motor connector 1.



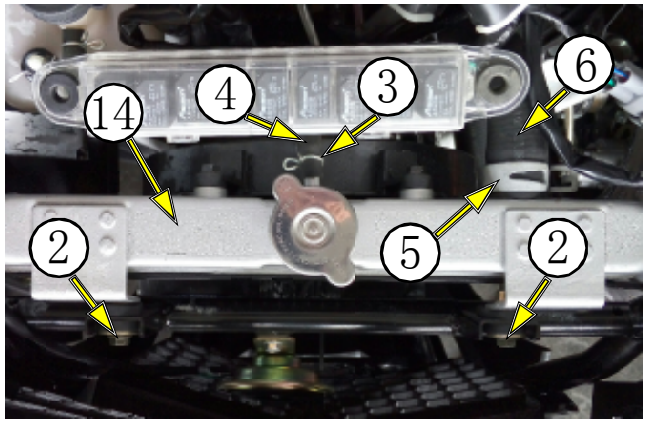
Remove the 2 bolts 2.

Loosen the clamp 3.

Detach the reservoir tank hose 4 from the radiator cap.

Loosen the clamp 5,

Detach the radiator inlet hose 6 from the radiator. .



Remove the bolt 8.

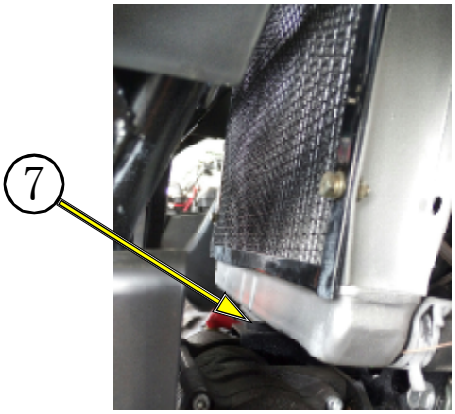
Remove the reservoir tank 9.

Loosen the clamp 10.

Disconnect the thermal sensor connector 11 and detach the radiator outlet hose 12 from the radiator.

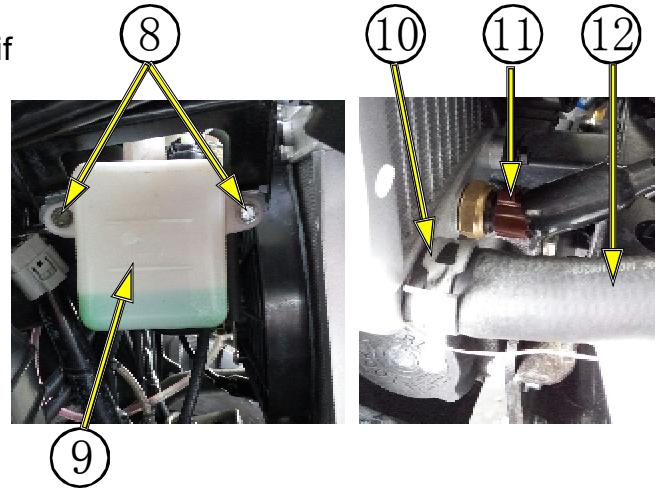
Remove the radiator lower rubber grommets 7

Remove the radiator 14 upwards.



Installation

Reverse the removal procedure for installation. Add coolant after installation if necessary.



Overview

WARNING

WARNING Do not start the engine without coolant. Otherwise the cooling system parts may be damaged.

Use the torque and service materials as per the exploded view.

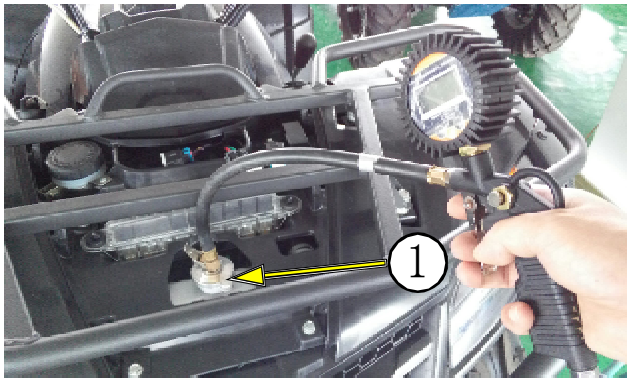
Inspection

Cooling system leak test

WARNING

To avoid potential burns, don't remove the Radiator cap or loosen the cooling drain plug if the engine is hot.

Remove the front rack, rack cover and radiator cap. Install the cooling system leak test cap（901- 18.01.00-922-001 ）. Use a pressure/vacuum pump to pressurize system to 103kPa(15PSI).



View

1. Cooling system leak test cap

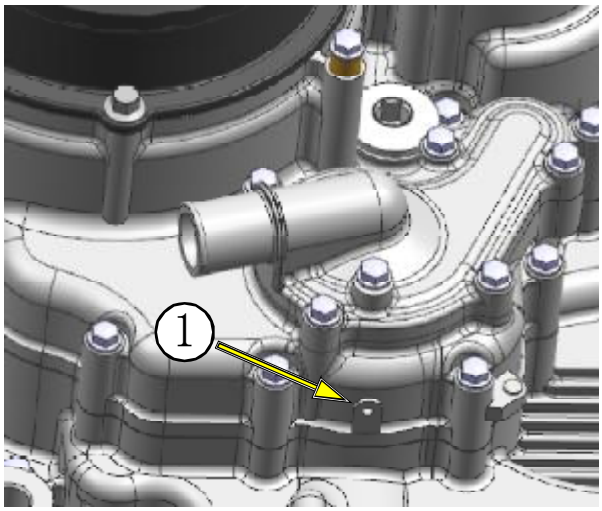
Inspection and replacement of cooling parts in the engine can be referred to the chapter in engine cooling system (→5.2. 9 cooling system inspection)

Inspection

Check general condition of hoses and clamps tightness.

Check the leak indicator hole if there is oil or coolant.

NOTE: Leaking coolant indicates a defective rotary seal. Leaking oil indicates a defective inner oil seal. If either seal is leaking, both seals must be replaced at the same time. Refer to WATER PUMP SHAFT AND SEALS in this section.



1. Leak indicator hole

Maintenance

Coolant replacement

WARNING

To avoid potential burns, don't remove the radiator cap or loosen the cooling drain plug if the engine is hot.

Use CFMOTO premixed coolant or a blend of 50% antifreeze with 50% water.

To avoid antifreeze deterioration, always use the same brand. Never mix different brands unless cooling system is completely flushed and refilled.

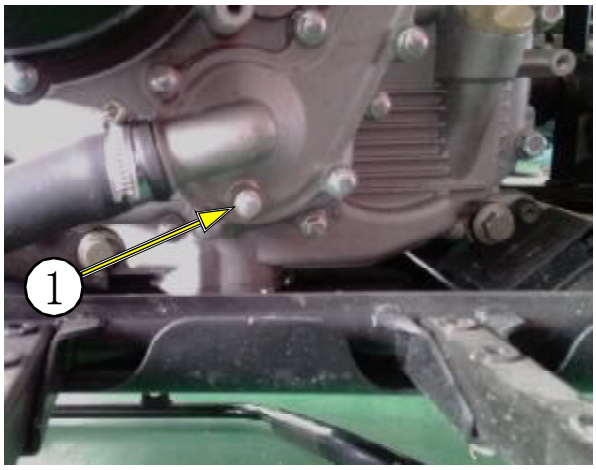
CAUTION: To prevent rust formation or freezing condition, always fill the system with the CFMOTO premixed coolant or with 50% antifreeze and 50% water. Don't use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system. During cold weather, straight water causes the system to freeze while straight antifreeze thickens and does not have the same efficiency. Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

Draining the system

WARNING

Never drain or fill the cooling system when engine is hot.

Remove the radiator cap. Partially unscrew cooling drain plug located below water pump housing. When cooling system is drained completely, remove coolant drain plug and install a new washer. Screw in the coolant drain plug and torque it to 10 **N • m** (89**lbf • in**)



Beside the LH foot rest

1. Coolant drain plug

Refilling the System

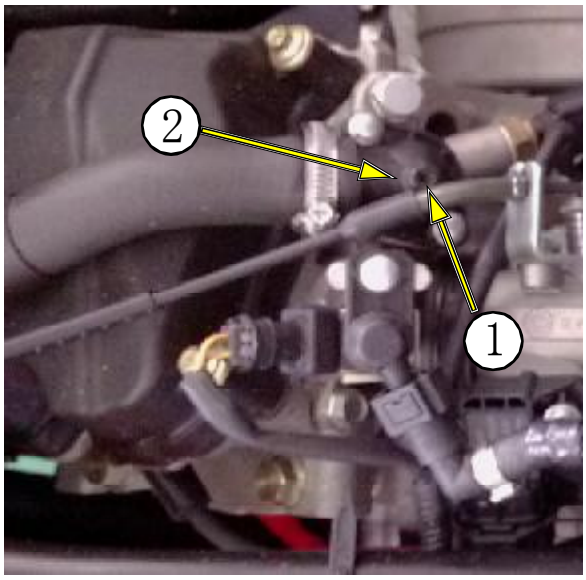
Remove related parts. Unscrew the bleeding screw on top of thermostat housing. With vehicle on a level surface, engine cold, refill radiator. When the coolant comes out by the thermostat housing hole, install the bleeding screw with its washer and torque to 5 **N • m** (44 **lbf • in**).

Fill up the radiator and install radiator cap.

Fill the reservoir tank and keep the coolant level even at “LOWER” mark, then install reservoir tank cap. Run the engine until thermostat opens, then shut off the engine. Recheck the coolant level in reservoir tank after the engine is completely cooled down. Refill coolant if necessary.

Maintain coolant level between “LOWER” and “UPPER”.

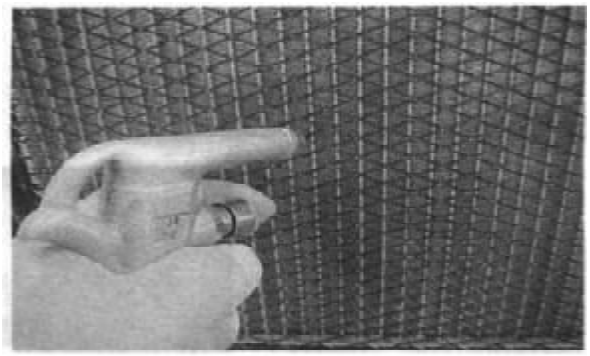
NOTE: Each year or every 100 hours or when vehicle reaches 3000km(1865mi), check coolant concentration (freezing point) with proper tester.



1.Bleeding screw
2.Seal gasket

Cooling system External parts inspection RADIATOR CAP

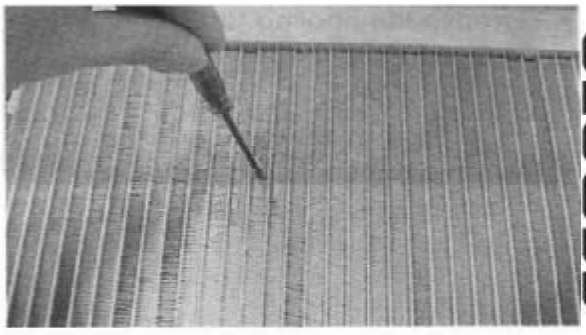
Using a pressure test cap to check the radiator cap working pressure. If the radiator cap working pressure is low, replace it with a new radiator cap with specified working pressure 110 kPa (16PSI)(don’t exceed this pressure) .



Radiator

Radiator Inspection

Check the radiator fins for obstruction or damage. Using compressed air or low pressure water, clean up the insects, mud or other obstruction.

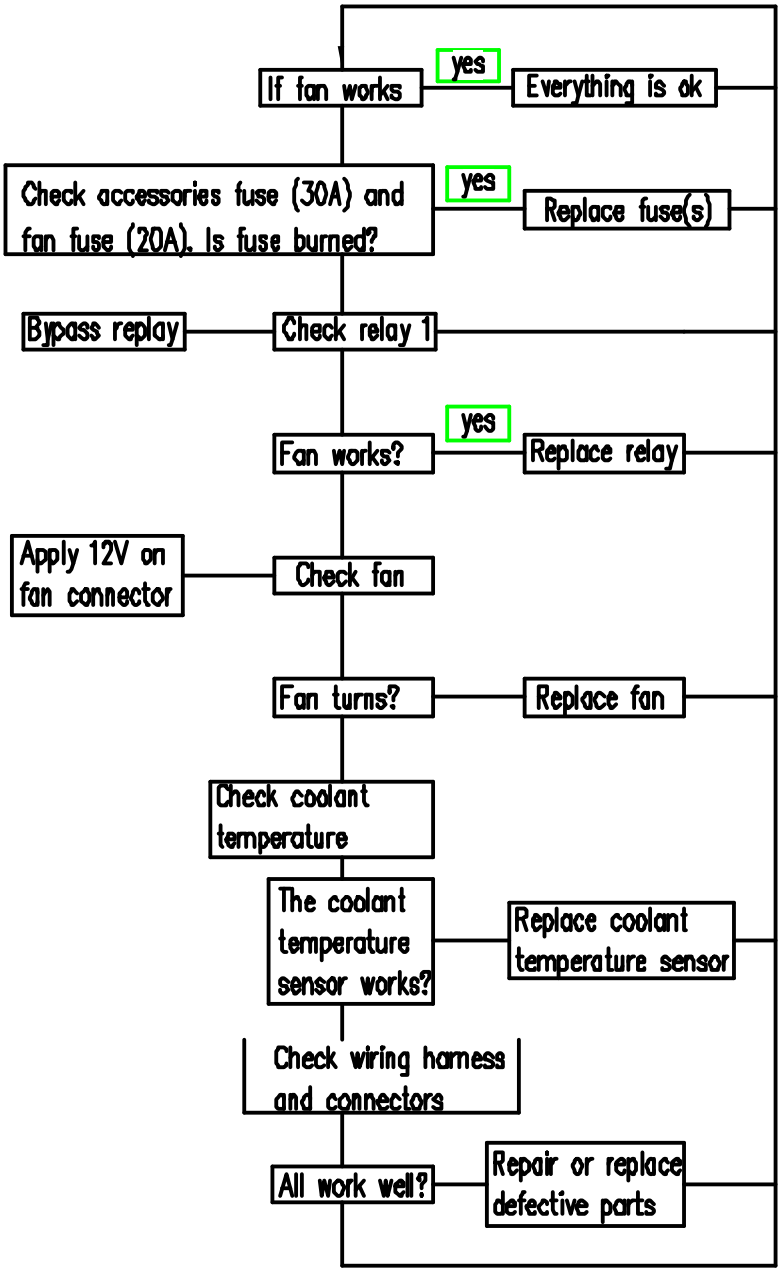


- Using compressed air or low pressure water to clean up the mud, sand and dirt on the radiator fins.
- Using a small screw driver, correct the radiator fins’ bending.

Checking the fan motor

Fan motor is controlled as per the thermal switch specifications. Fan motor starts to work when coolant temperature is at 88℃, while it stops working when coolant temperature decreases to 82℃.

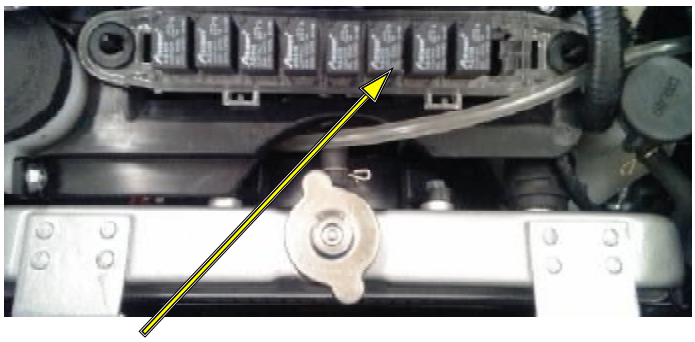
Troubleshoot the fan failure as per the right figure.



Fan relay

Fan relay installation

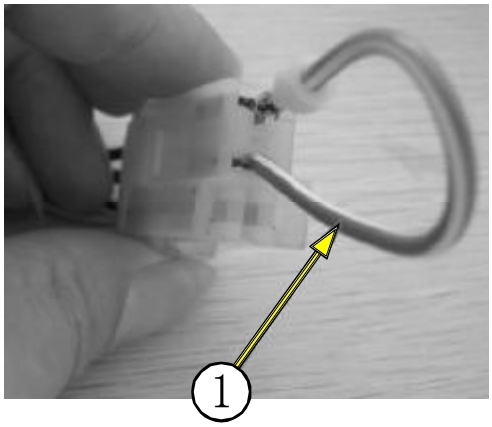
NOTE:Relay may be inverted by 180 at Installation and it will work correctly. Ensure to align tabs of relay with terminals of fuse holder at installation.



Fan relay

Relay operation test

The easiest way to check the relay is to remove it and bypass it with a jumper. If the radiator fan is activated,replace the relay. See illustration to find where to bypass the relay.



1：Bypass the Relay

Relay Continuity Test

Remove relay.

Use multimeter and select the position Ω.

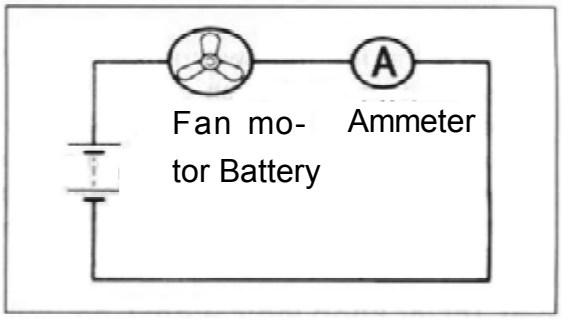
Probe relay as follows.

Terminals		Resistance
30	87	Open circuit (OL)

Probe relay

Checking the thermal switch

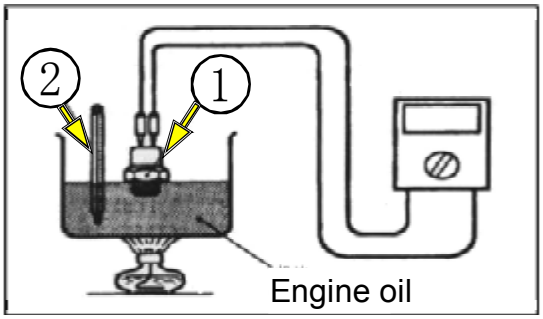
Remove the thermal switch. Check the open and close temperature of thermal switch as per right figure. Place the thermal switch ① in a container with engine oil filled. Heat the container slowly with an alcohol lamp and check the thermal switch open and close temperature by reading the thermometer ② measurements.



Thermal switch open temperature:

close - open approximate 88℃

open - close approximate 82℃



WARNING

Do not hit the thermal switch with hard objects. Otherwise, thermal switch could be damaged.Keep thermal switch away from the container.

Thermal switch installation£ºrenew the thermal switch O-ring and ③ tighten thermal switch to specified torque.

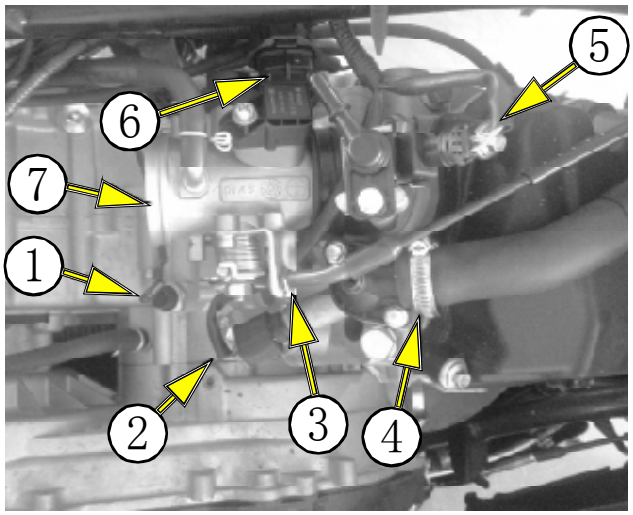
Thermal switch torque: 17N·m Check coolant level and add coolant if necessary after the thermal switch installation.

4.5 Engine removal and installation

Remove the seat, fuel tank cover, dashboard cover,left side panel, right side panel, left foot rest, right foot rest (→ chapter 2, body panels)

Remove fuel tank (→ 4.1 fuel system removal and installation).Remove air filter housing (→4.2 intake system removal and installation).

Remove muffler (→ 4.3 exhaust system removal and installation).



Disconnect the oil pressure sensor connector 1.

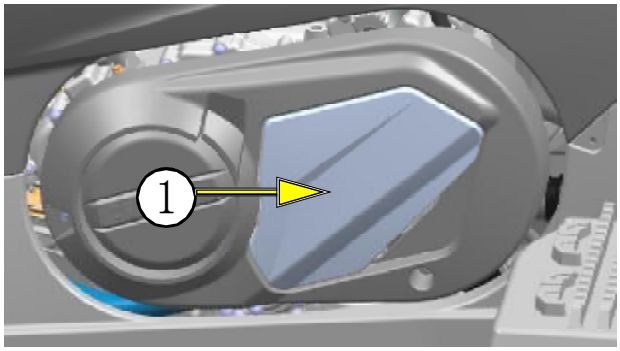
Disconnect the coolant temperature sensor connector 2.

Remove the throttle cable 3.

Loose the clamp 4 and disconnect the coolant hose from the engine.

Disconnect the intake air temperature/ pressure sensor connector 6.

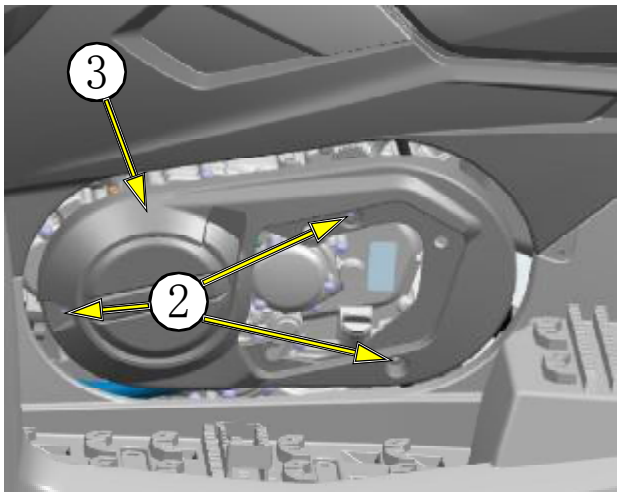
Remove throttle body 7.



Remove engine oil filler panel 1.

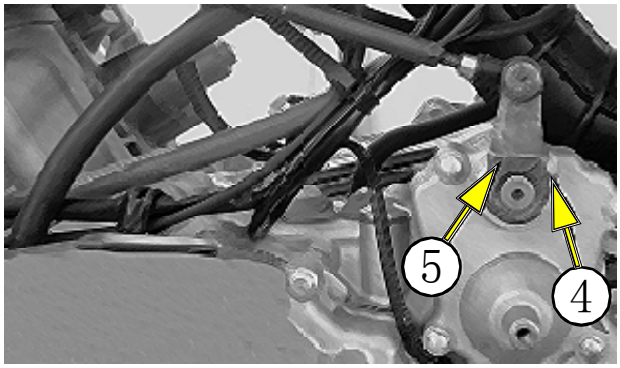
Remove the bolts 2.

Remove the engine left panel 3.

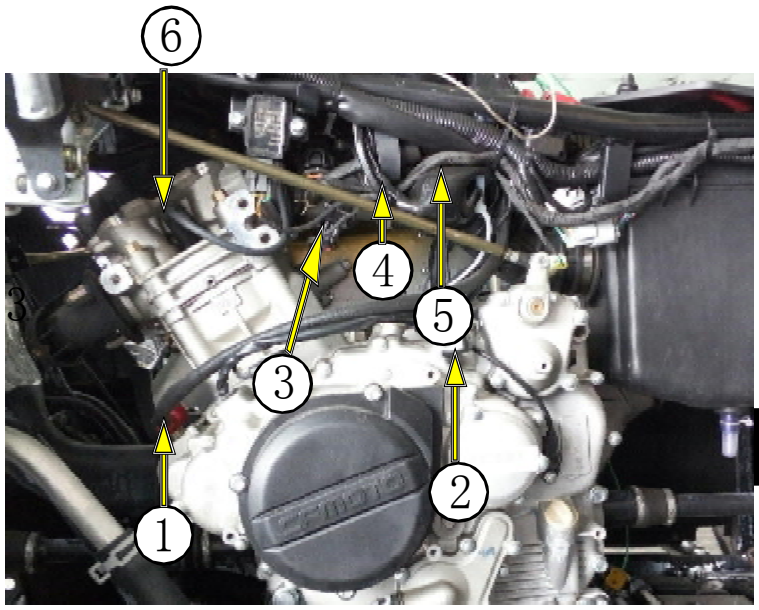


Remove the bolt 4.

Disconnect the shift arm 5 from the engine.

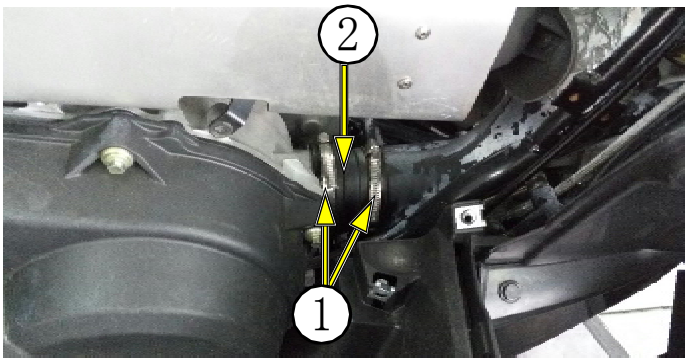


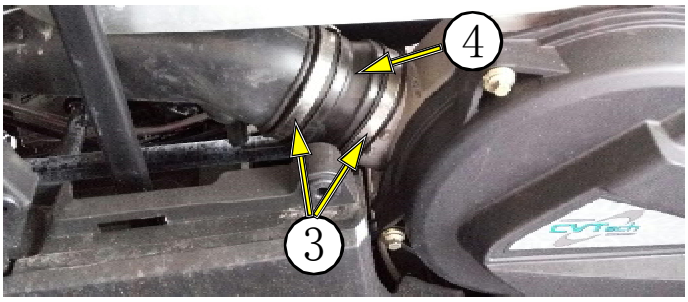
Remove the starting motor cable 1.
Remove the bond strap 2.
Remove the TPS sensor connector 3.
Remove the idle air control valve connector 4.
Remove the speed sensor connector/magneto connector/gear position sensor connector/ignition signal transducer 5.
Remove the ignition coil cap 6.



Loose the clamp 1.
Remove the intake duct from engine.

Loose the clamp 3.
Remove the outlet duct 4 from engine.

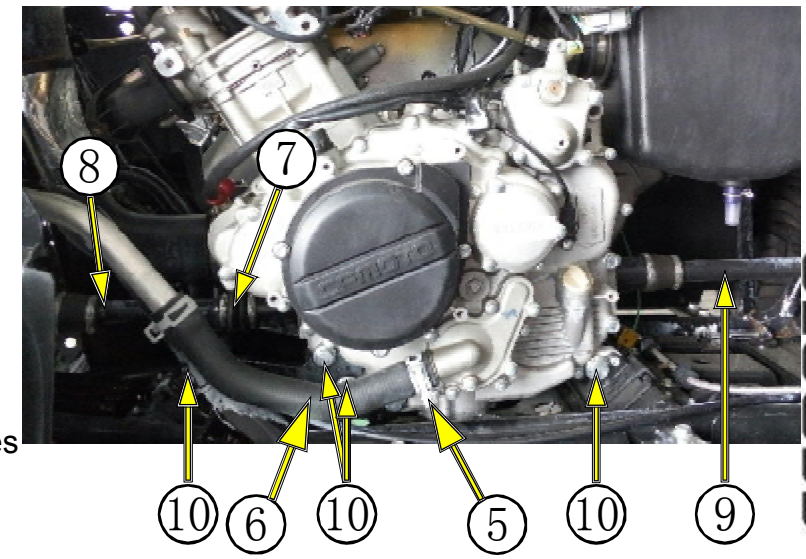




Loose the coolant hose clamp 5
Remove coolant hose 6 from engine.
Remove inner hex screw 7.
Remove the front drive shaft 8 from engine.
Remove rear drive shaft 9 (→ 6.7 Drive shaft removal)
Remove the engine mounting bolts 10.
Remove the engine.

Installation

Reverse the removal procedures for Installation.



5 Engine catalog

5.1 Maintenance imformation

Unit conversion table

Item	Conversion
Pressure	1kgf/cm^2=98.0665kPa 1kPa=1000Pa 1mmHg=133.322Pa=0.133322kPa
Torque	1kgf • m=9.80665N • m
Volume	1mL=1cm^3=1cc 1L=1000cm^3
Force	1kgf=9.80665N

DANGER/WARNING/CAUTION

Please read the following notification carefully which emphasize the special meanings of DANGER,WARMING and CAUTION.Always pay attention to these notification when servicing the engine.

DANGER:indicates a high risk which should be alert to.
WARNING:indicates a moderate risk which should be alert to.
CAUTION:indicates a minor risk chich should be paid attention to.

However,DANGER,WARMING and CAUTION 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 DANGER and WARMING.If you are no confident to complete the whole repair ,please refer to the senior mechanic for support.

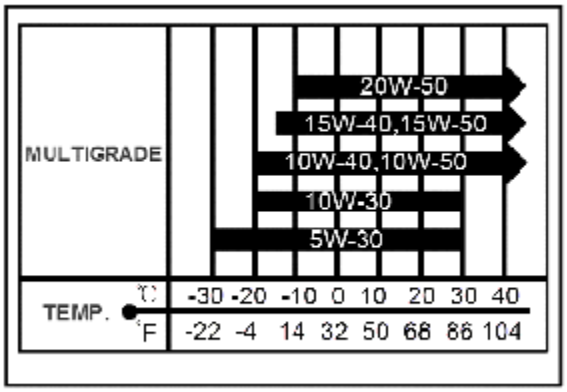
5.1.1 General precautions

Warning：Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the

·When two or more persons works together, pay attention to the safety of each other.
·When it is necessary to run the engine indoors, make sure that exhaust gas is forced out doors.
·When working with toxic or flammable materials, make sure that the area you work in is well ventilated and that you follow all of the manufacturer's instruction.
·Never use gasoline as a cleaning solvent.
·To avoid getting burned, do not touch the engine, engine oil, radiator, and exhaust system until they have cooled.
·After servicing the fuel, oil, engine coolant, exhaust or brake system, check all of the lines, and fittings related to the system for leaks.
·In order to protect the environment，do not unlawfully dispose of motor oil, engine coolant or parts no longer used.

Warning：
·If parts replacement is necessary, replace the parts with CFMOTO genuine parts or their equivalent.
·When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order.
·Be sure to use special tools when instructed.
·Make sure that all parts used in reassembly are clean. Lubricate them when specified.
·Use the specified lubricate, bonds, or sealants.
·When tightening bolts, screws and nuts, tighten the larger sizes first. Always tighten the nuts and bolts from the inside working out, diagonally and to the specified torque.
·Use a torque wrench to tighten fasteners to the specified torque. Wipe off grease and oil if a thread is smeared with them.
·After removing the parts, need to double check them, cleaning all the parts before measure.
·After reassembling, check parts for tightness and proper operation.
·Never reuse a oil seal, O-ring, gasket, self-locking nut, locking washer, cotter pin, snap ring, and other specified parts, be sure to remove them with new ones.

5.1.2 FUEL, OIL AND ENGINE COOLANT RECOMMENDATION



FUEL: Use unleaded gasoline that is Graded 93 octane or higher.

ENGINE OIL: Use 4-stroke motor oil, The oil need to meet API service Classification SG. If engine oil with a SAE 15W-40 is not available, choose from the right chart according to the environmental temperature.

ENGINE COOLANT: Since antifreeze also has corrosion and rust-inhibiting properties, engine coolant contains antifreeze, and the freezing point should below the atmospheric temperature like 5℃.

Recommended coolant type: -30℃ anti-frozen, antisepsis,high-boil coolant.

Danger: Keep the engine coolant properly and do not drink it as it is poisonous

Warning: Do not mix other brand engine coolant together.

5.1.3 Engine running-in

As the engine has a lot of relative motions parts, such as pistons, piston rings, cylinder blocks and inter-meshing gears, thus, good operation at the beginning is necessary. It helps a good adaptation to each part, adjust working gap, and make a smooth friction surface to bear heavy load.

Recommended running-in time: 20 hours, se detailed specification below:

0～10 hours

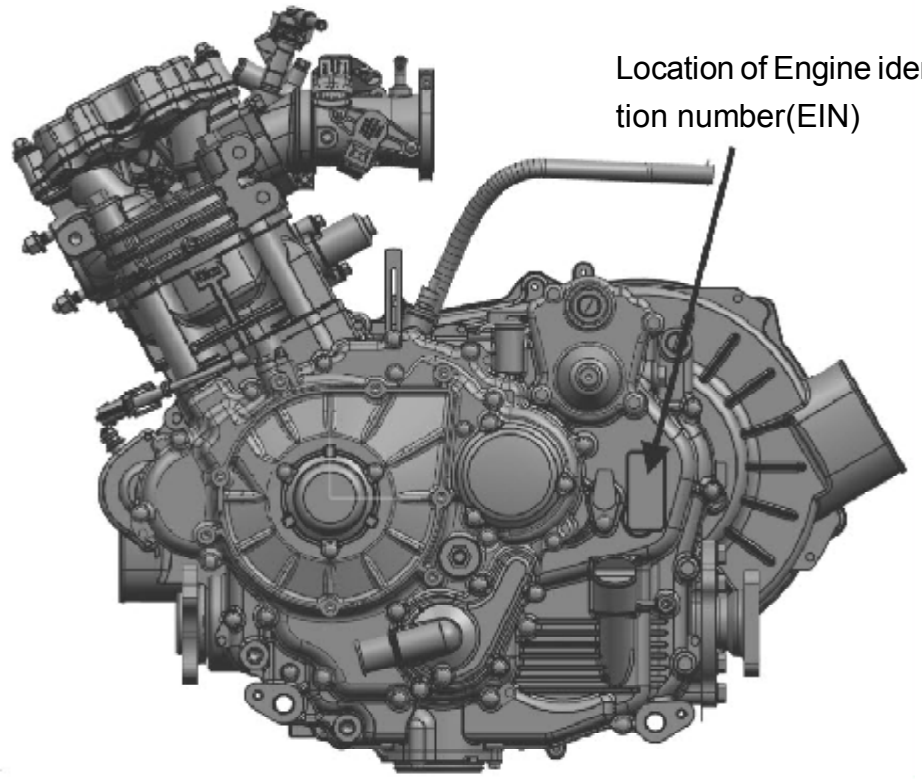
Avoid continuous operation above half-throttle or vary the speed of the vehicle from time to time. Do not operate it at one set throttle position. Allow a cooling-off period of 5 to 10 minutes after every hour of operation. Avoid acceleration heavily. The accelerator should be changed smoothly, avoid changing heavily from small to bigger

10～20 hours

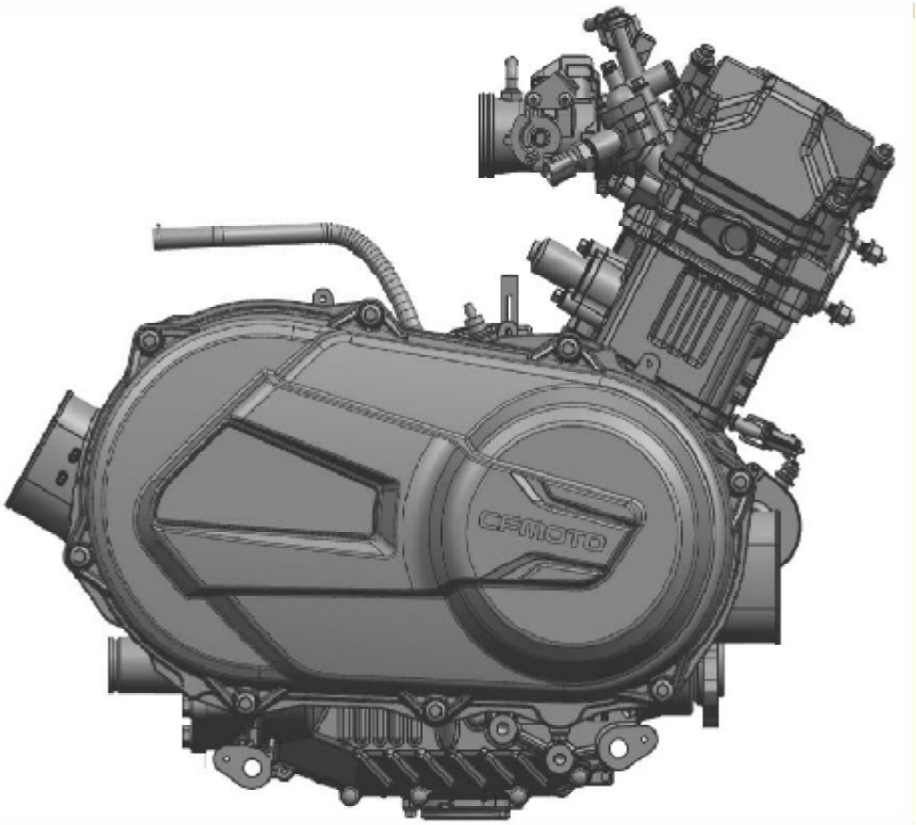
Avoid prolonged operation above three-quarter throttle. Allow using freely but not full throttle.

CAUTION：Maintain and repair as regular procedures during break-in period;
After break-in, do not forget to check and maintain the engine before normal use.

5.1.4 ENGINE SHAPE & LOCATION OF EIN



Engine left side



Engine Right side

5.1.5 ENGINE GENERAL INFORMATION

NO.	ITEM			TYPE/SPECIFICATION
1	Type			Single-cylinder, liquid-cooled, 4-stroke, SOHC4
2	Bore×Stroke			91mm×76.2mm
3	Displacement			495mL
4	Compression ratio			10.3:1
5	Low idling speed(Idling)			1500r/min±150r/min
6	Starting			Electric
7	Electrical system	ignition type/ ignition timing		ECU / BTDC10° 1500r/min
		Spark plug/ Electrode gap		DCPR8E-NGK/0.8mm～0.9mm
		Magneto type/ Power		3-phase AC generator, 320W/5000r/min，460W/5000r/min
8	Combustion system	Combustion chamber		Triangular combustion chamber
		Throttle body type		0GR0-173000
		Air filter type		Sponge, Paper filter
		Gasoline		RQ-93
9	Valves system	Valves type		SOHC/ Timing chain drive
10	Lubrication System	Lubrication type		Pressure and splash
		Oil pump type		Rotor drive
		Oil filter type		Paper type, replaceable
		Engine oil type		SAE15W－40/SG or higher
11	Cooling system	Cooling type		Liquid-cooled/close-loop cooling
		Coolant type		—30℃ anti-corrosion and anti-freezing
12	Drive train system	Transmission type		CVT+ Gearshift
		Reducer gear		Two forward gear, one reverse gear, one park
		Gearshift methods/ orders		Manual operation/L-H-N-R-P
		CVT ratio range		3.021～0.675
		Gearshift ratio	Final ratio	1.333（24/18）
			Secondary	1.952(41/21)
			Variable gear	L:2.53(38/15)；H：1.35(27/20)；R:2.071(29/14)
			Total ratio	L:6.595；H：3.514 ；R:5.392
13	Overall size			L（mm）×W（mm）×H（mm）：622×543×521
14	Dry weight			62.5kg
15	Output type			Front/Rear shaft drive
16	Rotation of engine output			When forward, clockwise(rear view)

Valves & Cylinder Head （mm）

Item	Standard value		Service limit	Remarks
Dia. Of valve neck	Intake valve	φ 33	——	
	Exhaust valve	φ 29	——	
Thickness of valve neck	Intake/Exhaust	1	0.5	
Valve clearance (cold engine)	Intake	0.08～0.12	——	
	Exhaust	0.12～0.18	——	
Inner dia. Of valve guide	Intake/Exhaust	5.000～5.012	5.045	
Outer dia. of valve stem	Intake	4.965～4.980	4.93	
	Exhaust	4.955～4.970	4.93	
Gap between valve guide and stem	Intake	0.020～0.047		
	Exhaust	0.030～0.057		
Valve stem roundness （diameter difference）		0.005	0.06	
Valve end run-out	Intake/Exhaust	0.02	0.05	
Valve length	Intake	90.1		
	Exhaust	88.7		
valve plate cone run-out	Intake/Exhaust	0.03	0.05	
Width of valve seat seal	Intake	1.2±0.1	1.7	
	Exhaust	1.3±0.1	1.8	
Valve spring free length	Intake/Exhaust	40	38.2	
Elasticity of valve spring	Intake/Exhaust	33: 200N～235N 23: 530N～587N		
Cam length	Intake	32.971～33.011	32.871	
	Exhaust	32.985～33.025	32.865	
Camshaft shaft neck	φ 35	34.959～34.975	34.95	
	φ 22	21.959～21.980	21.95	
Gap between outer dia. of camshaft and holes	φ 35	35.007～35.025	35.04	
	φ 22	22.012～22.025	22.04	
Gap between outer dia. of camshaft and holes	φ 35	0.032～0.066	0.09	
	φ 22	0.032～0.066	0.09	
Axial clearance of camshaft	0.12～0.28			
Camshaft run-out			0.10	
Bore diameter of rocker arm	Intake/Exhaust	12.000～12.018	12.03	
Dia. of rockshaft	Intake/Exhaust	11.973～11.984	11.96	
Fit gap between rockshaft	Intake/Exhaust	0.016～0.045	0.07	
Axial gap between rockshaft	Intake/Exhaust	0.06～0.34		
Flatness of cylinder head bottom surface	0.03		0.05	
Flatness Of cylinder head cover combination	0.08		0.10	

Cylinder, Piston, Piston Ring & Crankshaft (mm)

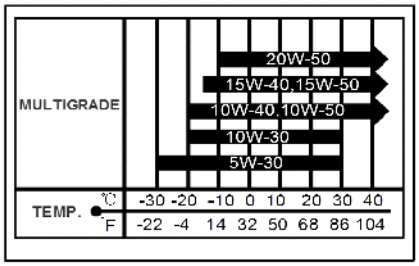
Item	Standards			Service limit	Remarks
Cylinder compression	1000kPa			———	
Piston/Cylinder clearance	0.030～0.050			0.10	
Dia. of Piston	90.95～90.97,9 mm down along to the piston			90.85	
Inner diameter of cylinder	90.99～91.01			———	
Flatness of cylinder top and bottom surface	0.03			0.05	
Free open of piston ring	1st ring	R	round 11.7	8.9	
	2nd ring	R	round 12	9.5	
Gap of piston ring	1st ring		0.25～0.40	1.5	
	2nd ring		0.35～0.45	1.5	
	Oil ring		0.2～0.7	1.5	
Height of piston ring	1st ring		0.02～0.06	0.150	
	2nd ring		0.02～0.06	0.150	
	Oil ring		0.03～0.15	0.250	
Height of piston ring	1st ring		1.17～1.19	———	
	2nd ring		1.47～1.49	———	
	Oil ring		2.37～2.47		
Width of piston ring	1st ring		1.21～1.23	———	
	2nd ring		1.51～1.53	———	
	Oil ring		2.50～2.52	———	
Inner diameter of piston pin hole	22.004～22.010				
Diameter of piston pin	21.995～22.000			21.980	
Inner diameter of small end of connecting rod	22.01～22.02			22.06	
Gap of piston/piston pin	0.004～0.015			0.08	
Small end hole of connecting rod / gap of piston pin	0.010～0.025			0.08	
Side gap of big end of connecting rod	0.1～0.45			0.7	
Thickness of big end of connecting rod	22.95～23.00				

To Be Continue (mm)

Item	Standards	Service limit	Remarks
Thickness of big end of connecting rod	22.95～23.00		
Crankshaft beat	0～025	0.055	
Connecting rod bearing journal	36.992～36.996	36.068	
Connecting rod bearing bore	37.006～37.028	37.06	
Gap of connecting rod bearing	0.01～0.032	0.065	
Main journal	41.955～41.970	41.935	
Case main bearing bore	41.980～42.000	42.10	
Gap of main bearing	0.045～0.01	0.08	
Gap of crankshaft axial direction	0.05～0.45	0.6	

5.1.6 MAINTENANCE SPECIFICATIONS

Lubrication System

Item		Standards	Service Limit
Engine Oil Capacity	Oil Change	2800mL （ without oil filter replacement）	—
	Oil Change	2900mL（with oil filter replacement）	
	Oil Capacity	3000mL	—
Recommended engine oil（see original）Grade/ TEMP 		·Special for four stroke motorcycle SAE-15 W-40 If it's not available, select alternative according to the following specifications. ·API classifications: SG or higher ·SAE classifications: according to the left chart.	
Oil Pump Rotor	Clearance Between Inner and Outer Rotor	0.07mm ～ 0.15mm	0.2mm
	Clearance Between Outer Rotor and Case	0.03mm ～0.10mm	0.12mm
	Oil Pump Rotor End Clearance	0.023mm～ 0.055 mm	0.12 mm
	Engine oil pressure	1400r/min ，90℃时 200 kPa～400kPa，general 240 kPa 6000r/min ，90℃时 600 kPa～700kPa，general 600 kPa	

COOLING SYSTEM

Item		Standards		Service Limit	Remarks
Thermostat	Opening temperature	65℃±2℃			
	Fully opening	85℃			
	Travel when fully opening	When 85℃, ≥5mm			
Radiator cap opening pressure		110kPa±15kPa (1.1kgf/cm^2)			
Relations between water temp. and resistant of water temp. sensor	Water temperature (℃)	Resistant of B terminal(Ω)	Resistant of A,C Terminal(kΩ)		
	-20	——	13.71～16.94		
	25	——	1.825～2.155		
	50	176～280	——		
	80	63.4～81.4	0.303～0.326		
	110	24.6～30.6	0.138～0.145		
Working temp. of thermo switch	OFF-ON	Around 88℃			
	ON-OFF	Around 82℃			
Coolant type		-30℃ anti-freezing,anti–corrosive and high boiling point			

Clutch + Transmission mechanism (mm)

Item	Standards		Service limit	Remarks
Belt width	35.2		33.5	
Free length of driven pulley spring	238.5		214	
Hole dia. of driven pulley collar	38.10～38.14		38.30	
Clearance between gearshift fork and engagement groove	0.10～0.35		0.45	
Thickness of gearshift fork	5.8～5.9		5.7	
Groove width of high/low sliding	6.05～6.15		6.25	
Output gear groove width of driven shaft	6.05～6.15		6.25	
Groove width of gearshift drum	8.05～8.10			
Dia. of gearshift pawl pin	7.90～7.95		7.83	
Hole dia. of gear box	25～25.021		25.025	
Hole dia. of Reverse gear transition	25～25.021		25.025	
Dia. of main shaft	Φ30	28.980～29.993	29.970	
	Φ17	16.983～16.994	16.978	
Dia. of secondary shaft	Φ15	14.983～14.994	14.978	
	Φ17	16.983～16.994	16.978	
	Φ20	19.980～19.993	19.974	
Dia. of drive bevel gear shaft	Φ17	16.983～16.994	16.978	
	Φ25	24.980～24.993	24.974	
Dia. of reverse intermediate gear	Φ20	19.980～19.993		

Air Intake System

Item	Standards
Throttle Body Part NO.	0GR0-173000
T-MAP Sensor Part No.	0JY0-175000
Fuel Injector Part No.	0GR0-171000
Idle Speed	1500 r / min±150r / min

Electric system

Item		Standards	Remarks
Spark plug	Type	DCPR8E(NGK)	
	Gap of spark plug	0.8 mm～0.9mm	
Characteristic		＞8mm, under 0.1MPa	
Resistance of ignition coil	Primary	0.74Ω～0.78Ω	
	Secondly	10.1kΩ～11.1kΩ	
Resistance of magneto coil		0.5Ω～1.5Ω	
Resistance of speed sensor（trigger）		900Ω～1000Ω	
Voltage without load(cold engine)		＞ 50V(AC),5000r/min	
Max. output power of magneto		320W, 5000r/min 460W/5000 r/min	
Stable voltage		13.5V～15V	
Secondly voltage of ignition coil		⩾25kV	
Peak voltage of Trigger coil		Peak voltage⩾3V, 200r/min	
Resistance of starter relay coil		3Ω～5Ω	
Resistance of auxiliary relay coil		90Ω～100Ω	

5.1.7 Engine tightening Torque list

Item	Qty	Dia. Of thread(mm)	Torque（N·m）	Remarks
Oil drain bolt M12×1.5	1	M12×1.5	25	
Bolt M14×1.5×12(left case)	2	M14×1.5	28	
Link bolt M14×1.5(left case)	2	M14×1.5	28	External oil tube
Plug screw, oil passage pressing plate (left case)	4	M6×12	8	Thread locker glue
Primary screen cover bolt	3	M6×20	8	Thread locker glue
Oil pressure switch	1	M10×1	12	Thread locker glue
Screw R21/8(CVT oil passage)	1	R21/8	20	Apply seal gum
Bolt, CVT air intake plate	3	M6×12	8	Thread locker glue
CVT cover screw	8	M6	7	
Plug screw, relief valve(left crankcase cover)	1	M20×1.5	30	
Bolt of wiring clamper (left crankcase cover)	1	M6×10	8	Thread locker glue
Screw of oil seal plate((left crankcase cover)	3	M6×8	8	
Adjust nut, valve clearance	8	M6	12	
Bolt, timing sprocket	2	M6×10	15	
Bolt, decompressor, starter	1	M8×32	30	
Bolt, cylinder	4	M10	20、60	
Bolt, cylinder installation	2	M6×132/120	10	
Plug, spark	1	M12×1.25	20	
Sensor, water TEMP.	1	M12×1.5	16	
Tud bolt M8×42（exhaust port）	2	M8×42	25	Thread locker glue
Nut, thrust M8（exhaust port）	2	M8	13	
Plug, Screw M12×1.5	1	M12×1.5	20	
Tapping screw ST4.8×13(thermostat cap)	1	ST5.5×13	5	
Bolt M6×45(thermostat cap)	2	M6×45	6	
Injector seat installation bolt	2	M8×25	20	

To be continued

Item	Qty	Dia. Of thread(mm)	Torque （N·m）	Remarks
Bolt COMP. Cylinder head cover	4	M6	7	
Thread tension plate pin	1	M8	20	Thread locker glue
Bolt, magneto stator	3	M6×30	10	Thread locker glue
Bolt, overriding clutch COMP	6	M8×20	26	Thread locker glue
Bolt M10×1.25×40(Magneto rotor)	1	M10×1.25	55	Thread locker glue
Bolt, drive pulley(CVT drive pulley)	1	M12×1.5-LH	40	
Screw, gear shifting shaft （CVT driven pulley）	1	M20×1.5	115	Thread locker glue
Lock nut, drive bevel gear	1	M22×1	145	
Bolt(bearing seat, drive bevel gear)	4	M8×28	32	
Screw （bearing holder, drive bevel gear）	4	M8×25	15	
Stopper nut (driven bevel gear)	1	M65×1.5	110	Thread locker glue
Bolt(bearing seat, driven bevel gear)	4	M8×28	25	
Retainer, bearing (left)	1	M55×1.5	80	Thread locker glue
Bolt front/rear output M10×1.25×20	2	M10×1.25	55	Thread locker glue
Set screw, shift drum T25	1	M5×8	6	
Bolt, gear orientation	1	M14×1.5	18	
Bolt, oil pump cover	3	M5×16	7	Thread locker glue
Bolt, oil guard	2	M6×12	8	Thread locker glue

5.1.8 191R Engine Service Tools

Measuring instruments				
Item	Tool name	Specifications	Purposes	Remarks
1	Vernier caliper	0～150mm	Measure length and thickness	
2	Micrometer	0～25mm	Measure outer diameter of rocker arm shaft, valve stem, camshaft	
3	Dial gauge	25mm～50mm	Measure Max. travel of camshaft	
4	Dial gauge	75mm～100mm	Measure size of piston skirt	
5	Inner dia. of cylinder meter		Measure dia. of cylinder	
6	Inside caliper micrometer	10mm～34mm	Measure inner diameter of rocker and piston pin hole, connecting rod hole	
7	Dial indicator	1/100	Measure jump	
8	Knife straight edge		Measure flatness	
9	Feeler gauge		Measure flatness and adjust valve clearance	
10	Plastigauge		Measure fit clearance	
11	Spring balance		Measure elasticity of spring	
12	RPM meter		Measure RPM	
13	Compression tester and adapter		Measure cylinder compression	
14	Oil pressure meter		Measure oil pressure	
15	Air pressure meter		Measure opening pressure of radiator cover	
16	Ohmmeter		Measure resistance and voltage	
17	Amperometer		Measure current of switch	
18	Thermometer		Measure coolant temp	
19	Timing light		Measure ignition timing	
20	Torque wrench	One set	Measure tightening torque	

Generally & Auxiliary tools				
Item	Tool name	Specifications	Purposes	Remarks
21	Alcohol light		Warm up or increase temp.	
22	Magnetic meter seat		Mounting dial indicator	
23	Plate		Auxiliary measurement	
24	V-shaped bluff		Auxiliary measurement for jump	
25	Nipper		Mounting valve lock-clip	
26	Circlip plier		Circlip removal and installation	
27	Nipper plier		Stop collar removal and installation	
28	Impact driver		Disassembly of crosshead bolt	
29	Screw driver			
30	Plus driver			

Engine Special Tools

Tool name	Part number	Purposes
Joint, oil hose	0800-000000-871-001	Measure oil pressure
Press tool, bearing of left crankcase	0GR0-012101-921-001	Press bearing
Punch, reverse transition gear shaft	0GR0-011103-921-001	reverse transition gear shaft
Oil pump duplex gear shaft installation	0GR0-011102-921-002	Oil pump duplex gear shaft installation
Punch, Oil pump duplex gear shaft	0GR0-011102-921-001	
Remover, magneto rotor	0180-031000-922-001	Remove magneto rotor
Press tool, bearing of left crankcase	0GR0-011101-921-001	Press bearing
Press tool, cover of left crankcase	0GR0-014001-921-001	Press bearing, water seal
Gauge, circumferential position of crankshaft balance gear		Inspection circumferential position of crankshaft balance gear
Press tool, right crankcase bearing bush	0800-012101-921-002	Pressing bearing bush
Press tool, oil seal	0180-012004-921-001-1	Install oil seal
30×45×7 Installer, oil seal	CF188-012006-923-001	Install oil seal
Installer, Driven bevel gear, bearing seat	0800-062202-921-002	Pressing bearing
Press tool, Driven bevel gear, bearing seat	0800-062202-921-001	Pressing bearing
Installer, Driven bevel gear, bearing seat	0800-062202-922-001	Install/Remove the retainer of ring gear bearing
Bearing Retainer Remover	0800-062206-922-001	
Installer, driven bevel gear bearing (6207C3)	CF188-062201-921-003	Pressing rolling bearing 6207c3
Press tool, left crankcase bearing bush	0800-011101-921-002	Pressing bearing bush
Installer	CF188-062103-921-001	Pressing bearing 6305C3
Press tool, bearing	CF188-062103-921-002	Pressing bearing
Installer, bearing front output shaft 6205	CF188-062301-921-001	Pressing bearing 6205
Air leak tester, cylinder cover	0800-022101-922-001	

Tool name	Part number	Purposes
Installer, oil seal SD15×25×5	CF188-065002-923-001	Install oil seal
Installer, oil seal SD15×25×5	CF188-065002-923-002	
Inspection tool, piston	152MI-040001-860-001	Inspection piston
Inspection tool, 191R engine piston	0800-040001-860-001	
Installer, seal ring, valve stem	152MI-022500-923-001	Install seal ring, valve stem
Installer, cylinder cover, lock clip, valve	0800-022101-922-001	Install lock clip valve
Tester, air leak		Testing air leak of cylinder cover
Air leak tester, cylinder cover	0800-022101-922-001	
Press tool, needle bearing RNA49/22		Install needle bearing RNA49/22
Press tool, left crankcase cover, hole bearing	CF188-014001-921-001	Pressing bearing 60/28
Press tool, oil seal	CF188-014008-921-001	Pressing oil seal 28×52×7
Press tool, oil seal of water pump	172MM-080005-923-001	Pressing oil seal 10×20×5
Press tool, left crankcase cover, water seal	152MI-081004-921-001	Pressing water seal
Press tool, water pump bearing 6000	1P72MM-081001-923-001	Pressing bearing 6000/P6
Installer, pump shaft	CF188-081001-922-001	Install water pump shaft
Press tool		Install oil seal ring
Press tool, CVT case bearing bush	0JY0-013101-921-001	Pressing bearing bush
Installer, washer, rubber		Install washer
Installer, nut	CF188-062000-922-001	Lock gear shaft nut
Installer, driven bevel gear	CF188-062200-922-001	Remove driven bevel gear
Wrench, front output shaft oil seal ring	CF188-060008-922-001	Remove/install front output shaft oil seal ring

Tool name	Part number	Purposes
Press tool, front output shaft oil seal	0800-060000-923-001	Install oil seal 35×61×9(14)
Press tool, driven bevel gear oil seal	0800-062204-923-001	Install oil seal 35×50×7
Wrench, shift gears	CF188-064005-922-001	Inspection shift gears
Press toll, oil seal 32×55×10	0JY0-013103-921-001	Install oil seal 32×55×10
Wrench, adjust nut, valve	1P39MB-022102-922-001	Adjust valve clearance
Spark plug spacer	0800-022800-922-001	Remove/assemble spark plug
Installer, drive pulley	0JY0-050000-922-001	Setting torsion of drive pulley nu
Driven Pulley Expander	0800-052000-922-003	Expand the driven pulley to ease belt installation
Radiator cover test cap	901-18.01.00-922-001	Measure cooling system
Puller, water seal	0800-014001-922-002	Remove water seal
Puller, bearing	0800-014001-922-001	Remove bearing
Piston ring compressor	0800-040003-922-001	compress ring when assemble piston
Installer, circlip, piston pin	0800-040005-922-001	Install piston pin
Drive pulley disassembling tool	0JY0-050000-922-002	Remove drive pulley

5.1.9 Engine operation materials and service products

Engine operation materials including lubricant(engine oil), grease, and coolant. Service products contain silicone,sealant and silicone sealant.

Item	Type	Lubrication points	Remarks
Lubricants (engine oil)	4-stroke motor oil SAE15W-40 Or SAE10W-40 API : SF, SG or higher	Cylinder rotating parts, sliding parts Inner crankcase rotating parts,sliding parts Cylinder head rotating parts, sliding parts Details see lubricants sketch map (Details of choosing brand of viscosity see page 5.1.2)	Capacity 2800ML （replace engine oil） 2900 ML （replace filter） 3000 ML （engine overhaul）
Molybdenum Disulfide grease		Piston pin, valve stem, valve oil seal, camshaft	
Grease	No.3MoS2 grease	Oil seal, O-ring and other rubber seals. Sealed bearing,	
Coolant	-30℃ Anti-freezing,anti-corrosive, high-boiling coolant	Engine cooling system, water seal installation	Coolant capacity depends on radiator pipes
Silicone sealant		Crankcase splitting surfaces, contact surface between crankcase and cylinder,	
Thread locker		Some threads	see 5.1.7

5.2 INSPECTION AND ADJUSTME

5.2.1 Period maintenance table

Engine maintenance is a periodic job, careful periodic maintenance is very important, will assure your vehicle good performance, reliability, economy and durability. Details are explained in below 191R engine periodic maintenance chart.

ATTENTION: Maintenance intervals in the following chart are based upon average riding conditions. Vehicles subjected to severe use must be inspected and serviced more frequently

A: Adjust C: clean I: Inspect L: Lubricate R: Replace		10 hours or 300km	20 hours or 750km	Every 50 hours or 1500km	Every 100 hours or 3000km or 1 year	Every 200 hours or 6000km or 2years	Remark
Engine	Facilitating Conditions&abnormal sound	I		I	I		
	Exhaust condition		I	I	I		No black smoke or blue smoke
	Valve setting		I, A		I, A		In: 0.08～0.12 Out: 0.12～0.18
	Idle speed	I		I			1400 r/min±100r/min
SparkPlug			I		I	R	No carbon deposition ,electrode gap: 0.8mm～0.9mm
Air Filter			C	R			
CVT system	CVT Belt			I	R		Replace every 2000km
	Primary Pulley, Driven pulley				I, C		
Engine oil, filter			R		R		
Throttle Body		I			I, L		
Cooling System	Water volume	I		I			
	Water pipe	I			I		
	Radiator valve opening pressure	I		I	I		0.75 kg/cm^2～1.05kg/cm^2
	Replace coolant	Replace every 2 years					

5.2.2 Procedure of Maintenance &Adjustment

This section describes the maintenance procedures for each item mentioned in the periodic maintenance chart.

5.2.3 Valve clearance

Inspect initially at 20-hour break-in and every 40 hours or every 1000km thereafter. Inspect the clearance after removing cylinder head

Excessive valve clearance results in valve noise and insufficient valve clearance results in valve damage and reduced power.

Check the valve clearance at the period indicated above and adjust the valve clearance to specification, if necessary.

● Remove CVT case cover ①;

● Remove RPM sensor of left crankcase cover ②;

● Remove cylinder head cover ③;

● Turn the crankshaft until the line 5 of T. D.C. on rotor is aligned with mark 6 of inspection hole on left crankcase..

● Insert feeler gauge to check the clearance between the valve stem end and the adjust bolt on the rocker arm.

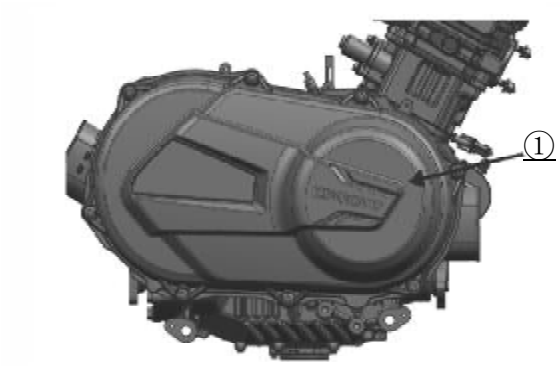
Valve clearance (When cold)	Intake valve	0.08～0.12
	Exhaust valve	0.12～0.18

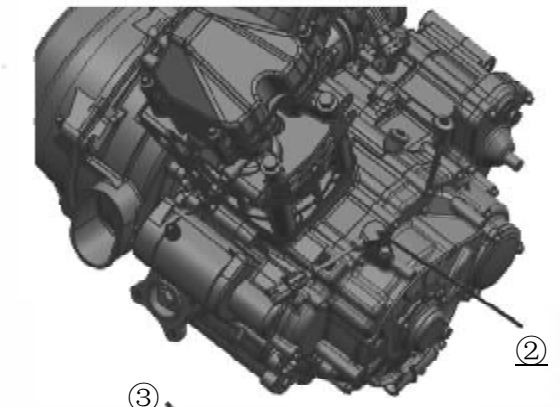
Attention:

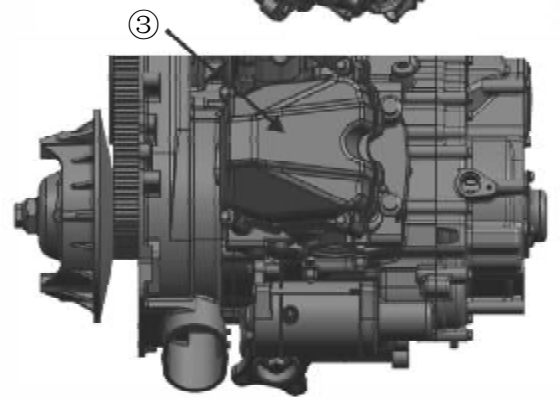
● The valve clearance must be adjusted when the engine is cold.

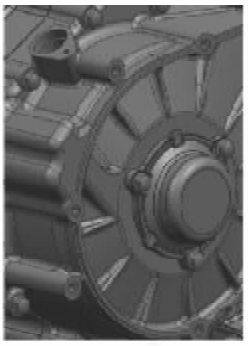
● Adjust the valve clearance when the piston is at the Top Dead Center (T.D.C.) on the compression stroke.

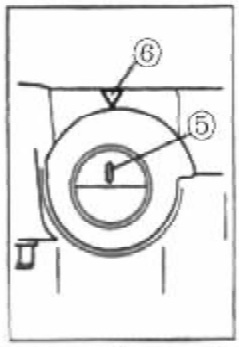
● If the clearance is incorrect, bring it into the specified range using the special tool.











Loosen valve adjust bolt and nut, insert a feeler gauge between the valve stem end and valve adjusting bolt (0.1mm thickness for intake valve, 0.15mm thickness for exhaust valve), tighten valve adjust bolt, make sure it slightly contacts the feeler gauge, tighten bolt and nut.

● Take out the feeler gauge, measure the clearance. If the clearance is incorrect, repeat the above steps until the proper clearance is obtained.

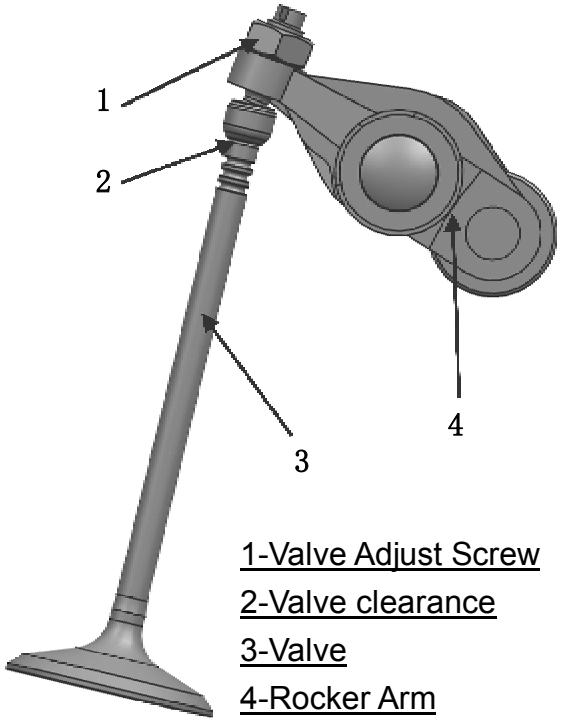
Locknut：12N • m

Tools：Valve adjuster
(1P39MB-022102-922-001)
Feeler gauge

Material：Thread Locker

Caution:

Securely tighten the locknut after completing adjustment



1-Valve Adjust Screw
2-Valve clearance
3-Valve
4-Rocker Arm

5.2.4 ENGINE IDLE SPEED

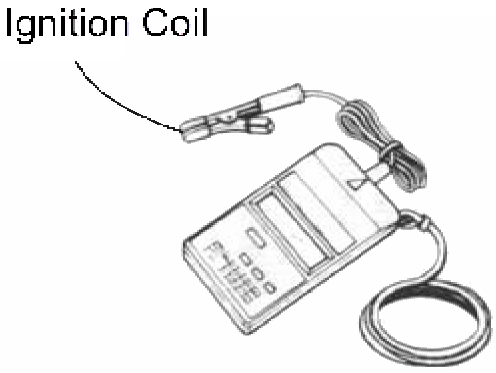
Inspect initially at 20 hours run-in and every 50 hours or 1500km thereafter.

● Install cylinder head, speed sensor

Start the engine and warm it up for several minutes,measure engine speed with a tachometer.

Engine idle speed：1400r/min ± 100r/min

Tool：Tachometer



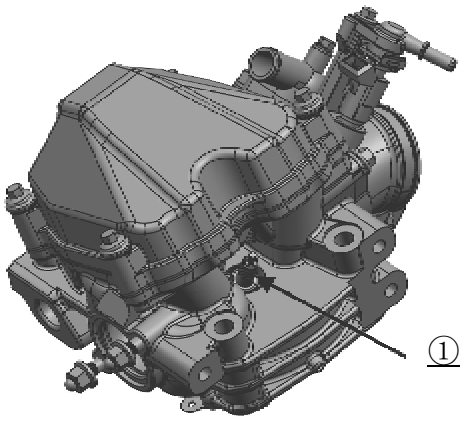
5.2.5 SPARK PLUG

Inspect initially at 20 hours run-in and every 100 hours or 3000km thereafter.

● Remove the spark plug①with a special tool；

Specification:DCPR8E(NGK)

● Spark plug inspection：If the electrode is extremely worn or burnt, or spark plug has a broken insulator, damaged thread, etc, replace the spark plug with a new one

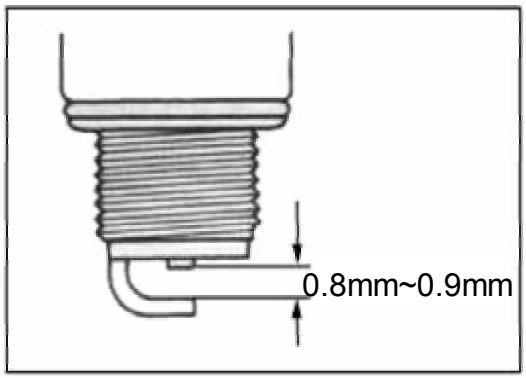


In case of carbon deposit, clean with a proper tool.

SPARK PLUG GAP：Measure the spark plug gap with a feeler gauge.

Out of specification: Adjust

Spark plug gap：0.8mm～0.9mm



Caution:

Check the thread size and reach when replacing the spark plug. If the reach is too short, carbon will be deposited on the screw portion of the spark plug hole and engine damage may result

● Spark plug installation

Caution:

To avoid damaging the cylinder head threads; first,tighten the spark plug with fingers, and then tighten it to the specified torque using the spark plug wrench.

Tightening Torque：20N • m

Tool：Spark PlugWrench

(0800-022800-922-001)

Feeler Gauge

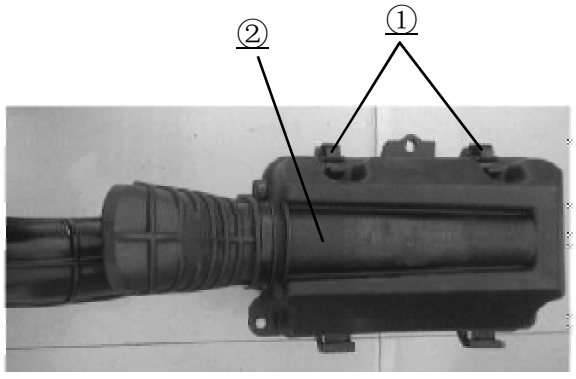
5.2.6 AIR FILTER

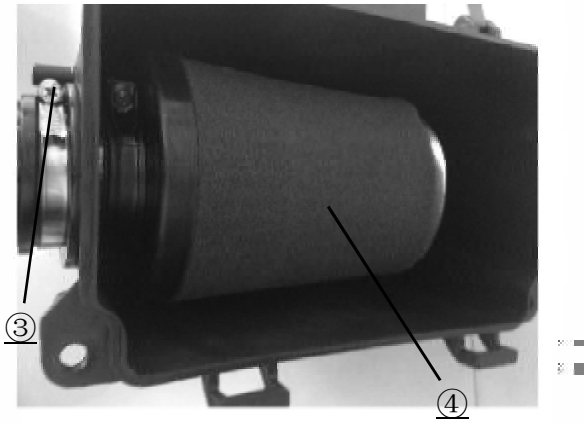
Inspect every 20 hours or 750km, clean it if necessary. Change every 1500km.

If the air cleaner is clogged with dust, intake resistance will be increased, with a resultant decrease in power output and an increase in fuel consumption. Check and clean the air filter as following:

● Remove fixing clamp①，and top cover②

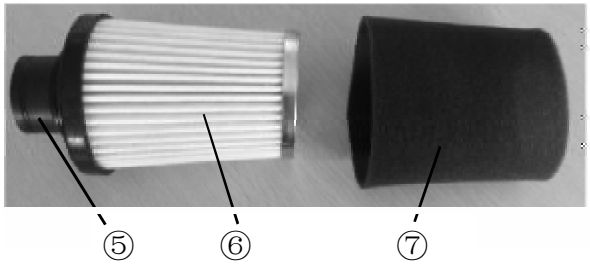
Note：Be careful not to drop the o-ring into the air filter box that is attached to the air filter top cover.





● Loosen screw③emove filter element④ separate support⑤filter paper⑥and sponge⑦

NOTE: *If vehicle is used in dusty area, inspect more frequently than specified in MAINTENANCE CHART.*



If lilquid/deposits are found, squeeze and dry the foam filter. Replace filter element if damaged.

CAUTION: Do not start engine if liquid or deposits are found. If there is oil in the air filter housing,check engine oil level. Oil level may be too high.

Pour air filter cleaning solution or an equivalent into a bucket. Put the foam filter in to soak. Do not wash filter element.

While foam filter soaks, clean inside of air filter housing.

Rinse foam filter with warm water and let it dry completely.

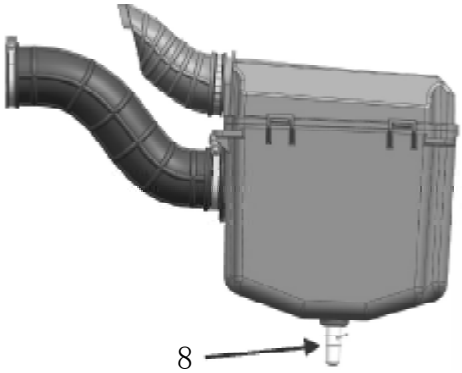
Blow low pressure compressed air on filter element to clean it.

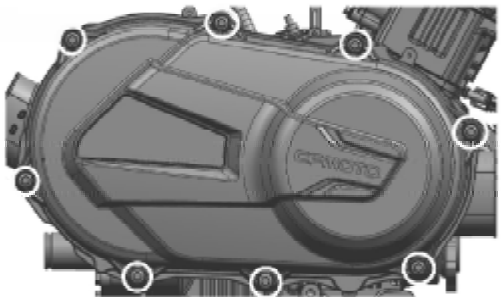
Warning：Never use with gasoline or low flash point solvents to clean the filter element.

● Inspect the filter element for tears, torn element must be replaced.

Note: Make sure that the air filter element is in good condition at all times. The surest way to accelerate engine wear is to operate the engine without the element or with torn element. If driving under dusty conditions, clean the air filter element more frequently

● Remove the drain plug 8 of air box to drain out any water.





5.2.7 Drive belt, CVT

Removal

● Remove CVT cover

●Hold the primary sheave with special tool and loosen primary bolt 1, nut 2 and gasket, take drive disk.

Special Tool：CVT Rotor Holder (0JY0-050000-922-001)

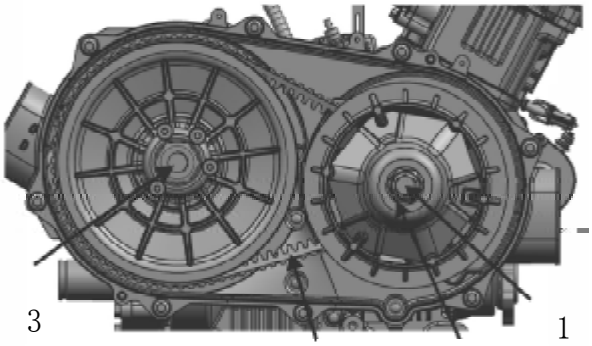
● Hold the secondary sheave with special tool and loosen secondary sheave nut 3.

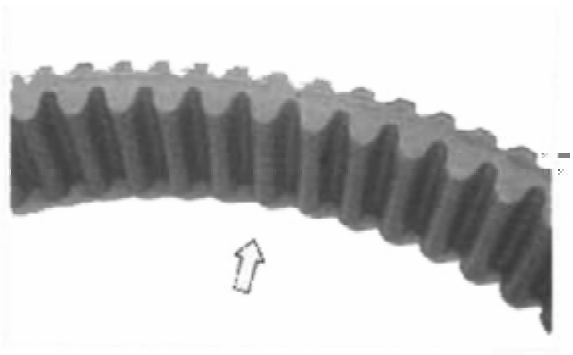
Special Tool：CVT Rotor Holder (0JY0-050000-922-001)

● Remove secondary sheave together 3 with drive belt.

Tool：Driven Pulley Expander (0800-052000-922-003)

● Remove drive belt 4 from secondary sheave





Inspection

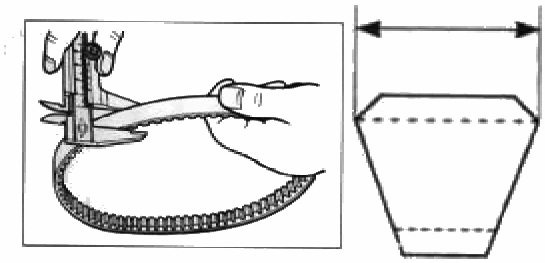
● Inspect CVT friction disk for wear and damage. If any cracks or damages are found, replace CVT with a new one.

● Inspect drive belt for wear and damage. If any cracks or damages are found, replace drive belt with a new one.

● Inspect drive belt for width, if width is out of service limit, replace drive belt with a new one.

Service Limit：33.5mm

Tool：Vernier Caliper



Installation

Reverse the removal procedure for installation.Pay attention to the following:

● Insert drive belt with a special tool , as low as possible, between secondary sliding sheave and primary fixed sheave:

● Hold secondary sheave with a special tool and tighten the nut to the specified torque.

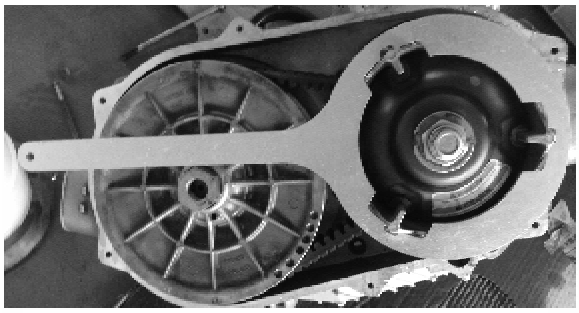
Tool：Installer, drive pulley

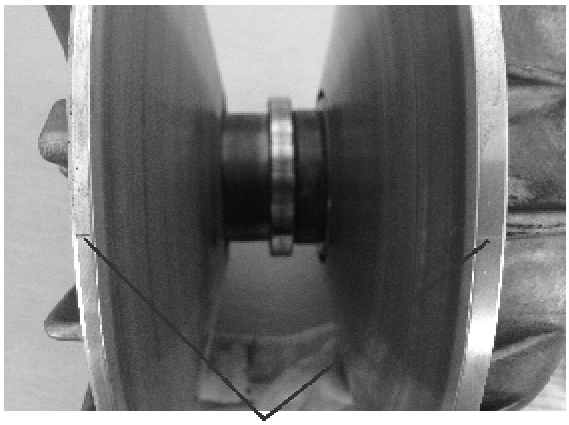
(0JY0-050000-922-001)

Nut, Secondary Sheave：115N • m

● Install primary sheave and nut. Hold the primary sheave with a special tool and tighten the nut to the specified torque.

Nut, Primary sheave：40N • m



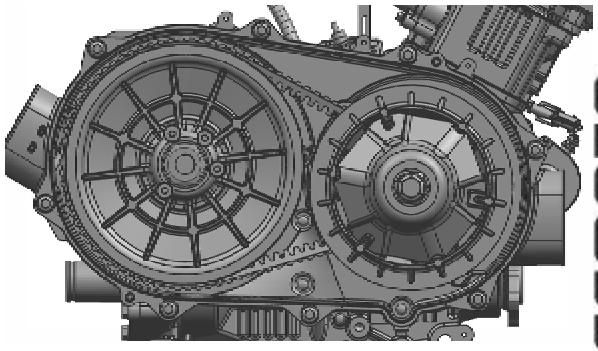


sign

Caution:Fit the drive belt with the arrow on the drive belt points towards normal turning direction.

● Screw Off Driven Pulley Expander, turn primary sheave, until the drive belt is properly seated.

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



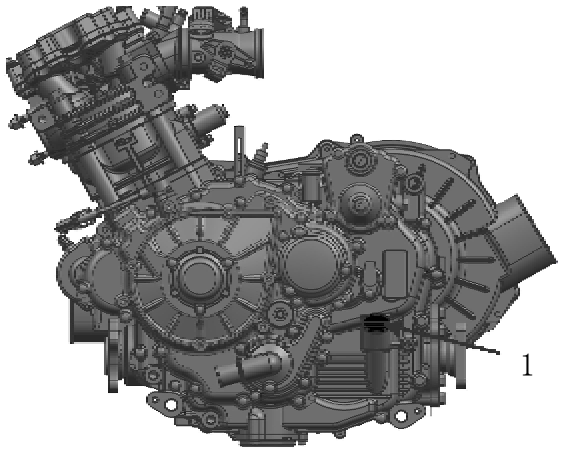
● Install CVT cover

5.2.8 Inspection of Lubrication System

Replace engine oil and oil filter initially at 20 hours or 750km and every 100 hours or 3000km thereafter.

Check Engine Oil Level

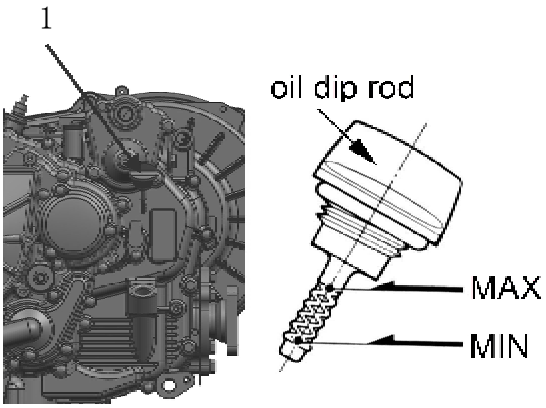
● Keep the engine in a plan position
● Remove oil dip rod 1



●Clean oil dip rod, insert oil dip rod but do not tighten it.

● Take out oil dip rod and check if oil is between upper and lower limit.
● If the engine oil is insufficient, fill more oil until the sufficient oil is obtained.

Engine oil：SAE15W/40 SGor higher



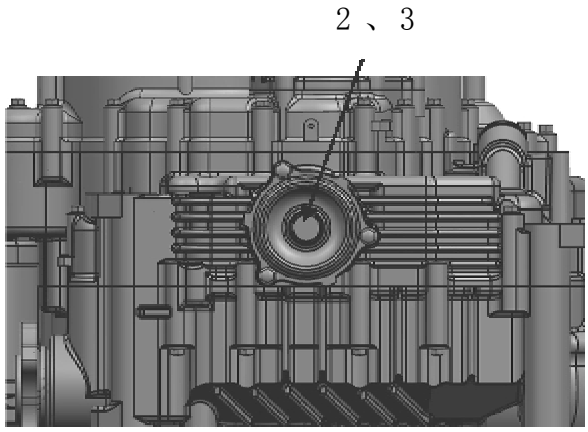
Note：
Keep the engine in a plan position Do not tighten oil dip rod when measuring oil level.

Replace Engine Oil

● Remove oil dip rod 1, drain bolt 2 and washer 3;
●Drain out the engine oil while the engine is still warm.
● Clean oil dip rod, drain bolt and washer with solvent.
● Install washer and drain bolt;

Drain Bolt：25N • m

● Fill engine oil（about 2900mL）



● Install oil dip rod, start the engine and allow it to run for several minutes at idling speed.

● Turn off the engine and wait for about 3 minutes,and then check the oil level on the dipstick.

Caution：

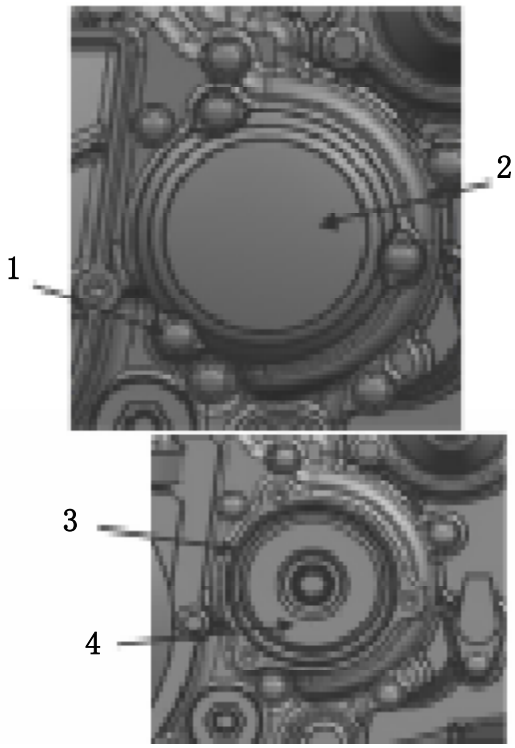
The engine oil should be changed when the engine is warm. If the oil filter should be replaced,replace engine oil at the same time.

Replacing Oil Filter

● Remove relative parts (see Replacing Engine Oil)

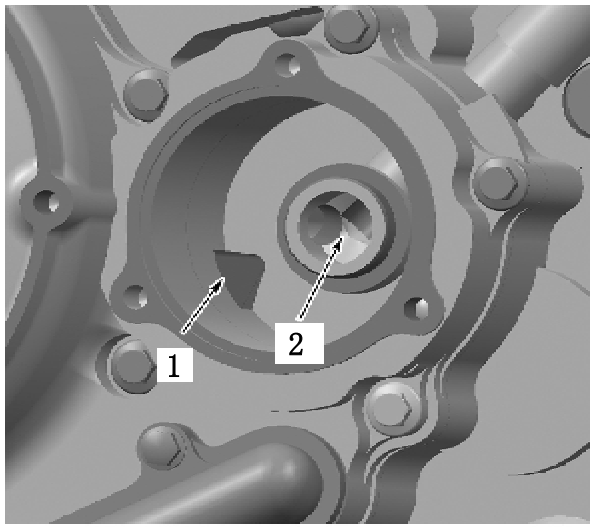
● Remove oil filter cover bolt 1 and filter cover 2

● Remove O ring 3 , then oil filter 4



Oil Filter Element Inspection

Check and clean the engine oil filter inlet 1 and outlet 2 area for dirt and other contaminations.



Oil Filter Element Installation

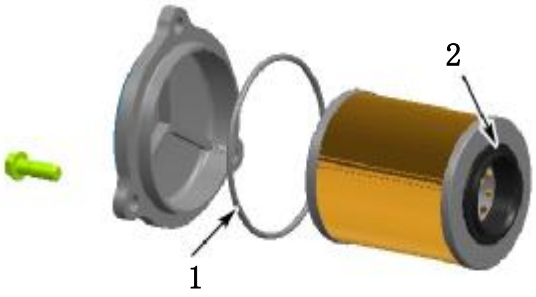
Install a **NEW** o-ring on oil filter cover,

Apply engine oil on o-ring and the end of filter;

Install the element into oil filter bore;

Install the element into oil filter bore, bolt.

Torque screws to:8N • m



5.2.9 Inspection of Cooling System

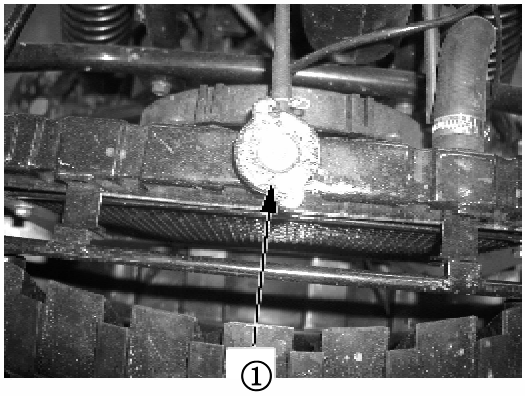
Check initially at 50 hours or 1500km, replace coolant every 2 years

Check radiator, reservoir tank and water hoses.

Leakage or Damage——Replace

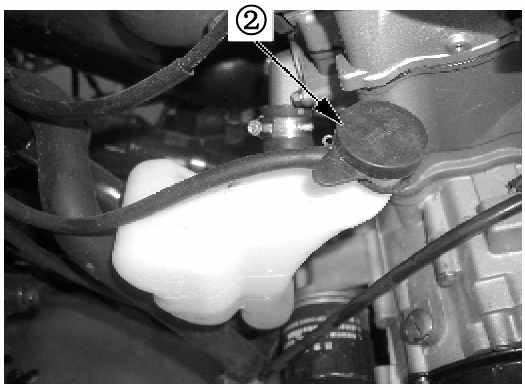
Inspection of engine coolant

Check coolant level by observing the upper and the lower limit on the reservoir tank. If the level is below lower limit, fill coolant until the level reaches the upper limit.



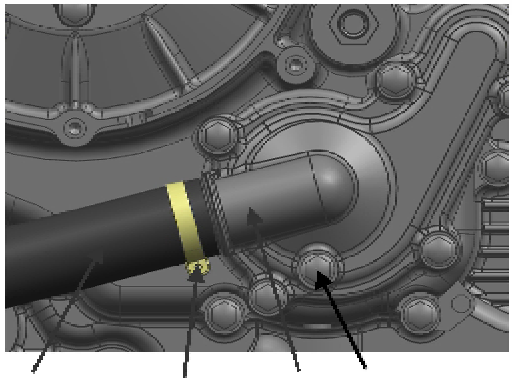
Replacing Coolant

● Remove radiator cap ① and reservoir tank cap ②



● Place a pan below water pump, and drain coolant by removing drain plug ③ and water hose ④

● Drain coolant from reservoir tank.



Warning:

Do not open radiator cap when engine is hot,you may be injured by escaping hot liquid or vapor.

Engine coolant is harmful. If coolant splashes in your eyes or clothes, thoroughly wash it away with water and consult a doctor. If coolant is swallowed, induce vomiting and get immediate medical attention.

Keep coolant away from reach of children.

● Clean radiator with fresh water, if necessary

● Connect water hose ④, and tighten clamp ③ securely

● Fill the fresh specified coolant into the radiator

● Loosen bleed bolt ⑤, on water pump, when coolant flow from bleed bolt, tighten the bolt. Install radiator cap ① securely after filling coolant.

● Start the engine and keep it running for several minutes. After warm up and cooling down the engine, open radiator cap and check coolant. Fill the specified coolant until the level is between the upper and lower lines on the reservoir tank.

Caution：
Repeat the above procedures several times and make sure the radiator is filled with coolant and air is discharged.

●Fill coolant into the reservoir tank till between upper and lower limit. Install reservoir tank cap.

Warning：Never mix with other brand

Inspection of Radiator Hose

Perform inspection every 40 hours or 3000km

Check radiator hose and clamp, leakage or damage----- Replace.

5.2.10 Inspection of cylinder pressure

Cylinder pressure can reflect the inner cylinder working status. Check cylinder pressure is necessary.

Cylinder pressure:1000kPa

A lower cylinder pressure may be caused by:

- Excessive wear of cylinder
- Wear of piston or piston ring

● Piston ring jam in groove
● Poor closure of valve seat
● Damaged cylinder gasket or other defects

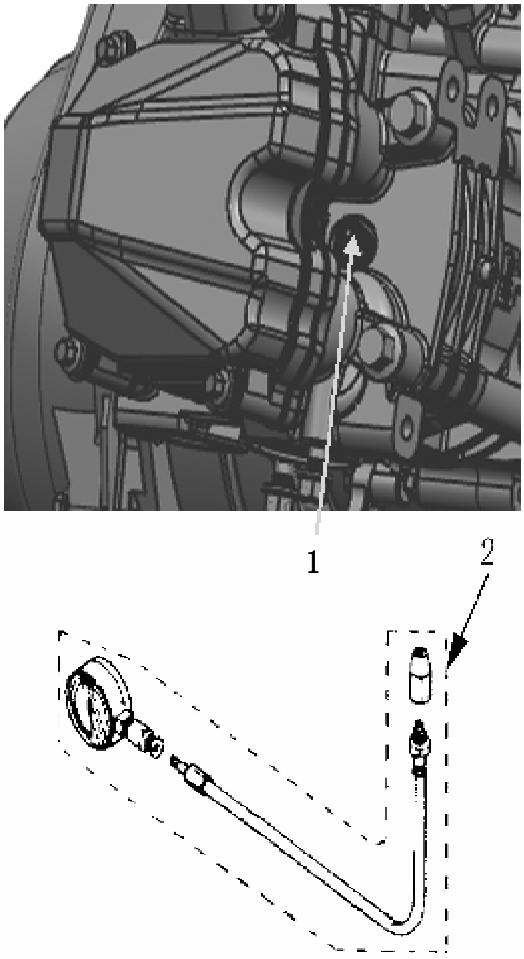
Note：
When cylinder pressure is too low, check the above items.

Testing Cylinder Pressure

Note:
Before testing of cylinder pressure, make sure that cylinder head bolts are tightened to the specified torque and valve clearance has been properly adjusted.

● Warm up the engine before testing
● Make sure battery is fully charged
● Remove spark plug 1
● Install cylinder pressure gauge 2 in spark plug hole and tighten nut
● Keep throttle full open
● Press start button crank the engine a few seconds. Record the maximum reading of cylinder pressure.

Tools：Cylinder Pressure Gauge
Adaptor



5.3 Engine Removal, Inspection & Installation

△Engine Removal/Installation Orders and the Relative Page Numbers

Item	Description	Disassembly	Inspection/Maintena	Assembly	Remarks
Engine Front Side	Spark Plug	5-37	5-26	5-94	
	Cylinder Head Cover	5-37	5-47	5-94	
	Timing Chain Tensioner	5-37	5-47	5-93	
	Start decompression COMP	5-37	5-47	5-93	
	Timing driven sprocket	5-38	5-47	5-93	
	Camshaft, rocker arm	5-38	5-48	5-92	
	Cylinder Head	5-38	5-48	5-92	
	Guide chain plate	5-38	5-58	5-91	
	Cylinder	5-38	5-58	5-91	
	Piston	5-39	5-59	5-90	
Engine Right Side	CVT Cover	5-39	5-61	5-94	
	Primary Sheave/Secondary Sheave/Drive Belt	5-39	5-62	5-89	
	CVT case	5-40	5-68	5-89	
	Chain holder, Tension plate	5-40	5-68	5-89	
	Timing Chain	5-40	5-68	5-89	
Engine Left Side	Starting Motor	5-40	5-113	5-89	
	Sector Gear	5-41	5-68	5-86	
	Water Pump cover	5-41	5-69	5-88	
	Cap	5-41	/	5-88	
	Axle sleeve	5-42	/	5-88	
	Oil filter	5-42	5-69	5-88	
	Left Crankcase Cover/ Magneto Stator	5-42	5-69	5-87	
	Magneto Rotor	5-42	5-69	5-87	
	Starting Driven Gear	5-43	5-70	5-87	
	Starting Dual Gear	5-43	5-71	5-87	
	Oil pump drive gear/Oil pump dual gear	5-43	5-71	5-87	

To be continue

Item	Description	Disassembly	Inspection/ Maintena	Assembly	Remarks
Engine Center	Gear Position Bolt	5-43	/	5-86	
	Right Crankcase/Crankcase inspection	5-44	5-72	5-85	
	Front Output Shaft Components/ Driven Bevel Gear Components	5-44	5-76	5-84	
	Bevel Gear Components	5-45	5-75	5-85	
	Transmission Main Shaft	5-45	5-79	5-84	
	Shift Drum/ Shift Fork COMP	5-45	5-79	5-84	
	Drive countershaft	5-45	5-79	5-84	
	crankshaft & connecting	5-46	5-82	5-85	
	Balance Shaft	5-46	5-83	5-85	
	Oil Pump	5-46	5-83	5-86	
	Filter Net	5-46	5-74	5-86	
	Left Crankcase	/	5-72	/	

Notes: Arrowhead direction is for engine removal orders. Reverse the direction for assembly and installation

Ⅰ Engine Removal

Preparation before engine removal

● Prepare a proper tray used for load of components

● Prepare necessary removal and assembly tools

● Drain up engine oil（see5.2.8）

● Drain up coolant（see5.2.9）

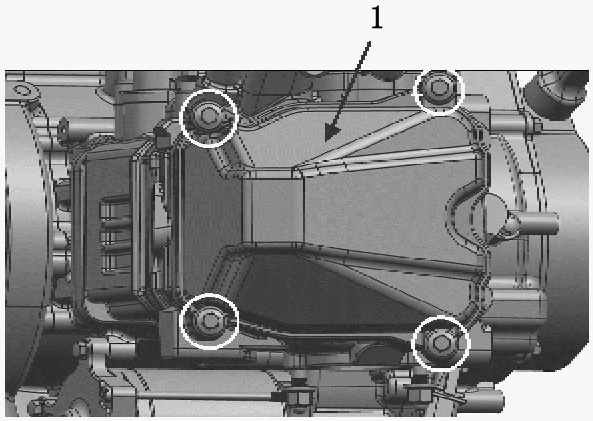
Engine Front Side

Spark Plug

● Remove spark plug with special wrench (see5.2.5）

Cylinder Head Cover

● Remove 4 bolts of cylinder head cover. Remove cylinder head cover 1

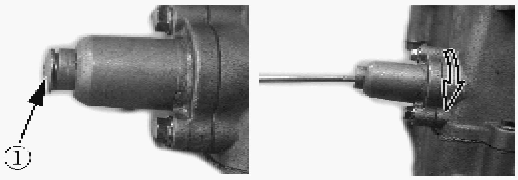


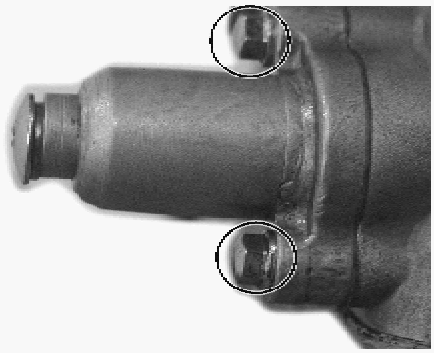
Timing Chain Tensioner

● Remove screw plug①，insert a flat screwdriver into slot of timing chain tensioner adjuster , turn it clockwise to lock tensioner spring;

● Remove tensioner fix bolt

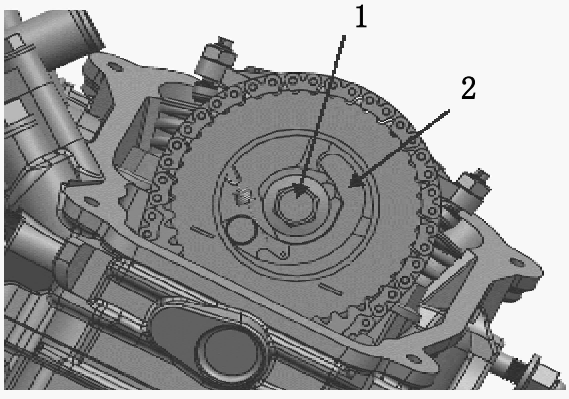
● Remove tensioner and gasket





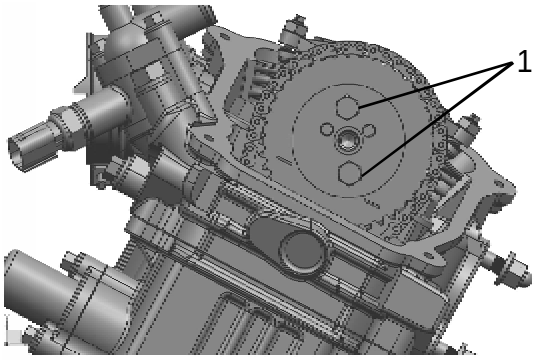
Start decompression COMP

● Remove bolt 1，RemoveStart decompression COMP 2



Timing driven sprocket

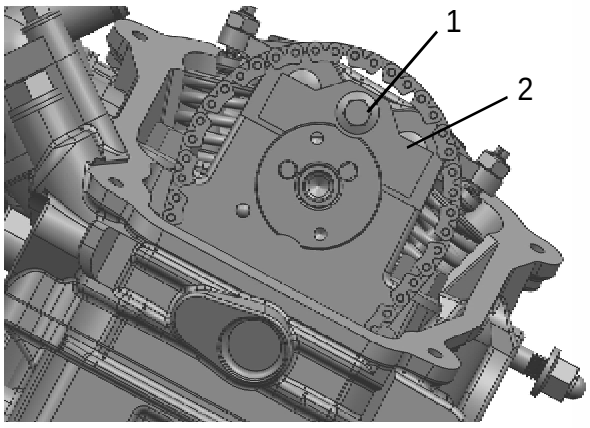
● Loosen 2 bolts 1 of timing driven sprocket
● Remove timing driven sprocket



Camshaft, rocker arm

● Loosen bolt1
● Remove camshaft holder
● Remove rocker arm shaft,Remove rocker arm
● Remove camshaft

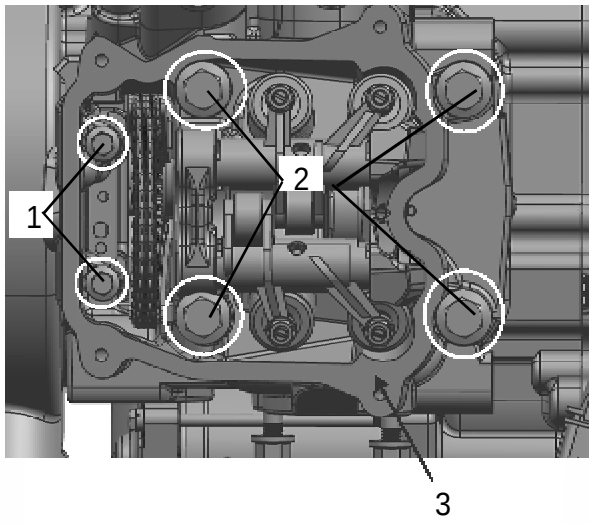
Note: Turn camshaft to free state.



Cylinder Head,Guide Chain Plate

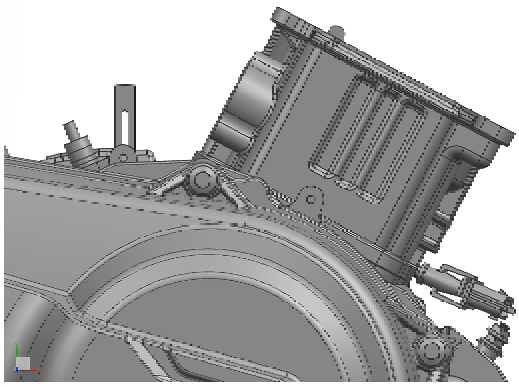
● Remove 2 bolts 1 of cylinder head
● Remove 4 cylinder head bolts 2 diagonally
● Remove cylinder head 3
● Remove guide chain plate
● Remove dowel pin and cylinder head gasket

Note: Take care not to drop dowel pin into crankcase



Cylinder

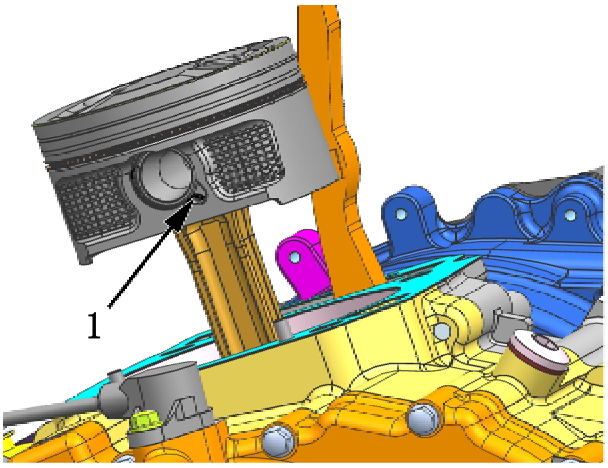
● Remove cylinder



Piston

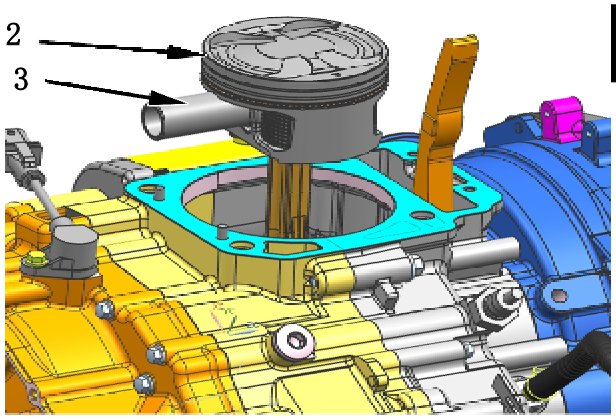
Put a clean rag under piston so as not to drop piston pin circlip into crankcase.

Warning:Piston pin circlip is spring-loading



●Remove piston pin circlip 1 and discard it.

Note: No need to remove two piston pin circlip



Remove piston pin circlip 3 from piston pin hole (connecting rod hole)

Remove piston 2 from connecting rod

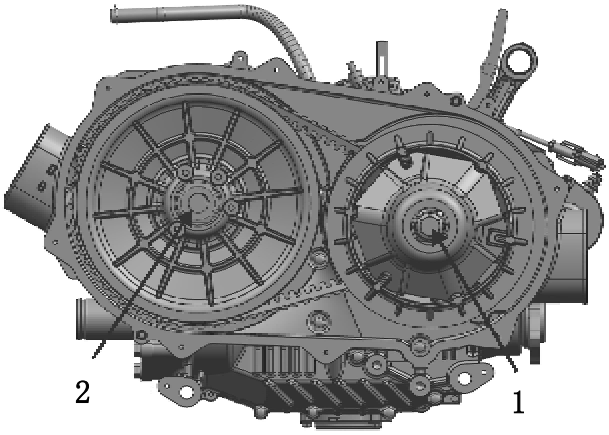
Engine Right Side

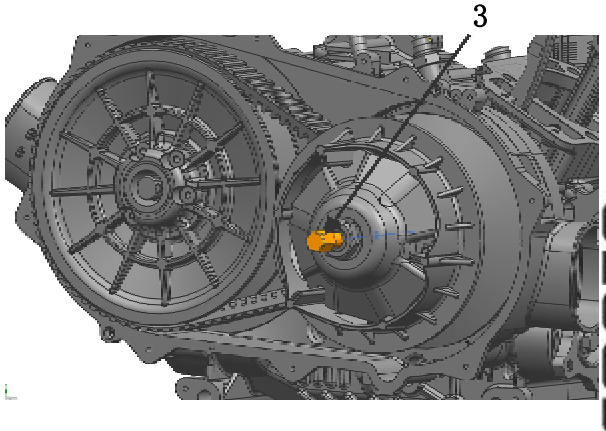
CVT Cover

● Remove CVT cover（see 5.2.7）

Primary Sheave/Secondary Sheave/Drive Belt

● Remove drive bolt 1 and driven screw 2





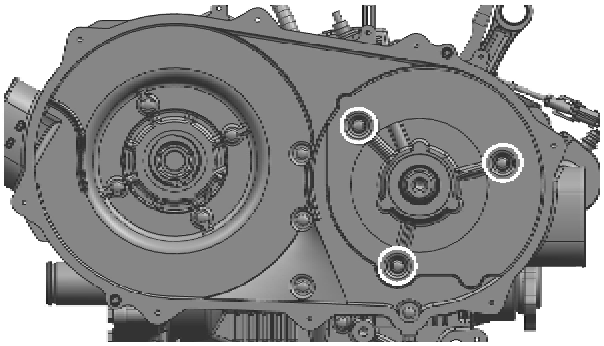
● Remove secondary sheave with special tools

● Remove primary sheave/secondary sheave/drive belt

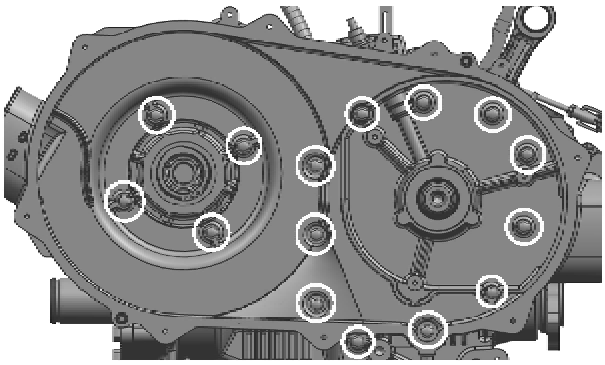
Tool: Sheave Holder 3
(0JY0-050000-922-002)

CVT Case

● Remove bolt of air intake plate
Remove air intake plate

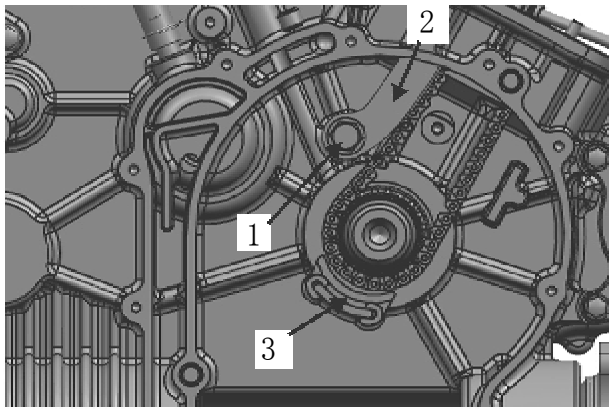


● Remove bolt of CVT case
● Remove CVT case
● Remove dowel pin
Remove paper gasket and discard it.



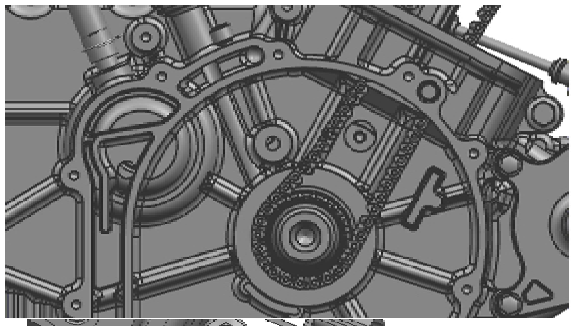
Chain holder, Tension plate

● Remove bolt 1 of tension plate
Remove tension plate 2
● Remove chain holder 3



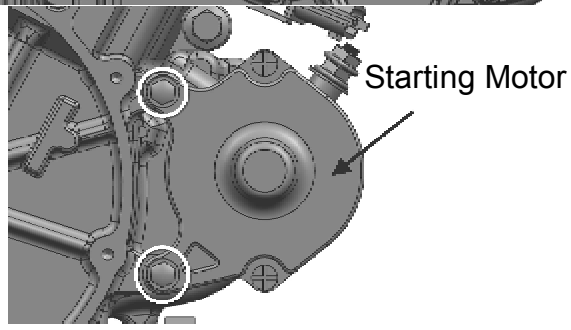
Timing Chain

● Remove timing chain from crankshaft sprocket



Starting Motor

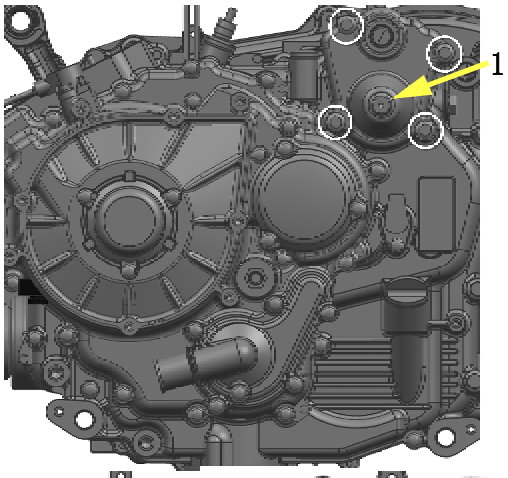
● Remove 2 bolts of starting motor
● Remove starting motor

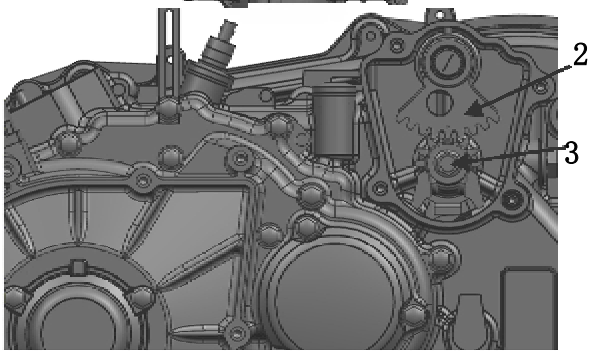


Sector Gear

● Remove 4 bolts of sector gear housing cover

● Remove sector gear housing cover 1





● Remove dowel pin and gasket

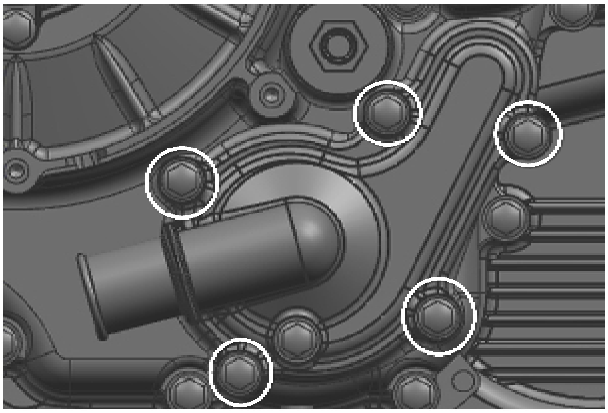
● Remove drive sector gear

● Loosen bolt 3, remove driven sector gear

Water Pump

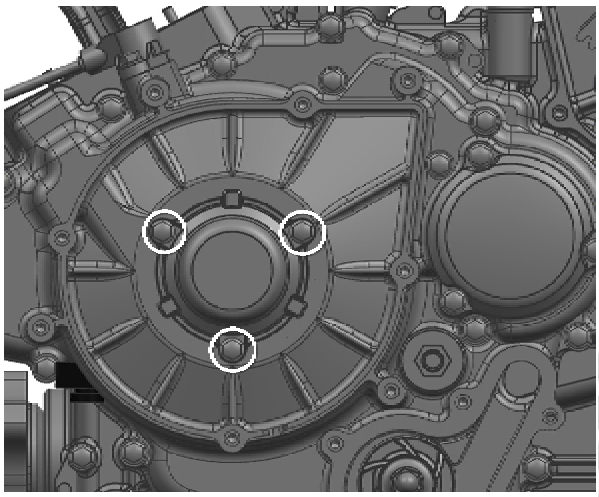
● Screw out bolt of water pump

● Remove water pump, O ring



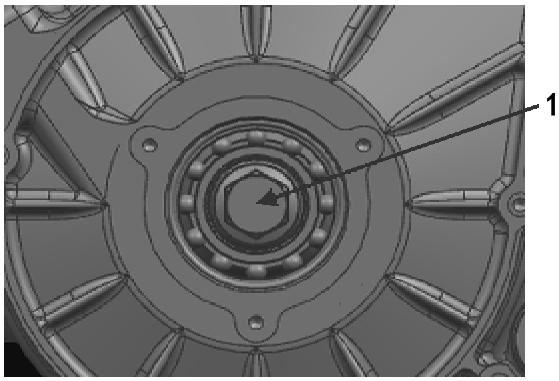
Cap

● Remove 3 bolts, remove cap



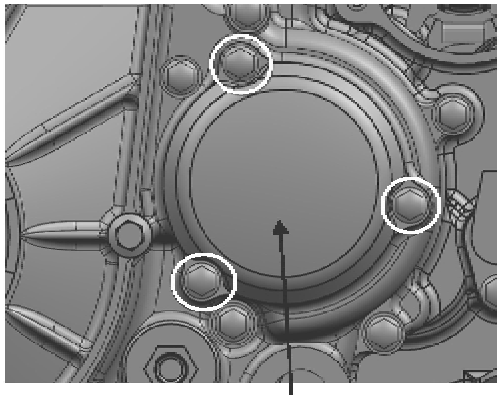
Axle sleeve

● Screw out bolt 1, remove Axle sleeve



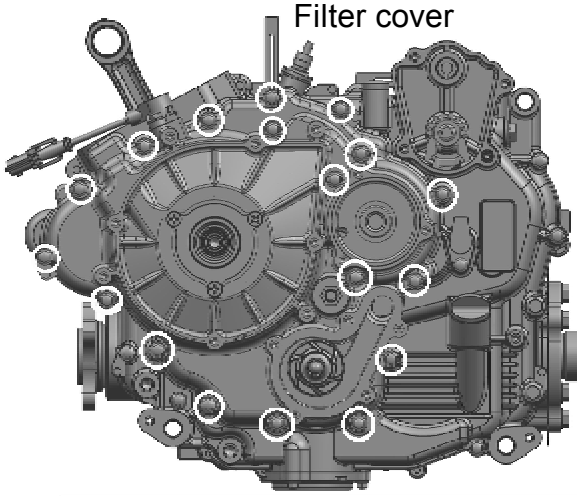
Oil Filter

● Screw out 3 bolts of filter cover
● Remove filter cover, O ring
● Remove oil filter



Left Crankcase Cover/Magneto Stator

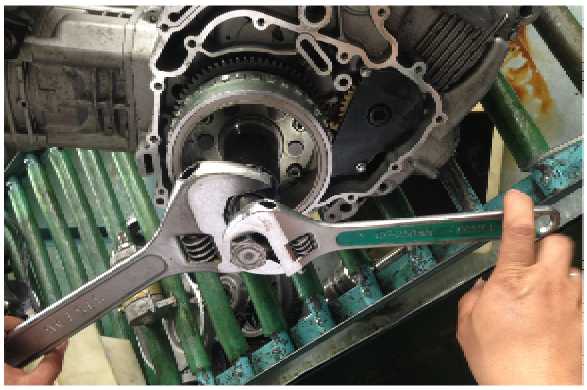
● Remove bolts of left
● Remove left crankcase cover
● Remove dowel pin and gasket



Magneto Rotor

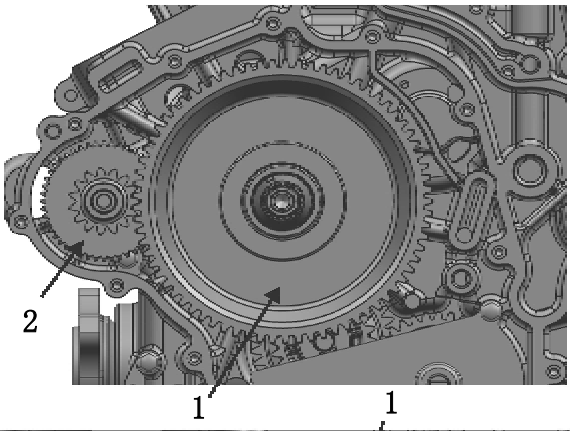
● Install special tool to rotor thread
Remove rotor and woodruff key

Tool: Rotor Remover
(0180-031000-922-001)



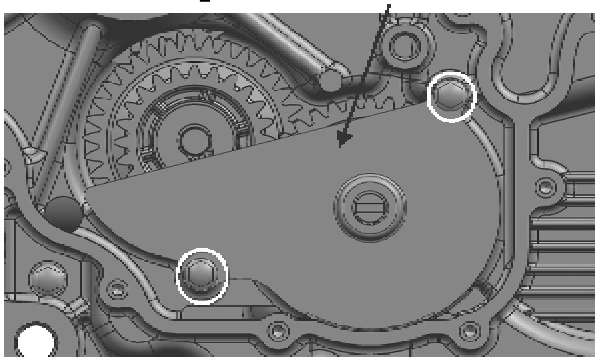
Starting Driven Gear/Starting Dual Gear

● Remove starting driven gear 1 and needle bearing
● Remove starting dual gear 2 and shaft

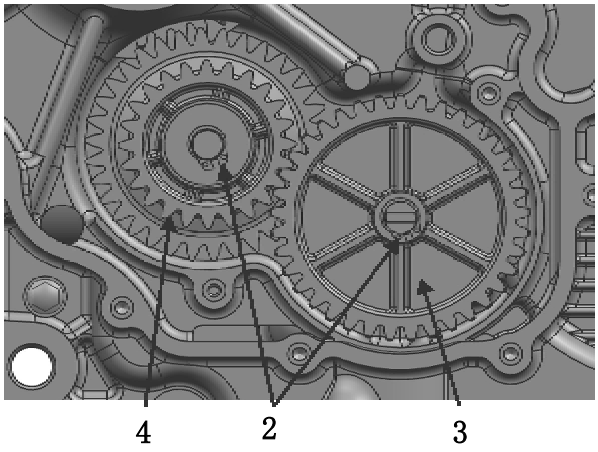


Oil pump drive gear/Oil pump dual gear

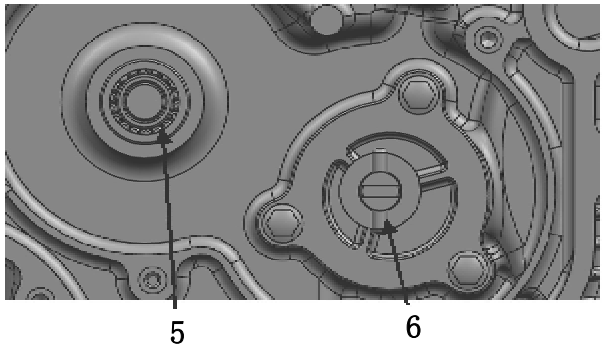
● Remove oil guide bolt
● Remove oil guide 1



● Remove 2 Circlip 2 by circlip plier
● Remove oil pump drive gear 3, oil pump dual gear 4 and gasket



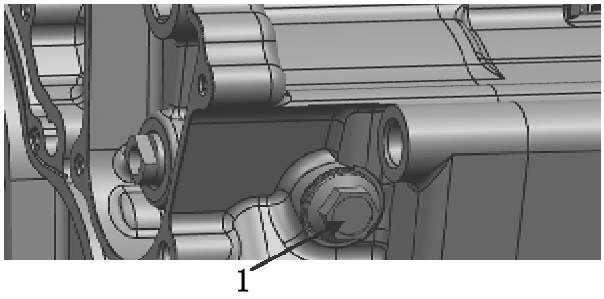
● Remove needle bearing 5
● Remove pin shaft 6, gasket



Engine Center

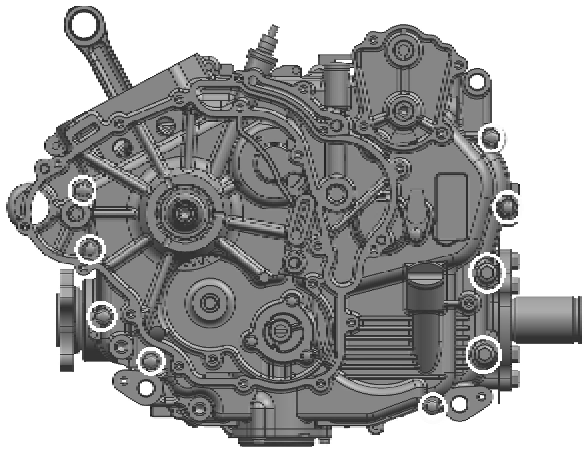
Gear position bolt

● Remove gear position bolt 1
● Remove spring and steel ball

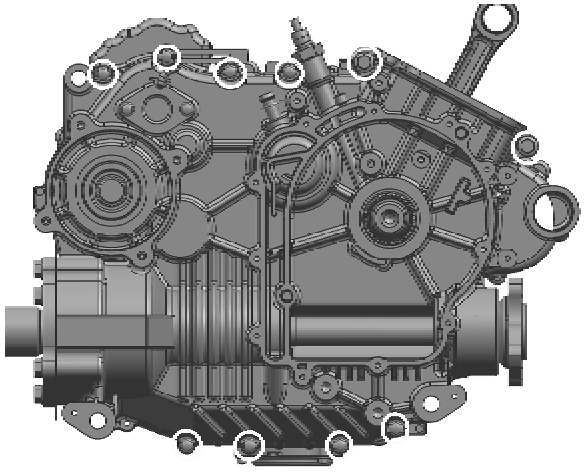


Right Crankcase

● Remove left crankcase bolts



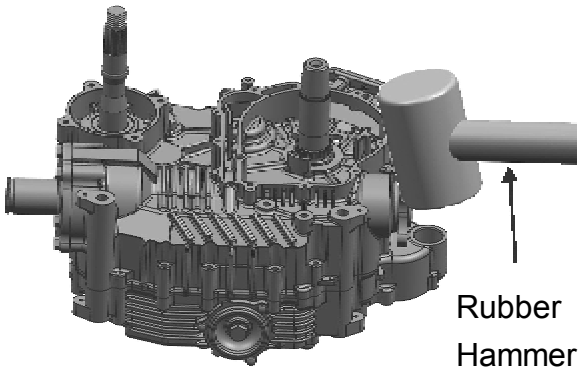
● Remove right crankcase bolts



● Separate crankcase carefully with rubber hammer knocking the case

Caution:

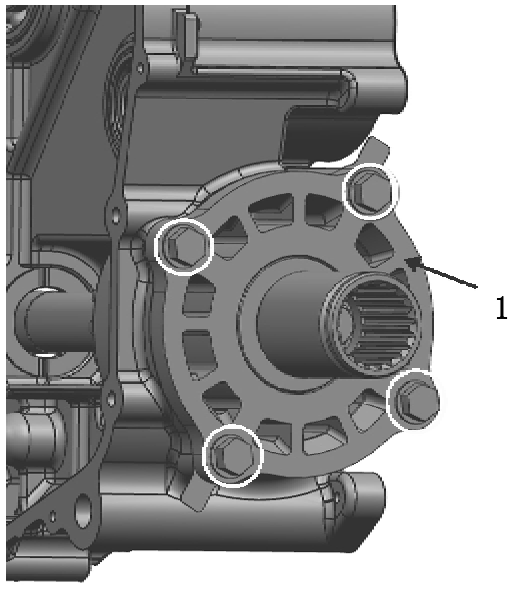
Do not damage the seal surface of right/left crankcase when separating Crankshaft should remain in the left crankcase half.



Front Output Shaft, Driven Bevel Gear

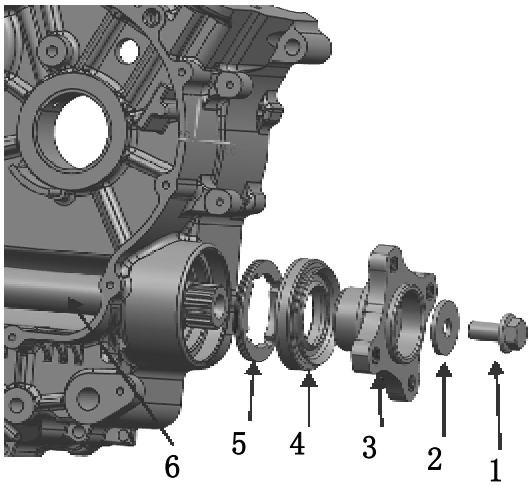
● Remove bevel gear cover bolt

● Remove driven bevel gear 1



● Remove bolt 1 , gasket 2 , front output coupler 3, oil seal 4, front output shaft bearing ring 5(LH)

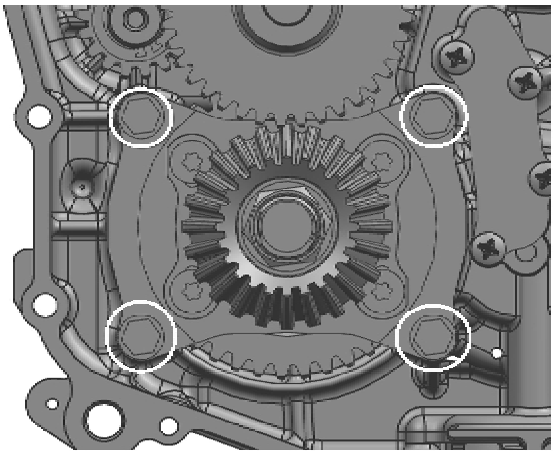
● Remove Front Output Shaft 6



Drive Bevel Gear

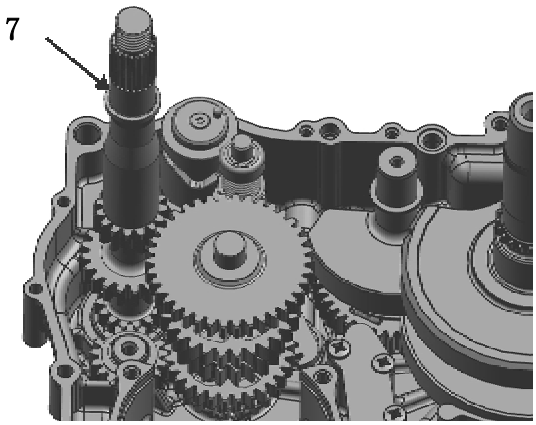
● Screw out driven bevel gear bearing seat bolt

● Remove driven bevel gear from left crankcase



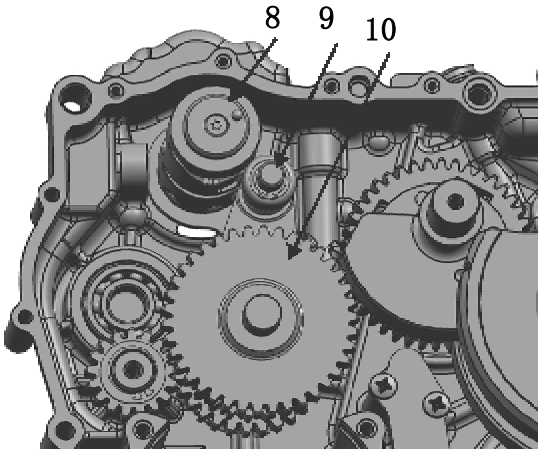
Transmission Main Shaft

● Remove transmission main shaft 7



Shift Drum, Shift Fork, Drive countershaft

● Remove shift drum 8, shift fork 9, and drive countershaft 10

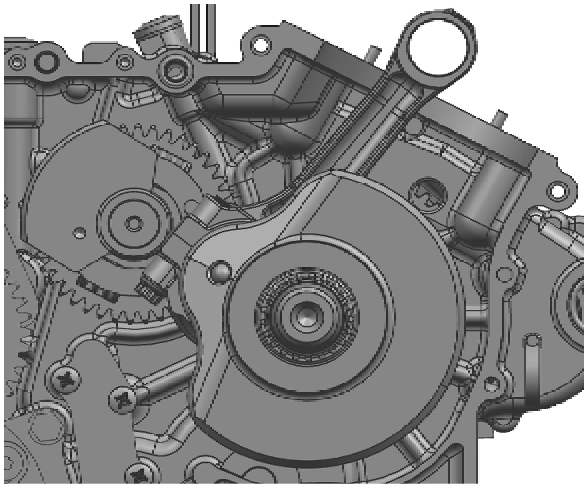


Note: Shift drum, shift fork and drive countershaft should be removed together.

Crankshaft

● Turn the crankshaft to the point indicated on the picture to level up scale and holes of the balancing shaft.

● Remove crankshaft from left crankcase



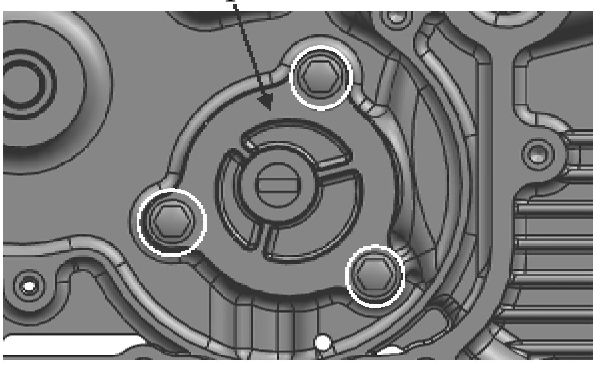
Balance Shaft

● Remove balancer shaft from left crankcase

Oil bump

● Screw out oil pump bolt

● Remove oil bump 1



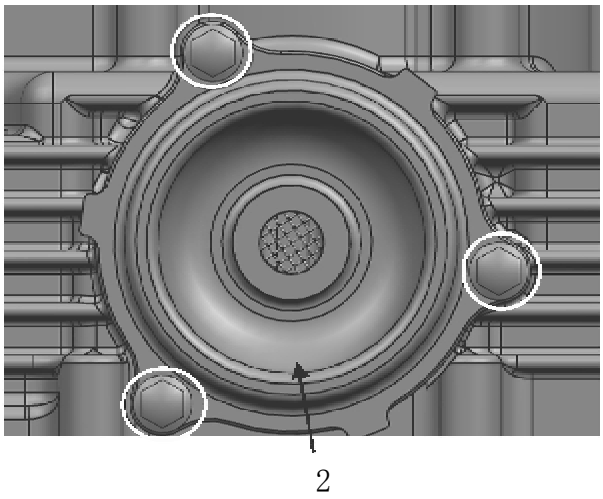
Note:Oil pump bolt size M5 X 16

Filter Net

● Screw out the bolt

● Remove filter cap 2

● Remove filter net

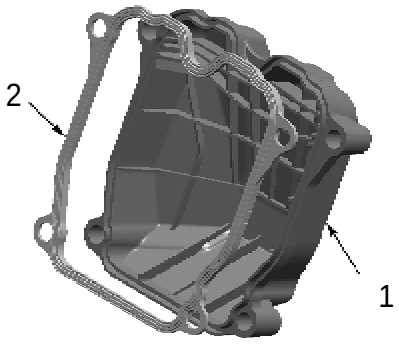


Ⅱ Engine Components Inspection

Cylinder Head Cover

Check if any scratch is on the cap.
Check is any crack, crush or hardening on the sealer ring. If so,change accordingly.

1.Cylinder Head Cover
2.Cylinder Head Cover Seal Ring



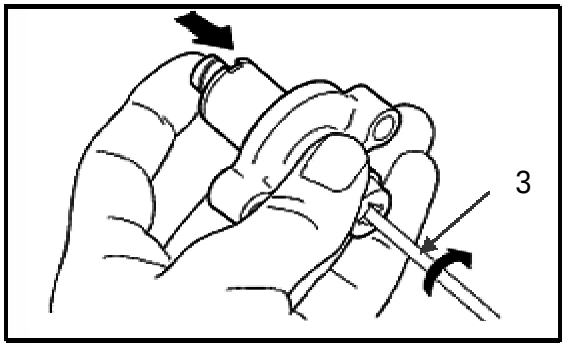
Timing Chain Tensioner

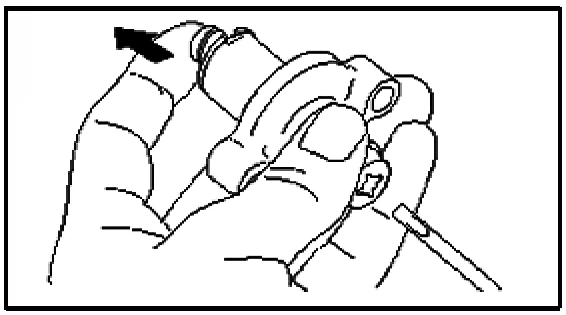
●Check tensioner for any damage or poor Function. Damage, poor function: Replace

●Performance stability inspection methods

■Insert screw driver 3 into the slotted end of adjusting screw, turn it clockwise to loosen the tension and release the screw-driver

■ Move the screw driver and let go of the arm slowly, ensuring the arm snaps back smoothly. If not, replace the chain tensioner with a new one.

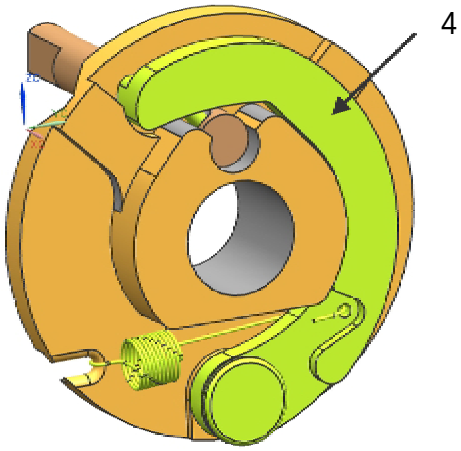




Start decompression COMP

● Check if any crack is on the reducer. If any,change a new one.

● Move pressure reducing arm 4 .Check if pressure-reducing rocker arm and cam-shaft can move flexibly and return automatically.



Timing Driven sprocket

● Check any scratch or damage on cam-shaft timing chain wheel. If the gear is scratched or damaged, change a new one completely (including camshaft timing chain wheel and timing chain).

Camshaft Inspection

● Check any scratch , abrasion, crack or other damage on each camshaft and journal.

●Check journal dia. and height of camshaft by micrometer

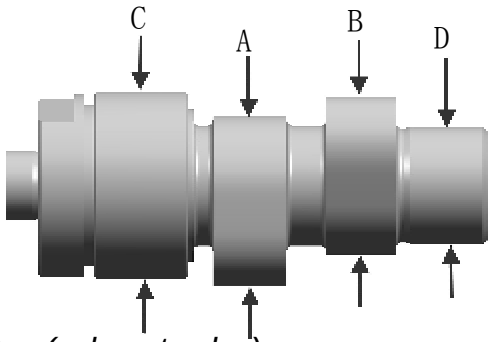
Camshaft	
Cam(intake)	
New part	32.985mm～33.025 mm
Maintenance limit	32.865 mm
Cam(exhaust)	
New part	32.971mm～33.011mm
Maintenance limit	32.871 mm

Camshaft journal(timing chain side)	
New part	34.959mm～34.975 mm
Maintenance limit	34.950 mm
Camshaft bearing shaft（ignition plug side）	
New part	21.959mm～21.980 mm
Maintenance limit	21.950 mm

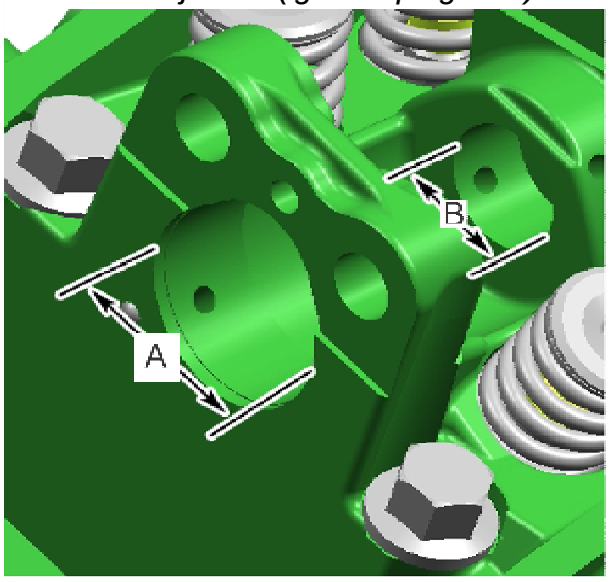
●Test tolerant clearance of camshaft sides and cylinder cap

Camshaft bearing hole(timing chain side)	
New part	35.007mm～35.025 mm
Maintenance limit	35.040 mm
Camshaft bearing hole(spark plug side)	
New part	22.012mm～22.025 mm
Maintenance limit	22.040 mm

If parameters are beyond standards, change the parts.



A.Cam(exhaust valve)
B.Cam(intake valve)
C.Camshaft journal(timing chain side)
D.Camshaft journal(ignition plug side)



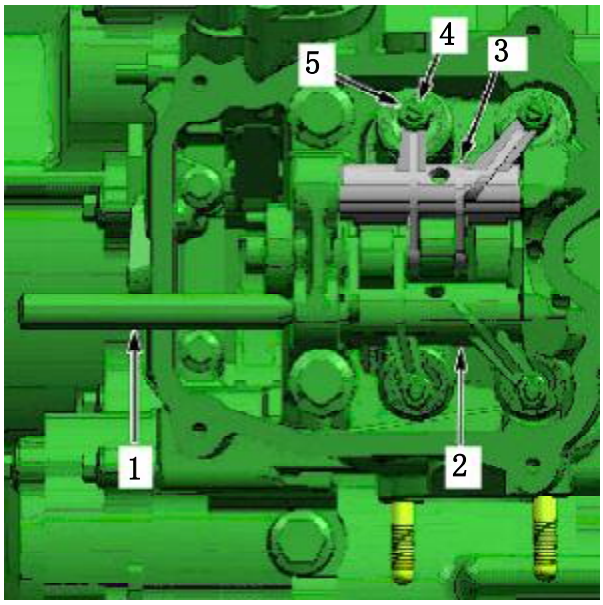
A.Camshaft bearing hole(timing chain side)
B.Camshaft bearing hole(spark plug side)

Cylinder head cover

Remove rocker arm

● Remove rocker arm bearing

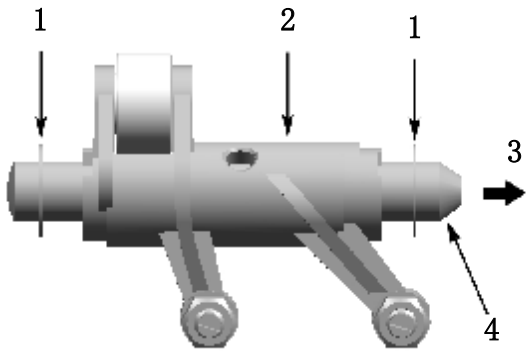
●Remove rocker arm(intake and exhaust) Including adjusting screw and nut.



1.Rockshaft
2.Exhaust rocker arm
3.Intake rocker arm
4.Adjusting screw
5.Nut

● Remove Thrust washer.

CAUTION: Pay attention not to lose thrust washers or drop them into the timing chain compartment.



1.2 Thrust Washers
2.Rocker Arm,Exhaust
3.Cylinder Head Spark Plug Side
4.Big Taper to Spark Plug Side

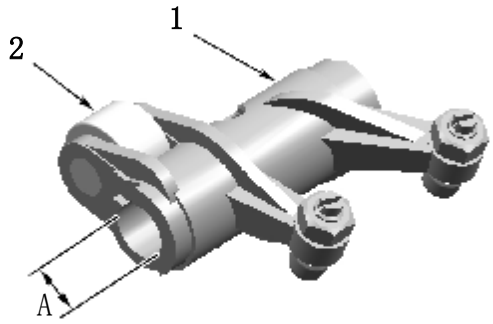
Rocker Arm Inspection

● Inspect each rocker arm for cracks and scored friction surfaces. If any, replace rocker arm assembly.

● Check the rocker arm rollers for freee movement,wear and excessive radial play. Replace rocker armassembly if necessary.

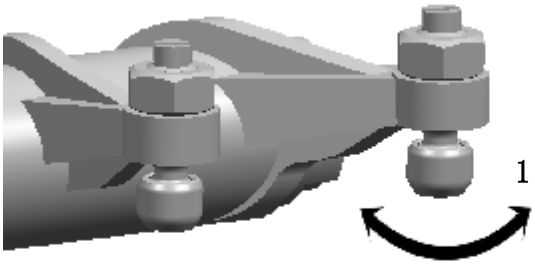
● Check rocker arm bore diameter. If diameter is out of specification, change rocker arm assembly.

Rocker Arm Bore Diameter	
New	12.000mm～12.018mm (0.4724in～0.4731in)
Service Limit	12.030mm (0.4736in)



1.Rocker Arm,Exhaust
2.Roller
A Bore for Rocker Arm Shaft

● Check adjustment screws for free movement, cracks and/or excessive play.



1.Free Movement of Adjustment Screw

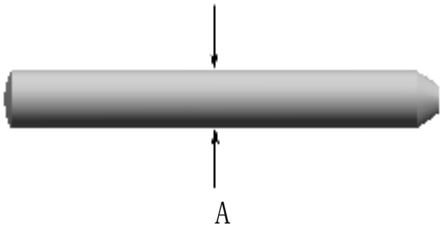
Rocker Arm Shaft

●Check for scored friction surfaces; if any, replace parts.

● Measure rocker arm shaft diameter.

Rocker Arm Shaft Diameter	
New	11.973mm～11.984mm
Service Limit	11.960mm

Any area worn excessively will require parts replacement.



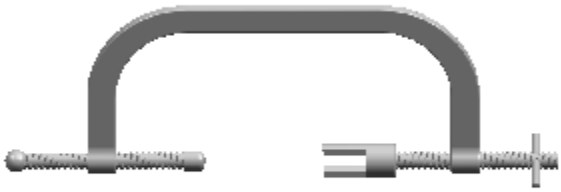
A.Measure rocker arm shaft diameter here

Valve Spring Removal

● Use valve spring compressor clamp (CF188-022006-922-001)to compress valve spring

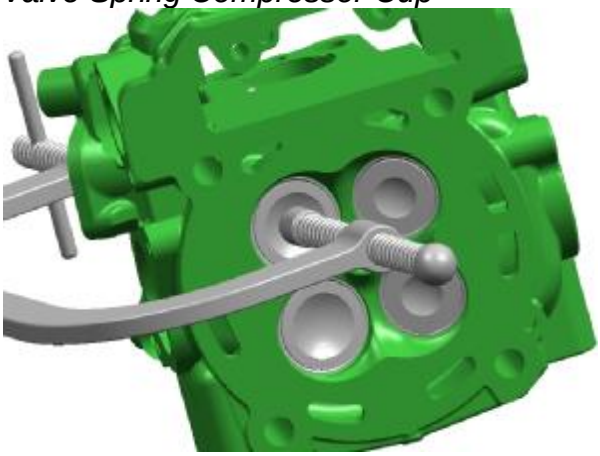
WARNING

Always wear safety glasses when disassembiling valve springs.Be careful when unlocking valves.Components could fly away because of the strong spring preload



Valve Spring Compressor Clamp

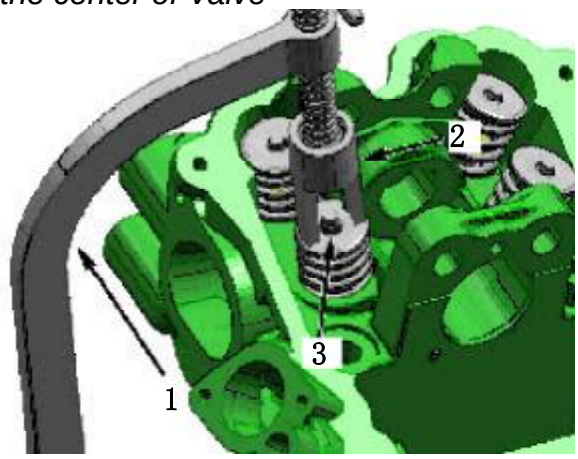
Valve Spring Compressor Cup



Align valve spring compressor clamp with the center of Valve

● Remove valve cotters.

●Withdraw valve spring compressor, valve spring retainer and valve spring.



1.Valve Spring Compressor Clamp
2.Valve Spring Compressor Cup
3.Valve Cotter

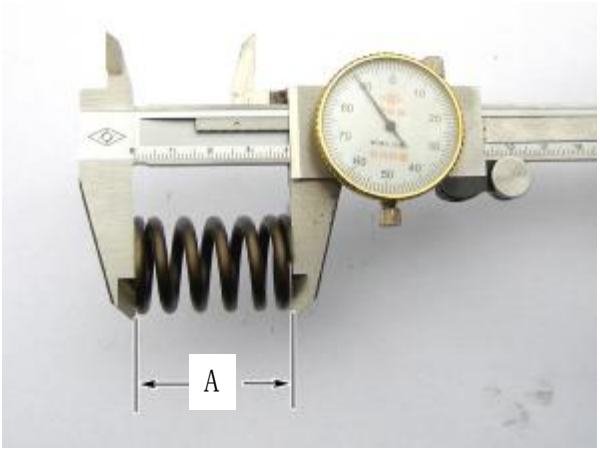
Valve Spring Inspection

● Check valve spring for visible damages, If any, replace valve spring.

● Check valve spring for free length and straightness.

Valve Spring Free Length	
Normal New	40 mm
Service Limit	38.2 mm

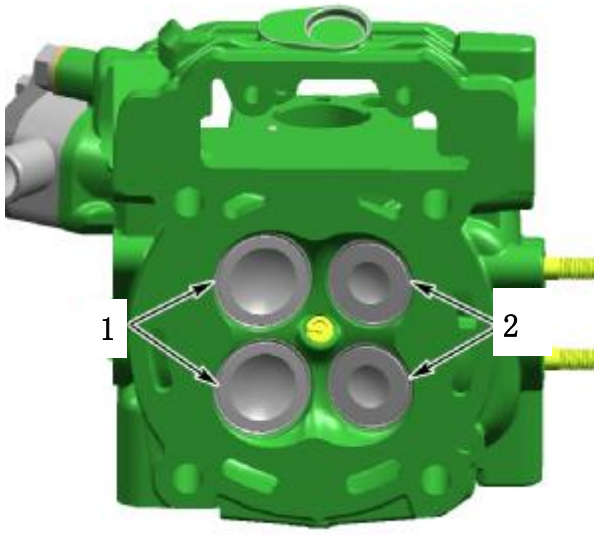
Replace valves springs if not within specifications.



A.Valve Spring Length

Valve Removal

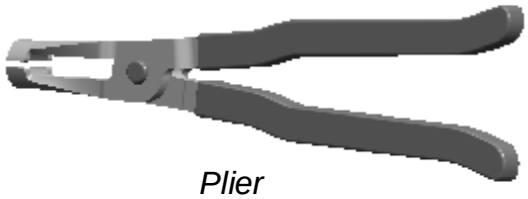
●Push valve stem, then pull valves(intake and exhaust)out of valve guide.



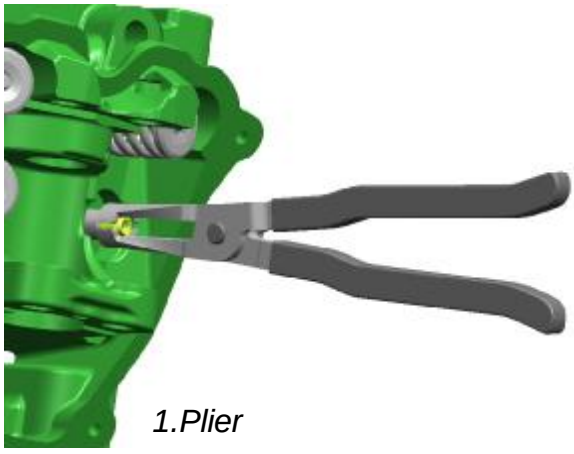
1.Intake Valve 33mm

2.Exhaust Valve 29mm

● Remove valve stem seal with Snap-on pliers and discard it.



Plier



1.Plier

2.Valve Stem Seal

Valve Inspection

Valve Stem Seal

Always install new seals whenever valves are removed

Valve

● Inspect valve surface, check for abnormal stem wear and bending. If out of specification, replace by a new one.

Valve Out of Round (Intake and Exhaust Valves)	
New	0.005 mm
Service limit	0.06 mm

Valve Stem and Valve Guide Clearance

● Measure valve stem and valve guide in three placesusing a micrometer and a small bore gauge.

NOTE: Clean valve guide to remove carbon deposit before measuring.

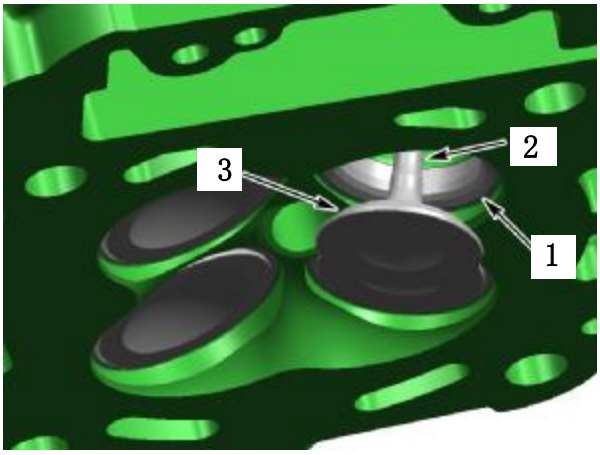
Change valve if valve stem is out of specification or has other damages such as wear or friction surface.

Valve Stem Diameter	
Exhaust Valve	
New	4.955mm～4.970 mm
Service limit	4.930 mm
Intake Valve	
New	4.965mm～4.980 mm
Service limit	4.930 mm

Replace valve guide if valve guide is out of Specification or has other damages, such as wear or friction surface

Valve Guide Diameter (Intake and Exhaust Valves)	
New	5.000mm～5.012 mm
Service limit	5.045 mm

A.Valve Stem Diameter



1.Valve Seat
2.Exhaust Valve Contaminated Area
3.Valve Face(Contact Surface to Valve Seat)

Valve Face and Seat

●Check valve face and seat for burning or pittings and replace valve or cylinder head if there are signs of damage.

● Ensure to seat valves properly. Apply some lapping compound to valve face and work valve on its seat with a lapping tool (see Valve Guide Procedure below).

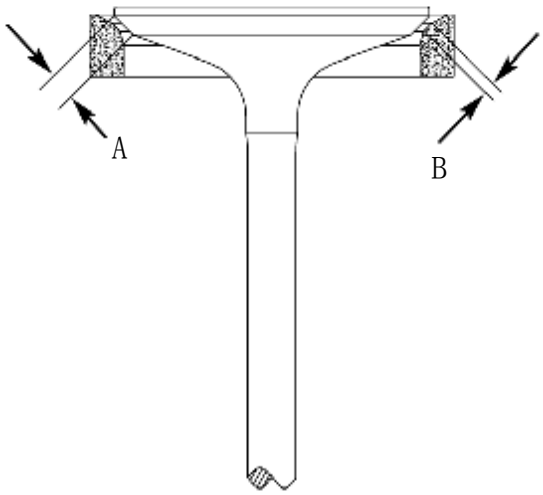
● Measure valve face contact width.

NOTE: The location of contact area should be in center of valve seat.

●Measure valve seat width using a caliper.

Valve Seat Contact Width	
Exhaust Valve	
NEW	1.20mm～1.40 mm
Service limit	1.80 mm
Intake Valve	
New	1.10mm～1.30 mm
Service limit	1.70 mm

If valve seat contact width is too wide or has dark spots,replace the cylinder head.



A.Valve Contact Surface Width
B.Valve Seat Contact Width

Valve Guide Removal

NOTE: Clean valve guide area from contamination before removal.

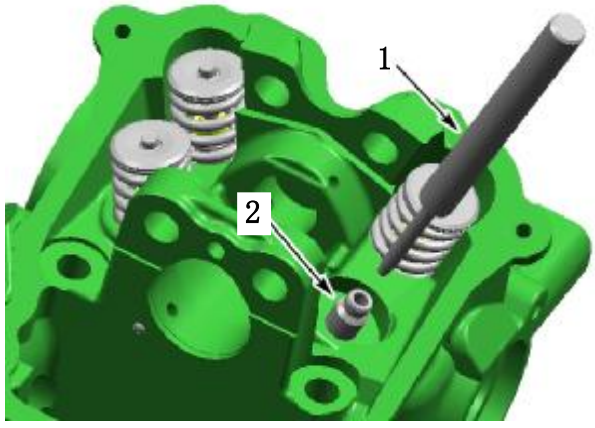
● Use valve guide remover(0800-022102-922-001)and a hammer, drive the valve guide out of cylinder head.

Valve Guide Remover

Valve Guide Inspection

Always replace valve stem seals whenever valve guides are removed.

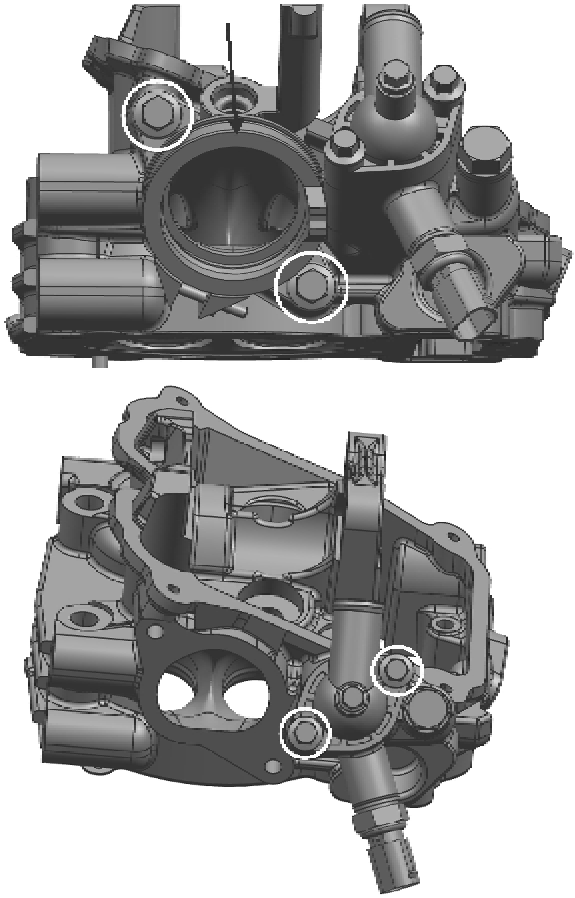
Clean the valve guide bore before reinstalling the valve guide into cylinder head.



1.Valve Guide Remover
2.Valve Guide

Injector Seat

● Unscrew the set bolt and remove the injector seat 1



Injector Seat Inspection

● Inspect Injector Seat for cracks or other damage..

Check the seal for wear or excessive using. Replace it if necessary.

Water Temperature Sensor and Thermostat

● Unscrew the Thermostat bolt,remove the Thermostat Cover,Thermostat,Thermostat Seat andWater Temperature Sensor.

● Water Temperature Sensor Inspection (Check 5. 4. 6)

● Thermostat Inspection (Check 5.6.7)

Cylinder Head Installation

Valve Guide Installation

For installation, reverse the removal procedure. Pay attention to the following details.

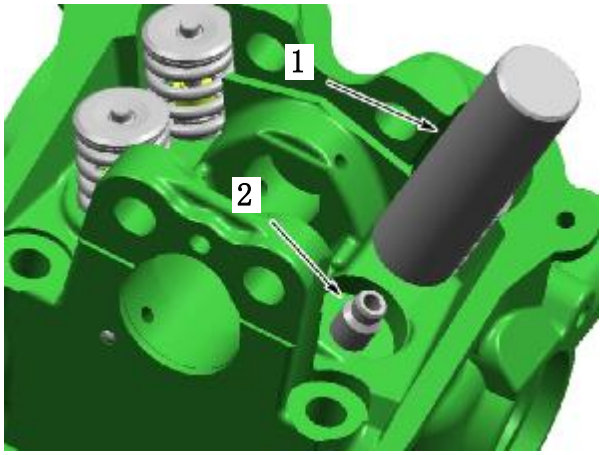
● Use valve guide installer(0800-022102-922-002)to install valve guide.

NOTE: Apply loctite(antiseize lubricant) on valve guide prior to install it into the cylinder head.

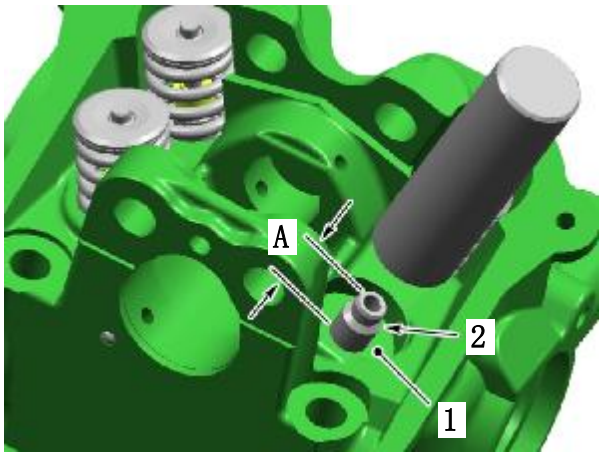
● Push valve guide in the cold cylinder head as per following illustration.

Valve Guide (Measurement “A”)	
NEW	14.70mm～15.30 mm

Valve Guide Installer



1.Valve Guide Installer
2.Valve Guide

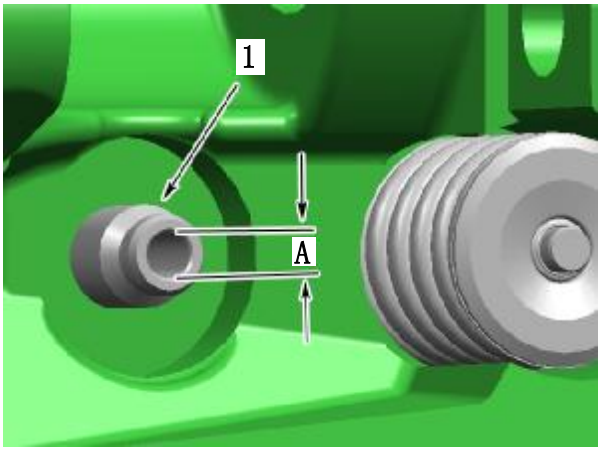


1.Thrust Surface of Cylinder Head
2.Valve Guide
A.Measurement from Thrust Surface to Valve Guide Top

● Valve guide to be adjusted in diameter by using a reamer.

Valve Guide Diameter (Intake and Exhaust Valves)	
New	5.000mm～5.012 mm

NOTE: Ensure to turn reamer in the right direction. Use cutting oil and make brakes to clean reamer/valve guide from metal shavings.



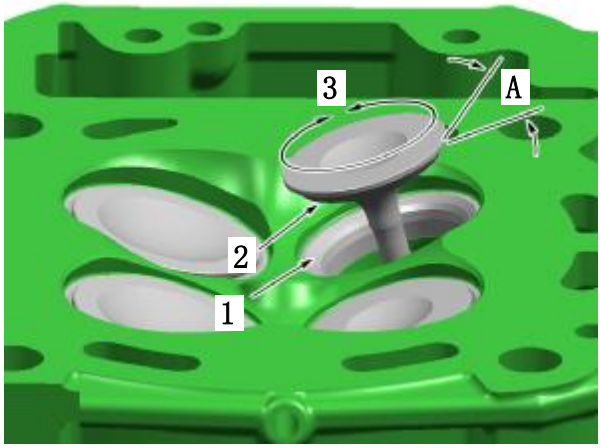
1.Valve Guide
A.Valve Guide Diameter

● Apply some lapping compound to valve face and work valve on its seat with a lapping tool.

NOTE: Ensure to seat valves properly. Apply marking paste to ease checking contact pattern.

● Repeat procedure until valve seat/valve face fits together.

Note: Clear up the abradant



1.Valve Seat
2.Valve Face(contact surface to valve seat)
3.Turn valve while pushing against cylinder head
A.Valve Seat Angle 45

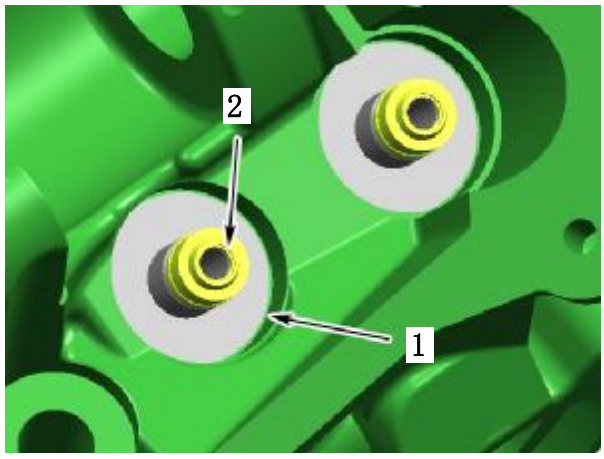
Valve Installation

For installation, reverse the removal procedure(Check 5-46).Pay attention to the following details.

● Install a **NEW** valve stem seal. Make sure thrust washer is installed before installing seal.

● Apply engine oil on valve stem and install it.

CAUTION: Be careful when valve stem is passed through sealing lips of valve stem seal.



1.Valve Spring Lower Seat
2.Sealing Lips of Valve Stem Seal

Valve Spring Installation

For installation, reverse the removal procedure(Check 5-45). Pay attention to the following details.

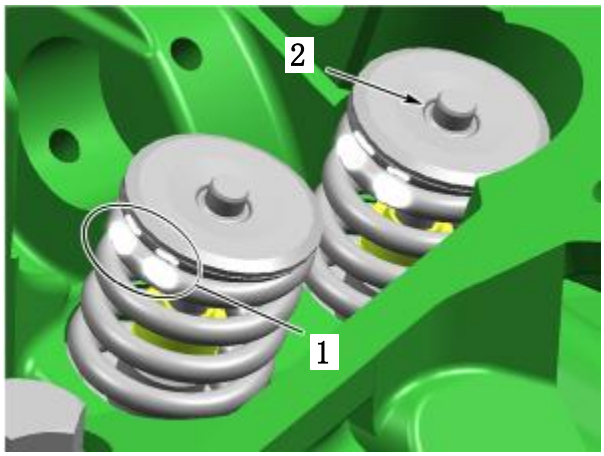
●Colored area of the valve spring must be placed on top.

● To ease installation of cotters, apply oil or grease on them so that they remain in place while releasing the spring.

NOTE: Valve cotter must be properly engaged in valve stem grooves.

●After spring is installed, ensure it is properly locked by tapping on valve stem end with a soft hammer so that valve opens and closes a few times.

CAUTION: An improper locked valve spring will cause engine damage.



1.Position of the Valve Spring
2.Valve Cotter

5

Rocker Arm Installation

NOTE: Use the same procedure for exhaust and intake rocker arm.

● Apply engine oil on rocker arm shaft.

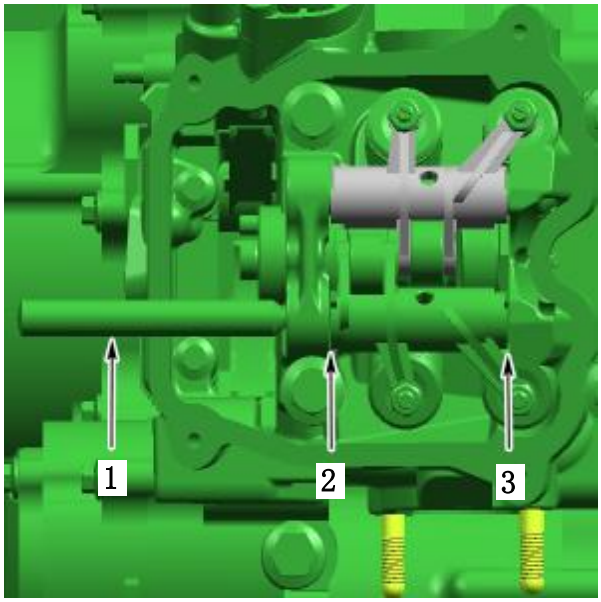
●Install the rocker arm shaft with the chamfered edge first and use following procedure.

1、Insert a rocker arm pin through rocker arm pin bore.

2、Install a thrust washer then proper rocker arm(exhaust side)or (intake side).

3、Push in rocker arm shaft until its chamfer reaches the end of rocker arm bore.

● Place the other thrust washer and push rocker arm¡¡shaft to end position.

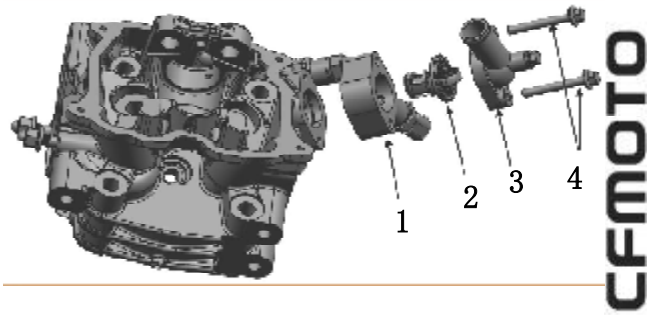


1.Rocker Arm
2.Thrust Washer(Timing Chain Side)
3.Thrust Washer(Spark Plug Side)

Thermostat Installation

● Install the Thermostat seat 1, Thermostat2,Thermostat cover 3 and two bolts 4

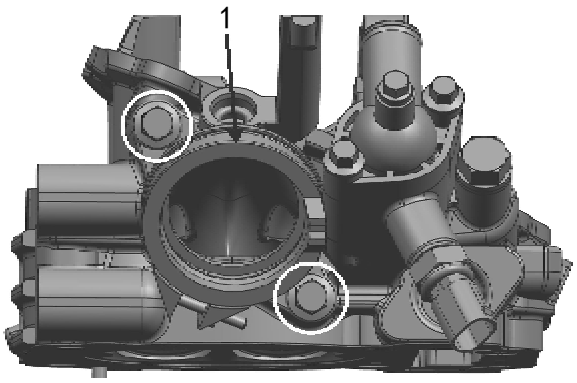
Note: Don't miss to install the "O" seal ring



Injector Seat Installation

●For installation, reverse the removal procedure (Check 5-49).

Note: Don't miss to install the seal ring.



1 .InjectorSeat

Upper Guide Chain Inspection

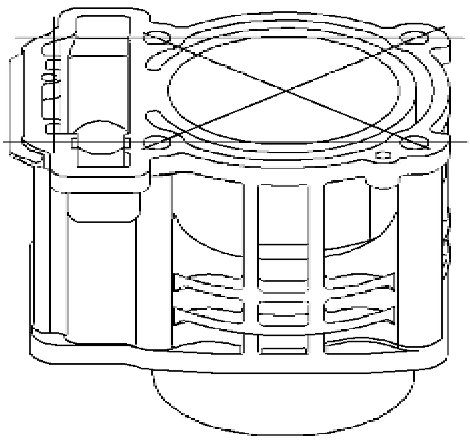
● Inspect Upper guide chain,check for abnormal wear,cracks and rubber fall off. If out of specification,replace by a new one.

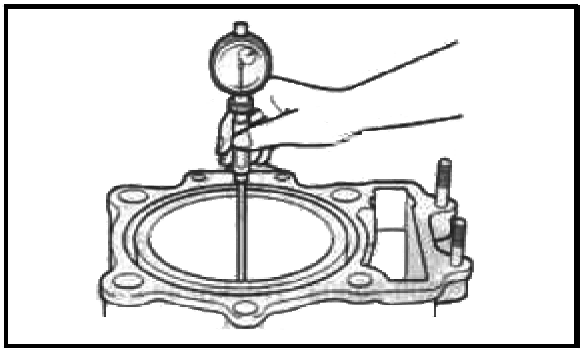
Cylinder Body Inspection

Cylinder Body Distortion

● Check the planeness of gasket surface, total 7 point to inspect with a straight edge and thickness gauge.Take clearance readings from several places. If any clearance reading is out of the service limit, replace with a new cylinder body.

Cylinder Body Distortion Service Limit:
0.05mm
Tool:Thickness Gauge,straight edge



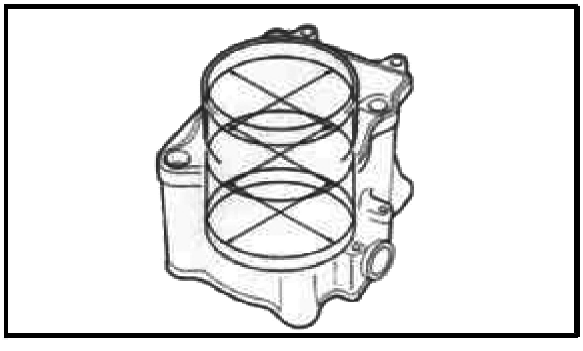


Cylinder Body Inner Diameter Inspection

● Check the scoring or other damages in the inner wall of Cylinder Body, Replace it if necessary.

● Measure the diameter of bore by Inner diameter gauge from upper,middle and lower places of cylinder inner diameter to check with two mutual vertical direction.

Cylinder body inner diameter service limit:
90.99mm～91.01mm
Tool:Inner diameter gauge



Pistion

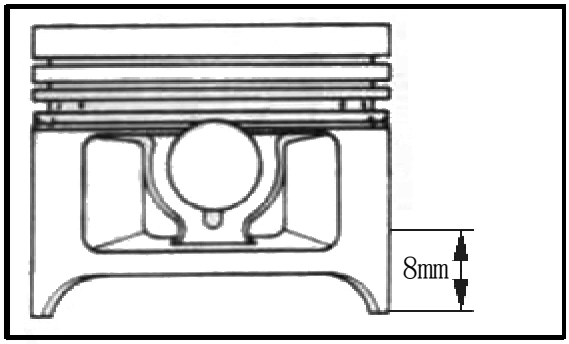
Pistion Diameter

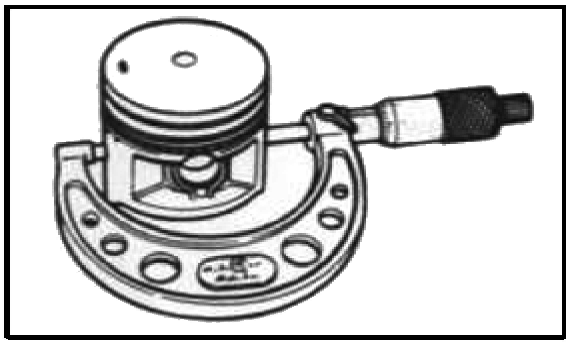
● Inspect Pistion for cracks or other damage.Replace pistion and pistion ring if necessary.

●Vertical measure the pistion on the 8mm direction between pistion pin by micrometer

Replace pistion if out of service limit.

Pistion Parameter	
New	90.950mm～90.970 mm
Service Limit	90.85 mm





Pistion Ring Groove Clearance

● Measure the one-sided clearance of pistion 1 and 2 by Straight edge, if out of service limit, replace pistion and pistion ring.

Service limit (Clearance)

Pistion ring 1: 0.15mm

Pistion ring 2: 0.15mm

Service limit (Width)

Pistion ring 1: 1.21mm~1.23mm

Pistion ring 2: 1.51mm~1.53mm

Oil ring: 2.50mm~2.52mm

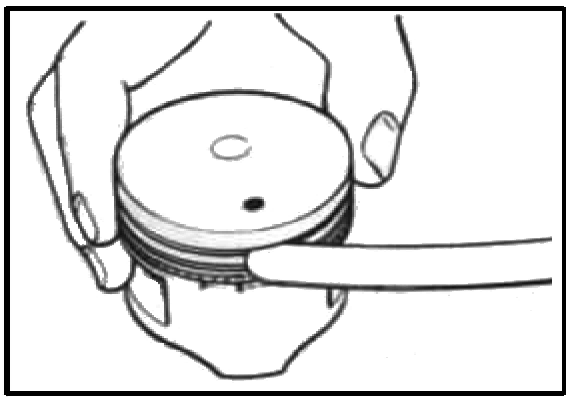
Service limit (Thickness)

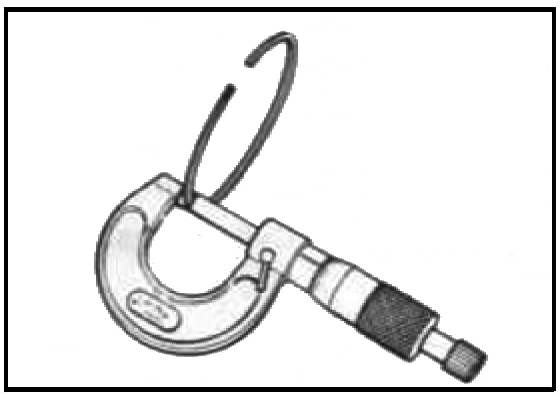
Pistion ring 1: 1.17mm~1.19mm

Pistion ring 2: 1.47mm~1.49mm

Tool: Straight edge

Micrometer(0~25mm)





Pistion ring free gap and Pistion ring end gap

●Using a feeler gauge measure each ring free gap,place the ring in the cylinder To measure the ring end gap, If the clearance is too large,the piston and piston rings should be replaced.

Pistion ring free gap (service limit)

Pistion ring 1: 8.9mm

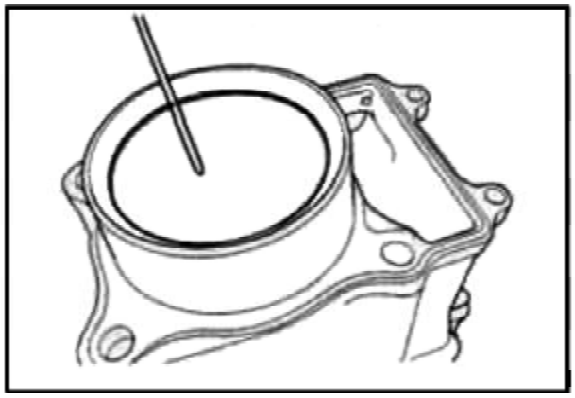
Pistion ring 2: 9.5mm

Pistion ring end gap (service limit)

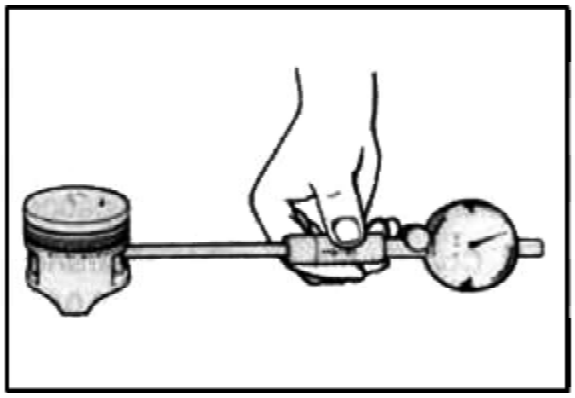
Pistion ring 1: 1.5mm

Pistion ring 2: 1.5mm

Tool: Vernier caliper. Feeler gauge

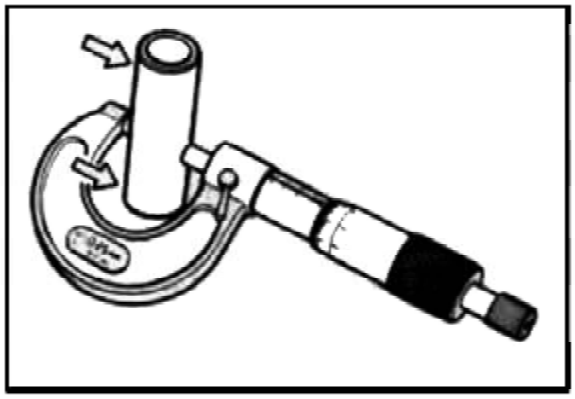


Pistion Pin and Pin Bore



●To measure the inner diameter of Pistion pin bore by Bore dial indicator.
To measure the outer diameter of Pistion pin by micrometer
If out ot service limit,replace Pistion and Pistion pin

Pistion Pin Bore(service limit): 22.010mm



●To measure the outer diameter of Pistion Pin in three difference positions by micrometer.

Pistion Pin outer diameter(service limit): 21.980mm

Tool: Inner diameter gauge(18mm~35mm)
Micrometer(0~25mm)

Piston/Cylinder Clearance

●Adjust and lock micrometer to the piston dimension.With the micrometer set to the dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0(zero).

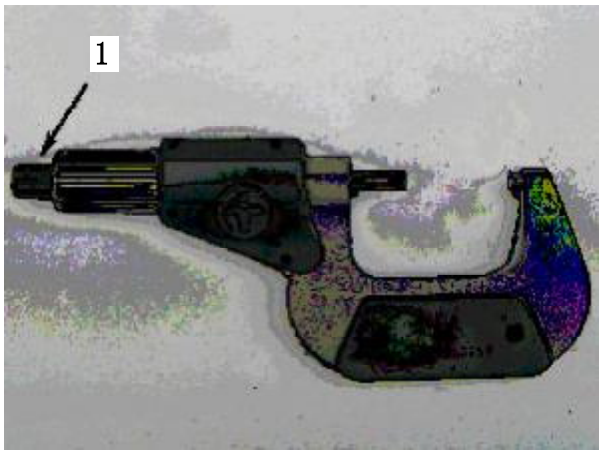
●Position the dial bore gauge 20mm(0.787 in)above cylinder base, measuring perpendicularly(90)to piston pin axis

Read the measurement on the cylinder boregauge.The result is the exact piston/ cylinder body clearance.

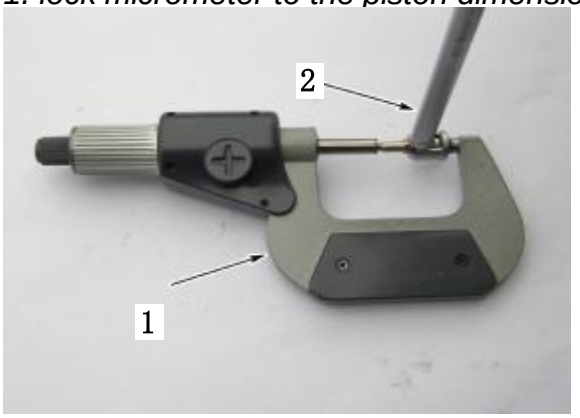
Piston/Cylinder Clearance	
NEW	0.030mm～0.050 mm
Service Limit	0.100 mm

NOTE: Make sure used piston is not worn.if clearance exceeds specified tolerance,replace piston by a new one and measure piston/cylinder clearance again.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.



1. lock micrometer to the piston dimension



1.Use the micrometer to set the cylinder bore gauge

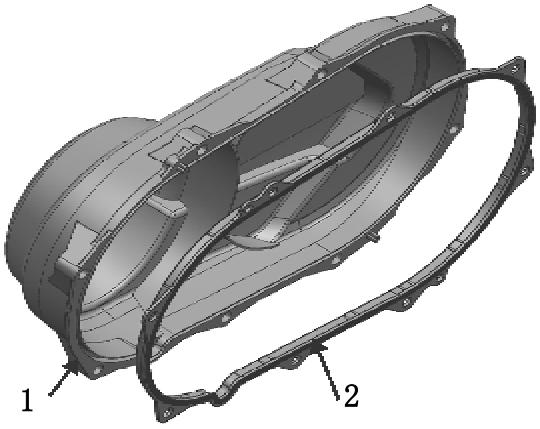
2.Dial Bore Gauge

1.Indiacator set to 0(zero)

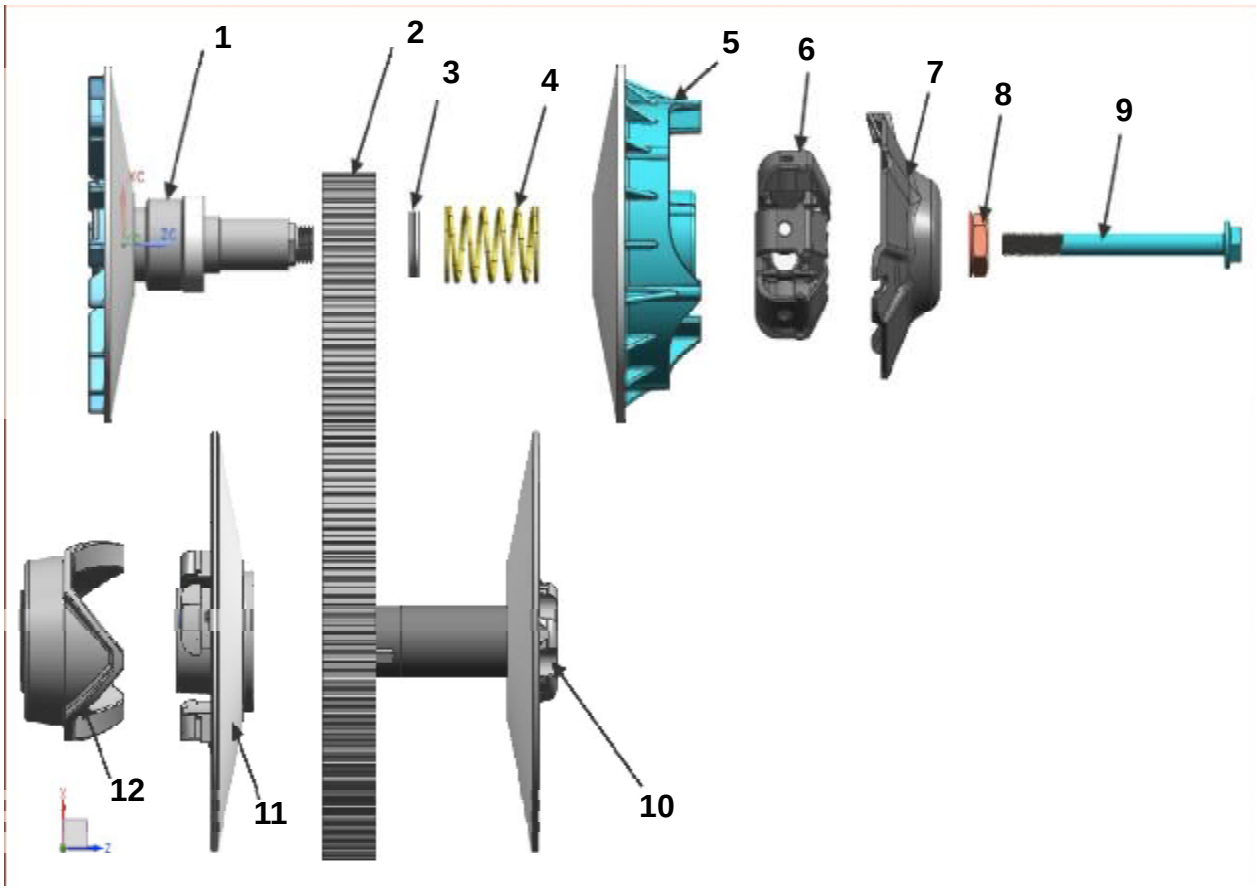
CVT Cover

●Inspect CVT Cover 1 for cracks.Replace a new CVT Case if necessary

● Inspect seal ring 2 of CVT Cover for ageing,damage.Replace a new one if necessary



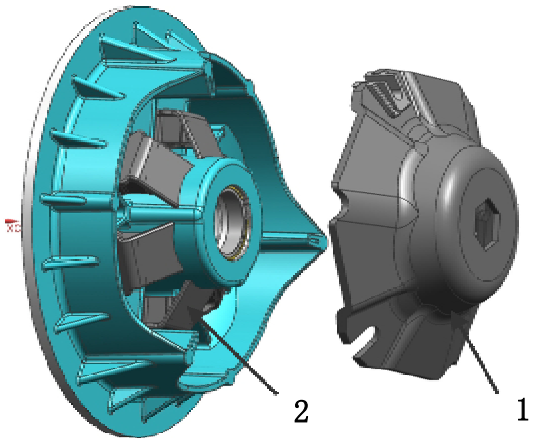
Drive Pulley,Driven Pulley,Drive Belt



1、Drive Pulley Fixed Sheave
2、Drive Belt
3、Ajusting Washer
4、Spring,Drive Pulley
5、Drive Pulley Sliding Sheave
6、Centrifugal weight
7、Cam
8、Nut
9、Bolt
10、Driven Pulley Fixed Sheave
11、Driven Pulley Sliding Sheave
12、Spring holder

Drive Pulley

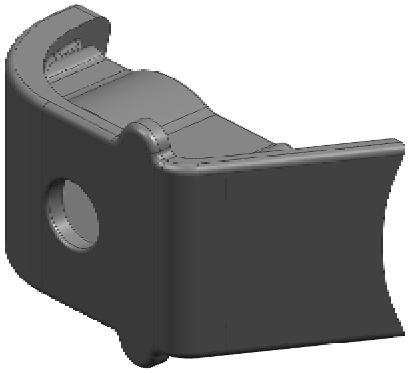
● Loosen Drive Pulley Nut,remove,CVT, Drive pulley fixed And Sliding Sheave
● Remove the Cam 1 and CentrifugalWeight 2



Centrifugal Weight Inspection

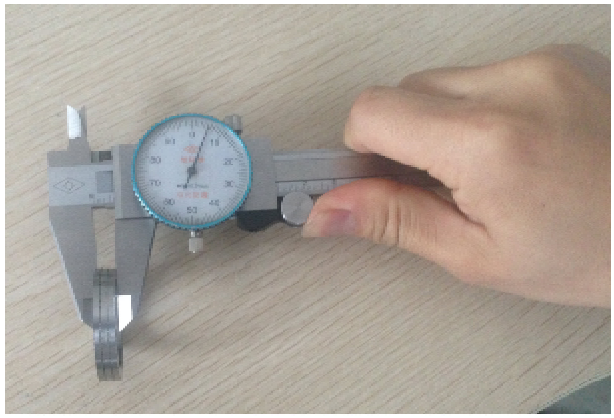
● Inspect CentrifugalWeight and Sliding surface for wear or damage,Replace a set of centrifugal weight if abnormal

Note: Centrigual Weight should be replaced by complete set.



Ajusting Washer Thickness Inspecti

● Measure the thickness of Ajusting Washer byvernier caliper.Replace it If out of service limit.
Service limit: 5 mm ~7mm



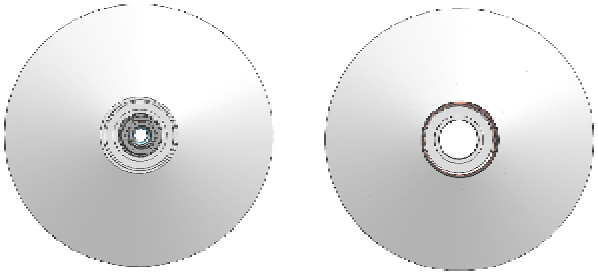
Drive Pulley Fixed and Sliding Sheave Inspection

● Inspect the abnormal conditions of drive surface for multistep wear or other damage. Replace it if abnormal
● Inspect one-way clutch if equipped.Replace it if abnormal

Drive Pulley Installation

To install it as contrary process of removal

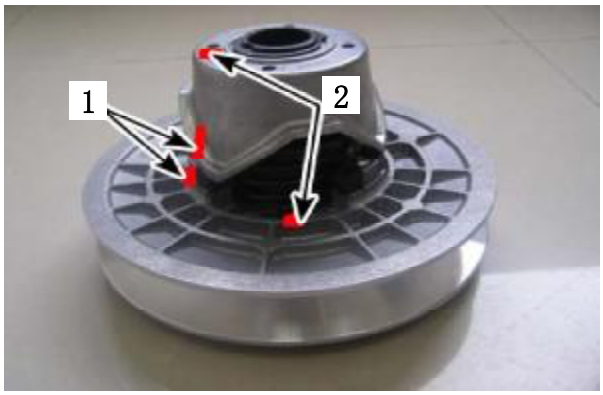
Note: The nut washer should be stucked in the hexagon shaft to stand-still locking.



Driven Pulley

Disassembly

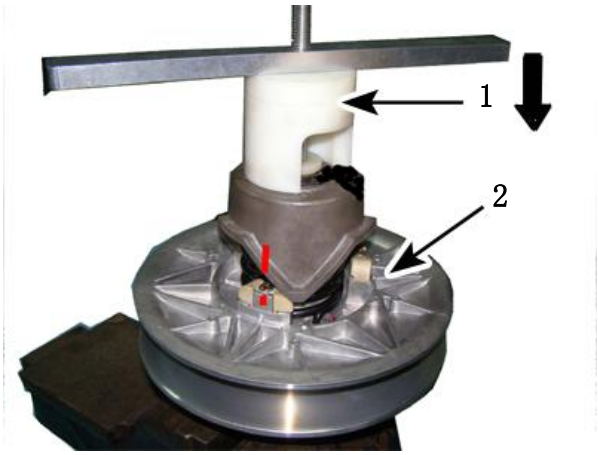
NOTE: Before disassembly, mark on the spring installation holes and cam feet to sliders positions.



1.Cam and slider marks
2.Spring Installation Holes Marks

● As the illustration shows, place driven pulley on the special tool base.

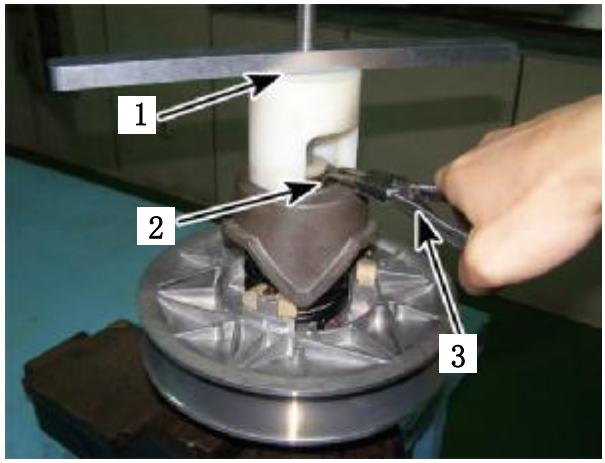
Special tool: Driven Pulley Remover
(0800-052000-922-002)



1.Driven Pulley Remover
(0800-052000-922-002)
2.Driven Pulley

●Turn special tool handle to compress the cam and spring.Using a circlip remover(a plier),remove circlip.

Note: Use special tool to remove circlip in order to avoid any wounding if spring seat flying up.



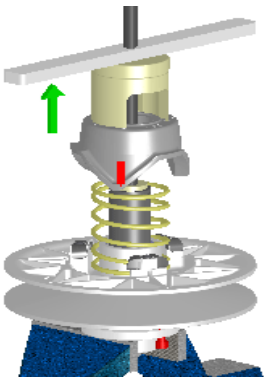
1.Driven Pulley Remover
(0800-052000-922-002)
2.Circlip
3.Circlip Remover

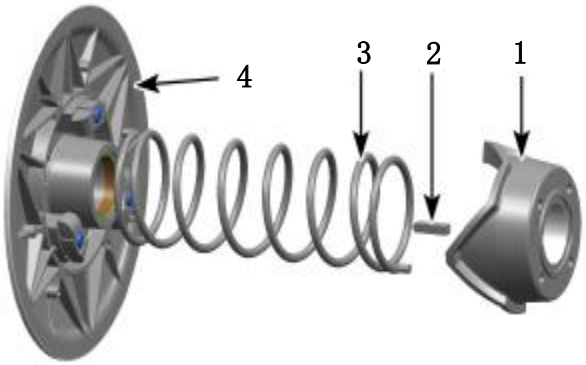
●Slowly loosen tool handle to release the spring tnesion and remove the special tool;

Remove cam;

Remove guide pin;

Remove spring and sliding sheave of driven pulley.





1.Cam
2.Guide Pin
3.Spring
4.Sliding Sheave of Driven Pulley

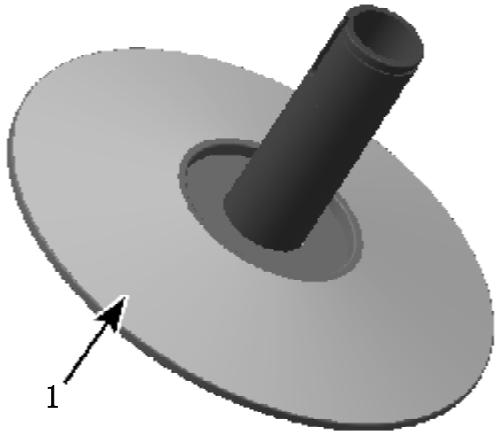
Driven Pulley Inspection

Driven Pulley Fixed Sheave Inspection

●Check driven pulley faces for any abnormal conditions, such as heavy wear or visible damage. Replace if necessary.

NOTE: Clean fixed sheave of driven pulley before inspection.

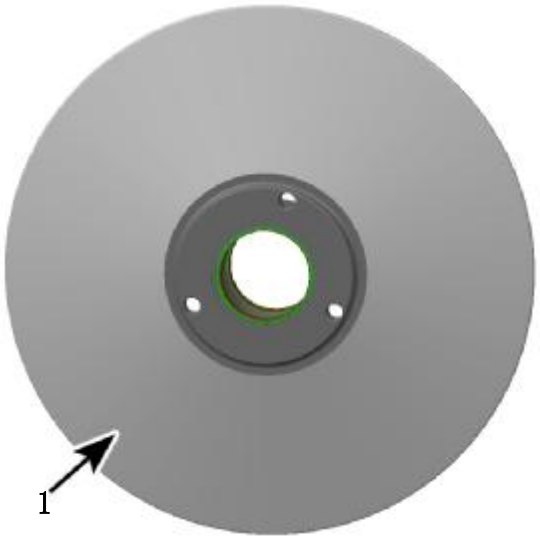
NOTE: Driven pulley assembly is precisely matched.If only fixed sheave or sliding sheave is replaced,the vibration may increase.It’s recommended to replace both when necessary.



1.Drive Face of Fixed Sheave

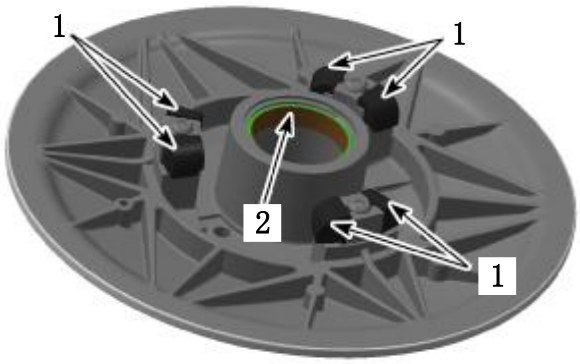
Driven Pulley Sliding Sheave Inspection

● Inspect the drive face of sliding sheave for heavy wear and damage.Replace it if necesary.



1.Drive Face of Sliding Sheave

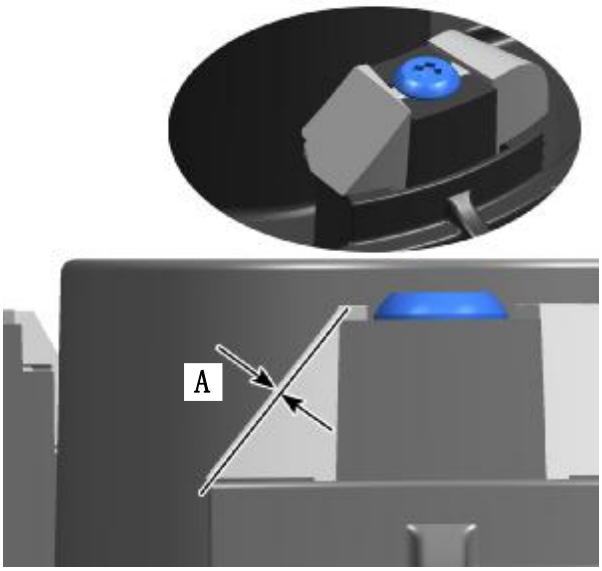
● Inspect the 4 sliders on driven pulley for wear and other damages.If the worn thickness is over the measurement illustrated in the following figure,
replace all 4 sliders at the same time.



1.Slider
2.Sliding Sleeve

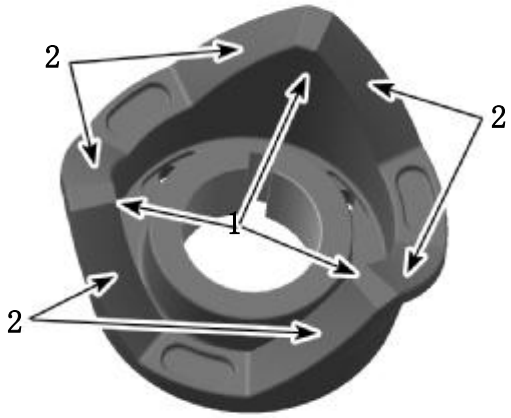
NOTE: Clean the sliding sheave before inspection

A ⩾ 1.5mm



Cam Inspection

● Check spring cam sliding face for wear and other damages. replace if necessary.

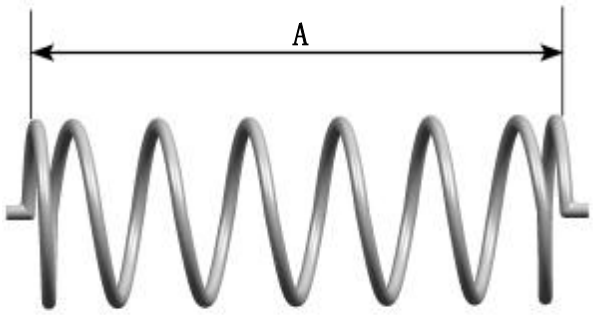


1.Cam
2.Sliding Face

Driven Pulley Spring Inspection

● Check spring free length. If it is shorter than limit length, replace it.

Spring free limit length A:214.0mm.



1.Spring

Driven Pulley Assembly

Reverse the disassembly procedure for driven pulley assembly.

NOTE: Special tool is also required in driven pulley assembly.

Drive Belt

● To inspect Belt for greasy dirt

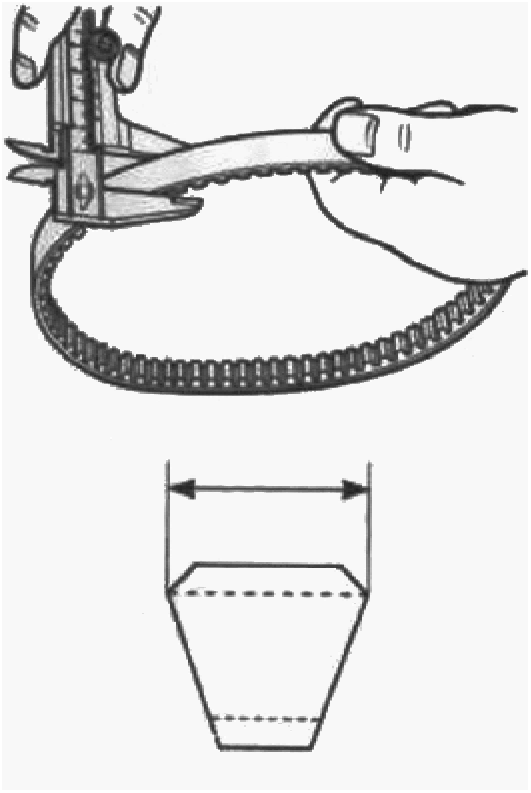
● To inspect Belt for cracks and damange

● To measure width of belt by vernier caliper

Replace a new one if any damage or out of service limit

Drive Belt service limit:33.5mm

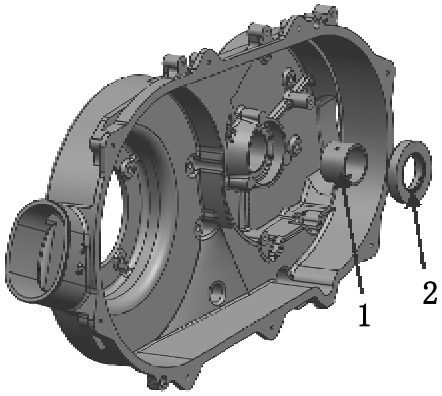
Tools:Vernier Caliper



Caution:Clean the Drive belt if any greasy dirt or lubricating oil.

CVT Case Inspection

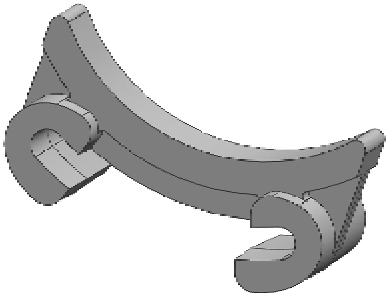
●To inspect Bearing Sleeve 1 and Oil seal 2.Replace it if necessary



Tool:Oil seal setting tool
(0JY0-013103-921-001)
CVT Case Bearing sleeve Installation tool
(0JY0-013101-921-001)

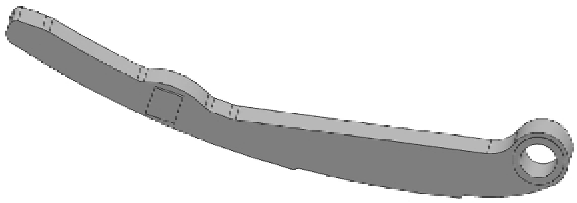
Lower Timing Chain Guide Inspection

● To inspect the lower timing chain guide for damage or ageing Replace it if necessary



Tensioner Plate Inspection

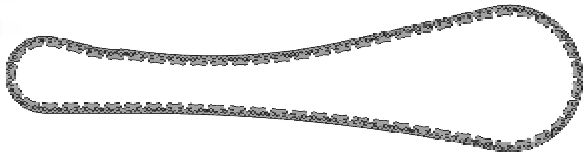
●To inspect tensioner plate for damage or ageing.Replace it if necessary.



Timing Chain Inspection

● To inspect the radial clearance of timing Chain.

●To inspect timing chain for excessive wear Replace timing chain and timing chain sproket if excessive wear or damage



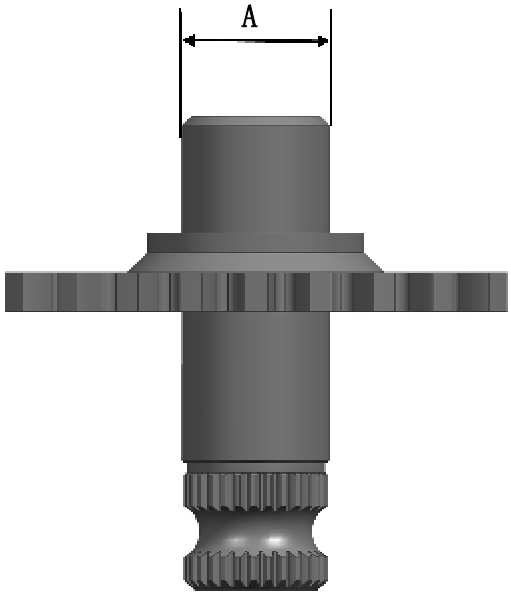
Gearshift Sector Gear Inspection

Gearshif, Drive Sector Gear

●To inspect drive sector gear for cracks or other defects.Replace it if necessary.

● To measure Gear shaft diameter (A) for cracks or other defects. Replace it if out of service limit.

Service limit:14.976mm~14.994mm



Gearshift driven sector gear inspection

● To inspect driven sector gear for damage or abnormal Replace it if necessary.

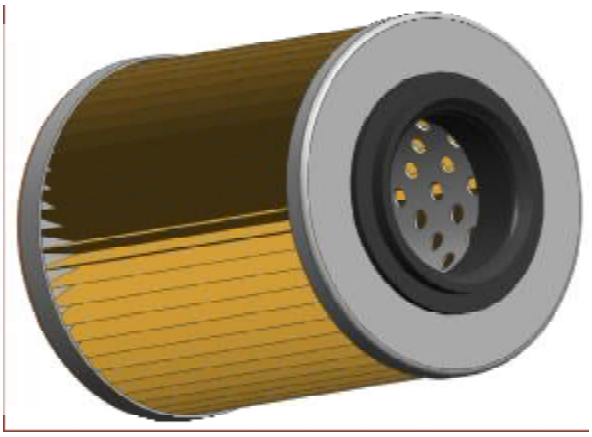
Water Pump Cover Inspection

● To inspect water pump cover for cracks and sealing surface for pit. Replace it if necessary.

Oil filter

● To replace a new oil filter

Note: Replace a new oil filter after Disassemble each time.



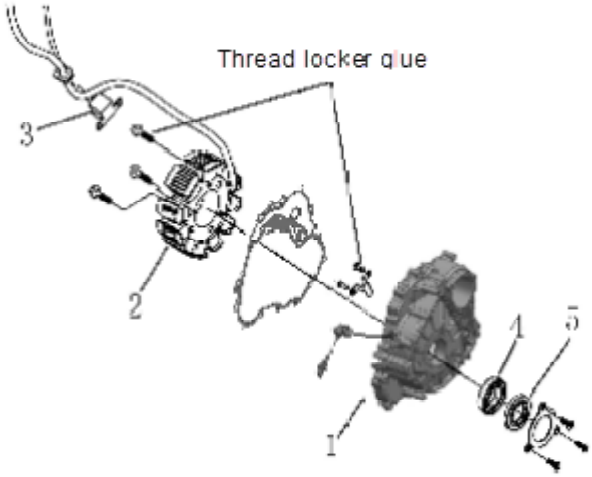
●Periodic replacement oil filter base on requirements of Maintenance period.

Crankcase(LH)Cover

●To inspect magneto coil(2),trigger coil(3) for damage or Short circuit, Replace it if abnormal.

●To inspect bearing(4) for smooth running. Replace it if clamping stagnation

● To inspect oil seal(5) for damage. Replace it if damage



●Smear Thread-locking Adhesives on nuts and fasten base on standard torque while assembling.

Torque:10N・m

● Smear lubricating oil on bearing 4 and grease on
oil seal 5

Magneto rotor

●Remove the set bolt of overrun clutch by wrench

● To inspect the overrun clutch roller and Cam for wear or damage.Replace it if defected.

● To install the overrun clutch as right direction.

Note: To confirm the direction of "A" is right while Assemble the overrun clutch into magneto rotor.

■ Ther arrow marking "B" should toward engine

■ Smear lubricating oil on the overrun clutch

■Tighten the bolt after smear thread-locking adhesives by Wrench as standard torque.

Bolt Torque：26N • m

Accessory：Thread-locking adhesives

● Install driven gear

●Driven gear will be locked if turn it as the direction of arrow by "B" indicated. Otherwise,it is smooth running.

●Turning the driven gear bearing. Replace it if not well running.

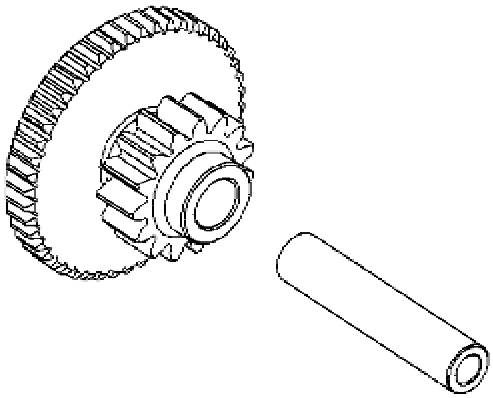
● Remove driven gear bearing by special tools

●Install the driven gear bearing by special tools

Tool：Bearing installation&removal tool

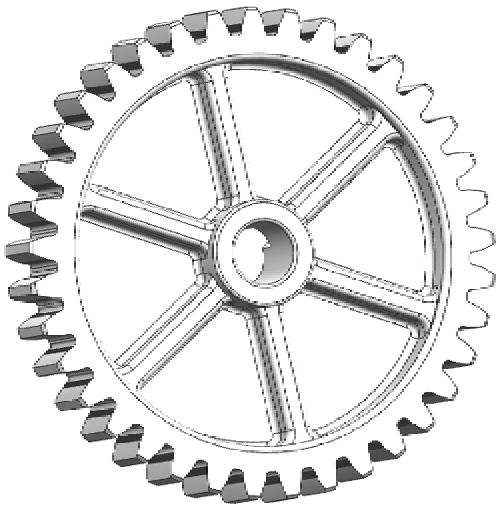
Dual Gear

● To inspect the dual gear surface for scratch or bump against. Replace it if abnormal.



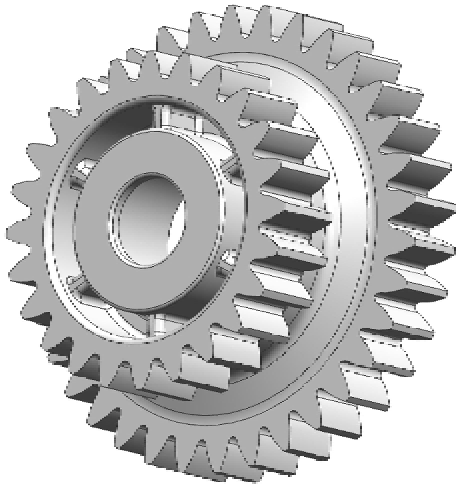
Oil Pump Transmission Gear

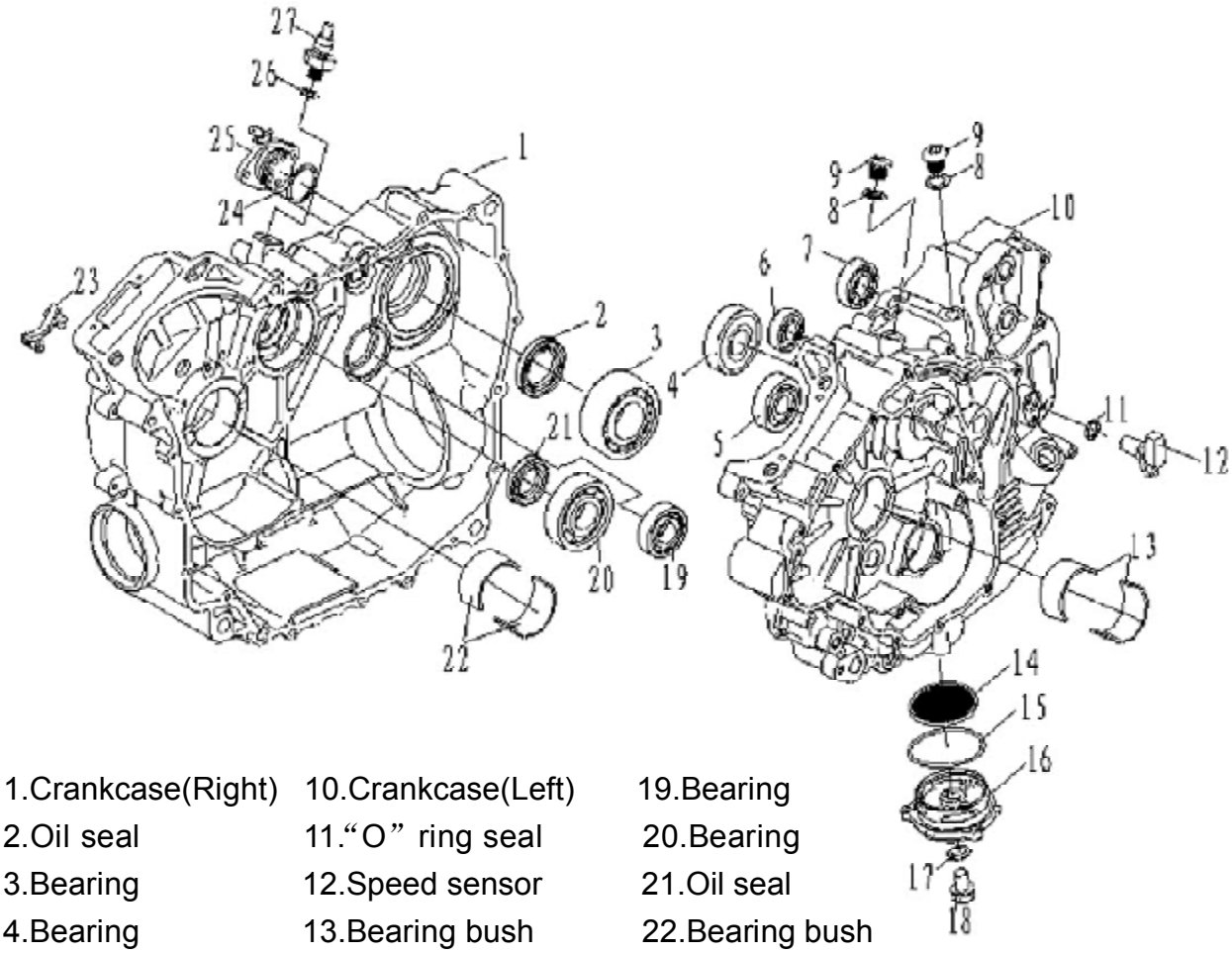
● To inspect the gear surface for scratch, bump against or plastic ageing. Replace it if abnormal



Oil Pump Dual Gear

● To inspect the gear surface for scratch, bump against or plastic ageing. Replace it if abnormal





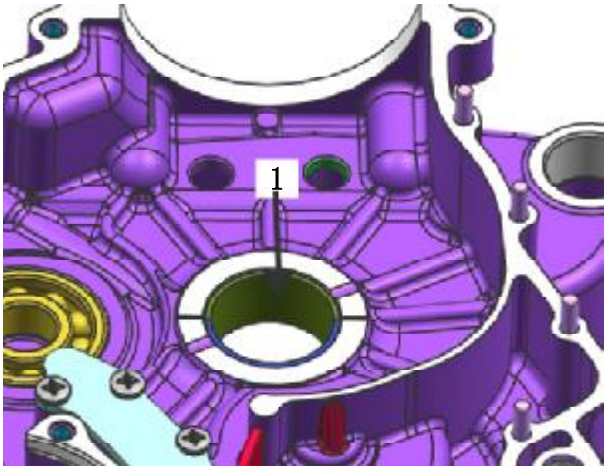
1.Crankcase(Right)	10.Crankcase(Left)	19.Bearing
2.Oil seal	11.“O” ring seal	20.Bearing
3.Bearing	12.Speed sensor	21.Oil seal
4.Bearing	13.Bearing bush	22.Bearing bush
5.Bearing	14.Oil strainer	23.Lower timing chain guide
6.Bearing	15.“O” ring seal	24.“O” ring seal
7.Bearing	16. Oil strainer cover	25.Gearshift sensor
8.Copper spacer	17.Copper spacer	26.Spacer
9.Bolt	18.Drain Bolt	27.Oil pressure sensor

Crankcase inspection

● Check crankcase halves for cracks or other damage.replace if necessary.

● Measure plain bearing inside diameter and compare to magneto and CVT side journal diameter of crankshaft(refer to CRANKSHAFT).Replace if the measurements are out of specification.

Plain bearing inside diameter (CVT/MAG)	
Service limit	42.100mm



1、Plain bearing bore diameter

Plain Bearing Replacement

Plain Bearing Removal

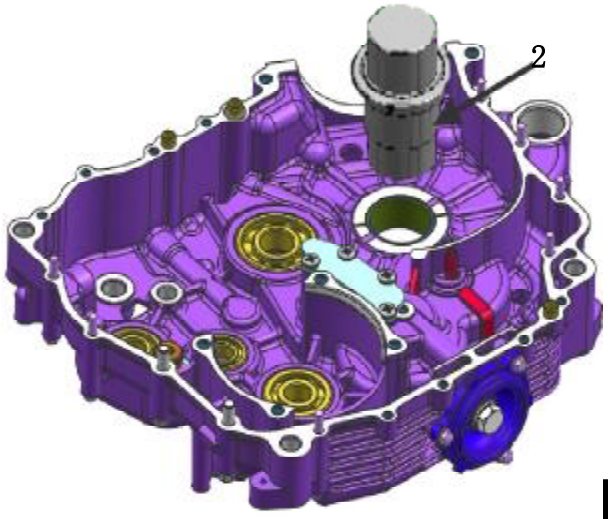
Caution:Alway support crankcase halves properly when ball bearings or plain bearings are removed .Damages to crankcase halves may occur if this procedure is not performed correctly .

NOTE: Always use a press for removal of plain bearing. Remove plain bearing with the proper plain bearing remove/installer.

● Carefully push the plain bearings out from the crankcase half inside towards the outside.

NOTE: Place the proper crankcase support sleeve under crankcase halves before removing plain bearing

NOTE: During disassembly ,do not damage the sealing surface of the crankcase halves.



2.Plain bearing remover/installer

Plain Bearing Installation

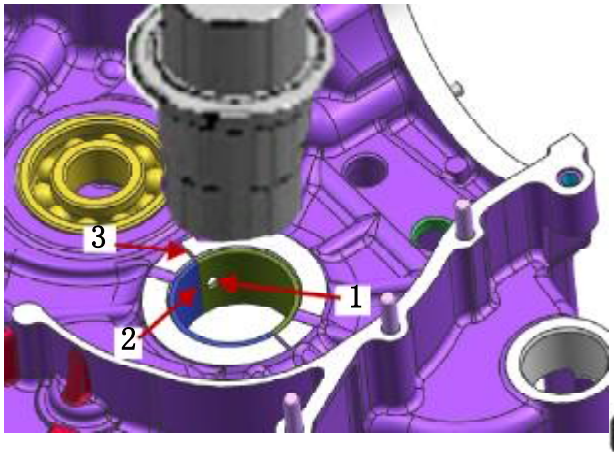
NOTE: Crankcase and plain bearing must be installed as a pair as shown in the following table:

Crankcase	Plain Bearing
Red (A)	Red
Blue (B)	Blue

CAUTION:Unless otherwise instructed, never use hammer to install ball bearings or plain bearings,use press only.

Install plain bearings with the proper plain bearing remover/installer in a cool crankcase.Do not lubricate plain bearing and /or crankcase for installation.

NOTE: Place proper crankcase support sleeve under the crankcase before installing the plain bearings (refer to bearing removal procedure).



1.Oil bore

2.The partition of the plain bearing

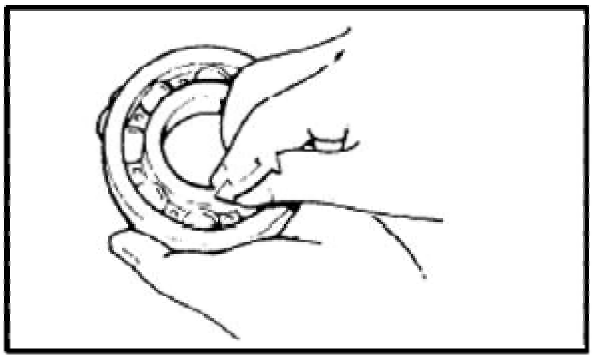
3. Crankcase mark

● Carefully press-in the plain bearings in the same direction as during installation, from then crankcase inside towards the outside.
During installation ,make sure not to damage the 3 sealing surface of the crankcase.

CAUTION:Mark position of oil bore on crankcase and on plain bearing remover/installer .Align mark on plain bearing remover/installer with mark on crackcase.Wrong oil bore will stop supply to plain bearing and will cause engine damaged.

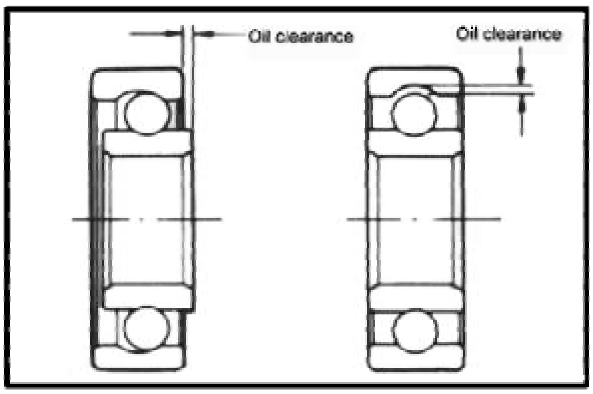
Ball Bearing and oil sealing Inspection

● To inspect the ball bearing for oil clearance,sound or turning stationarity after Cleaned and lubricated the ball bearing. Replace it if abnormal by special tools.



●To inspect all oil sealing for wear,cracks. Replace it if abnormal by special tool

●To remove and inspect the gearshift sensor (25) for breakover performance by multimeter.Replace it if abnormal



● To remove and clean the drain bolt(18) and Oil strainer(14)

●To install bearing,oil seal by special tools. Bearing with lubricating oil, Oil seal lips with lubricating grease

Note: To inspect running performance after bearing has been installed

● Install new “ O” ring “O” ring with lubricating grease

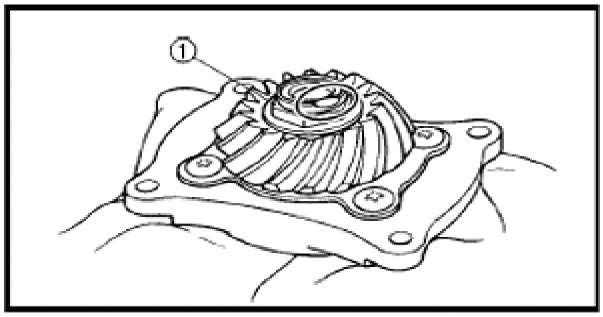
● Install gearshift sensor(25)and speed sensor(12).

● Install spacer(17) and drain bolt(18), tighten it as standard torque.

Torque(Drain Bolt): 25N • m

Tool: Bearing remover and installer

Multimeter



Drive Bevel Gear

● To protect the drive bevel gear shaft by one clean duster cloth and clamp by vise

● Loosen the Drive Bevel Gear Nut (3),remove Drive Bevel Gear(4) and Adjusting spacer(5).

● To inspect Drive Bevel Gear(4)and Output Driven Gear (2) for rust,cracks,wear. Replace it if necessary.

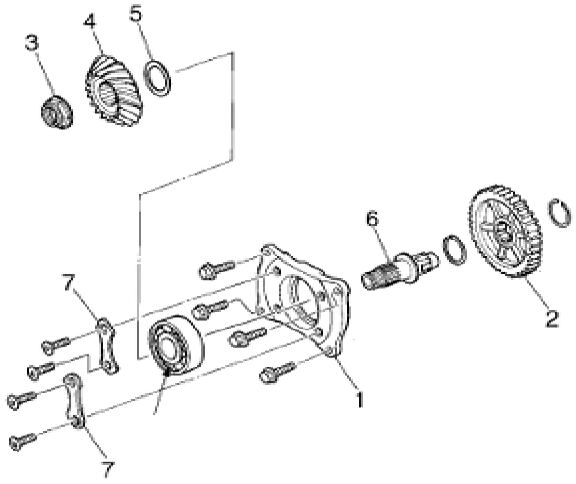
● To inspect Bearing (8)for turning.Replace it if abnormal.

● To adjust Adjusting Spacer(5) if replace any one of Crankcase(Right),Drive Bevel Gear (4),Drive Bevel Gea cover(1).Detailto check Bevel Gear adjusting method

● To tighten tight Nut(3)by standard torque and with lubricating oil on Bearing (8) before install.

Service Limit(Drive Bevel Gear Tigh Nut): **45N • m**

Note: Drive Bevel Gear(4) and Driven Bevel Gear should be together replaced.



1- Drive Bevel Gear Cover
2- Output Driven Gear Bear
3- Drive Bevel Gear Nut
4- Drive Bevel Gear
5- Adjusting spacer
6- Drive Bevel Gear Shaft
7- Bearing Plate
8- Bearing

Front Output Shaft

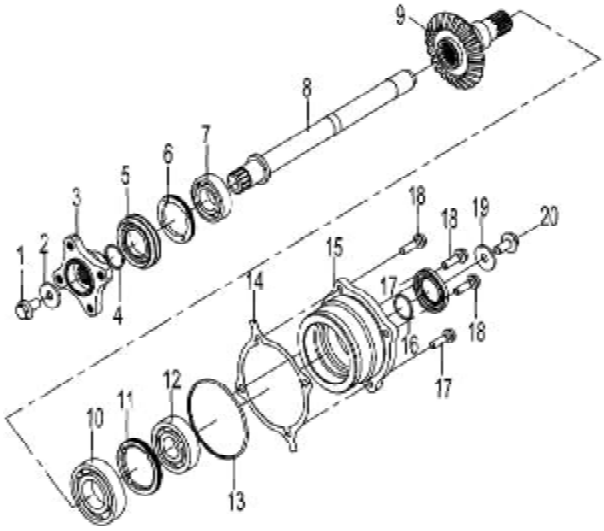
● To inspect Bearing (7) for wear or well running.To inspect Oil seal (5) for damage. Replace if abnormal.

● To inspect Bearing(7) for lubrication oil and Oil seal (5)lips for grease before install output shaft

●To tighten Bearing Stop Nut(6) with thread glue as standard torque

Bearing Stop Nut Torque：80N·m

Front and Bear Output Shaft Nut Torque: 55N·m

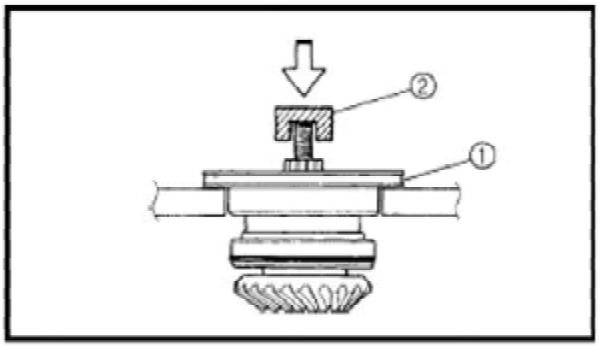


Driven Bevel Gear

●To remove Nut(19),Gasket (18),Land(17) and Oil seal(16)

● To proper protect the thread of Driven Bevel gear by protector,fixed bevel gear cover(14),Push out the Driven bevel gear.

● Put one clean duster cloth①，under the belve gear cover,to remove the Bearing stop nut(10) and Bearing By special wrench ②

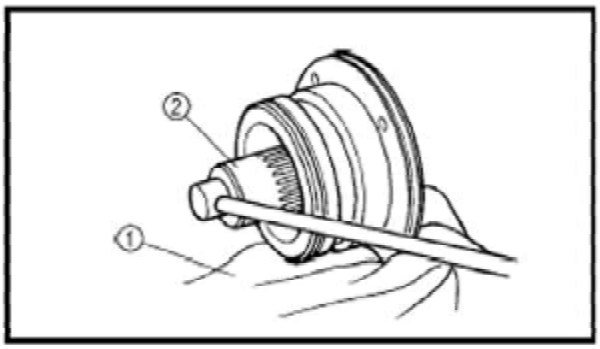


● To inspect Driven Bevel Gear (8) for crack,wear.Replace it if necessary.

● To inspect bearing(9)and (10) for well running.Replace it If not

● To install by use new oil seal(16) and “O” ring seal(12)

●To adjust Adjusting Spacer(13) if replace any one of Crankcase(Right),Driven Bevel Gear (8),Driven Bevel Gear cover(14). Detailto check Bevel Gear adjusting method



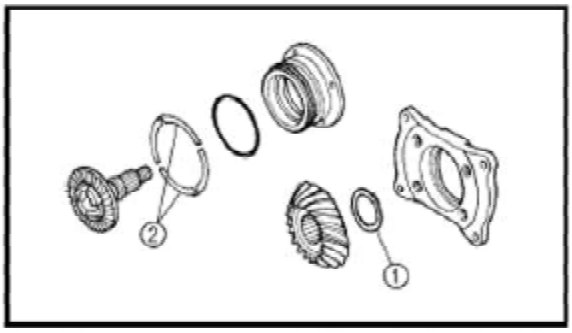
● To tighten stop Nut(10) with thread glue by standard torque and with lubricating oil on Bearing (9) ,Bearing (11),Oil seal(16) and “O” ring seal before install.

Bearing Stop Nut Torque：110N·m

Driven Bevel Gear Nut Torque：55N·m

Bevel Gear Spacer Adjusting Method

● To adjust spacer ① and ② if replace any one of Crankcase ,Bevel gear or Bevel Gear Cover.



Bevel Gear Adjustment

Caution:Keep the Gear backlash and contact surface Within the proper scope in order to best match the bevel gear mesh

Measure Bevel Gear Backlash

● To install Drive and Driven Bevel Gear on the Crankcase.

To tighten the Drive Bevel Gear by straight Screwdriver ③ with duster cloth ② into the Speed sensor hole ①

●To install special tool③and dial indicator ④

Tool:Bevel Gear backlash measuring tool

Dial indicator

a=46mm

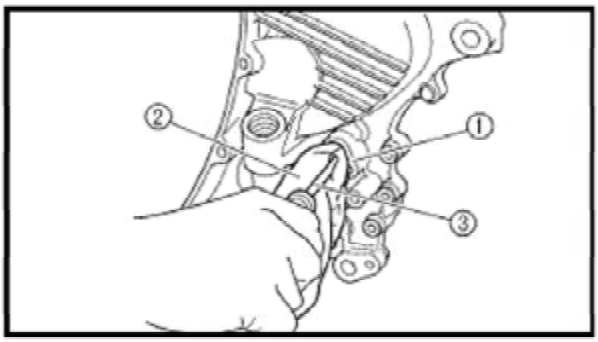
● To measure backlash by running the Driven Bevel Gear shaft.

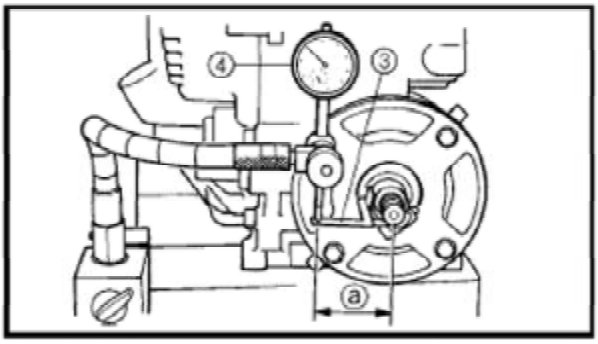
Note:Four points to measure on the mutual vertical direction.

● To adjust spacer thickness if out of service limit.Remeasure the backlash of Bevel Gear till to accord with service limit.

Bevel Gear backlash service limt ：

0.1mm～0.2mm





Adjustment Method：

Backlash Value	Thickness
＜0.1mm	Reduce thickness
0.1mm～0.2mm	Suitable
＞0.2mm	Increase thickness

Gear Surface Contact Inspection

To inspect Gear surface contact after backlash adjusted.Detail as follows：

● Remove Drive and Driven Bevel Gear Shaft From Crankcase.

●Clean splodge and grease for each gears of Drive And Driven Bevel Gear.

● With dyestuff for each gears surface of Driven Beleve gear

● To install Drive and Driven Bevel Gear

●Running the Driven Bevel Gear from front and back direction.

● To inspect dyestuff of Bevel Gears after removed Drive and Driven Beleve Gear.

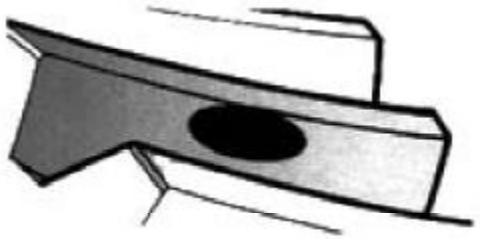
① Top contacted on the Gear Surface	**Improper**
② Middle contacted on the Gear Surface	**Proper**
③ Bottom contacted on the Gear Surface	**Improper**

● If it is proper gear contact surface ②, move to next Step.

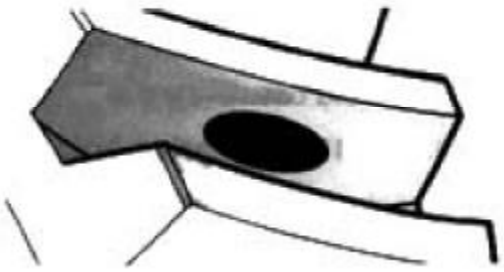
● If it is improper gear contact surface ① and ③, adjust spacer thickness of Bevel Gear and recheck till to accord with standard requirement.

Adjusting Method	
Gear Contact Surface	**Adjusting spacer thickness**
Gear Contact Surface ①	Reduce spacer thickness
Gear Contact Surface ③	Increase spacer thickness

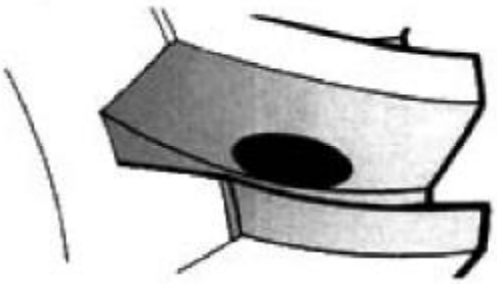
①



②



③



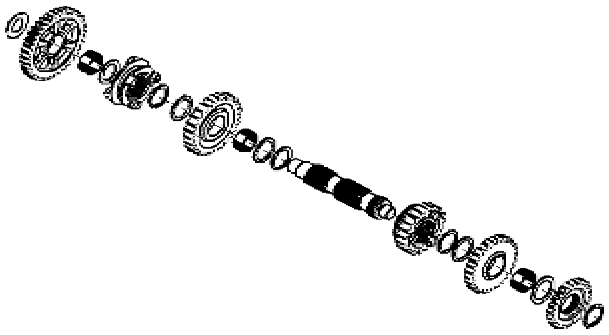
Note:
Must to inspect backlash after adjust the gear contact surface avoid to any change.
Replace the Drive and Driven Bevel Gear if gear contact surface still improper after backlash adjusting.
Gear contact surface and Gear backlash should be together according to requirement

Drive Shaft Inspection

● To inspect gear surface for hard spot, damage,excessive wear.Replace it if necessary.

Drive layshaft Combination

● To remove the layshaft as picture indication



● To inspect gear surface for hard spot, damage,excessive wear.
To inspect bearing and bush for damage or wear. Replace it if necessary.

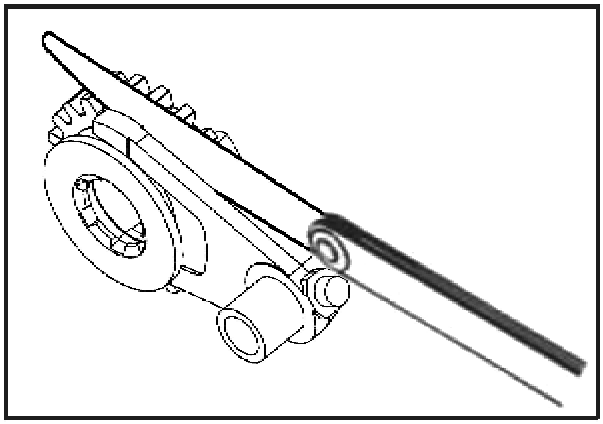
Note: Rear Retainer couldn't reuse after removed. Must to be replaced by new one

Shift Drum,Shifting Fork

●To inspect shifting fork clearance as picture indication: Check fit clearance by feeler gauge. Replace shifting fork ,or gears, or together replacement if clearance out of service limit

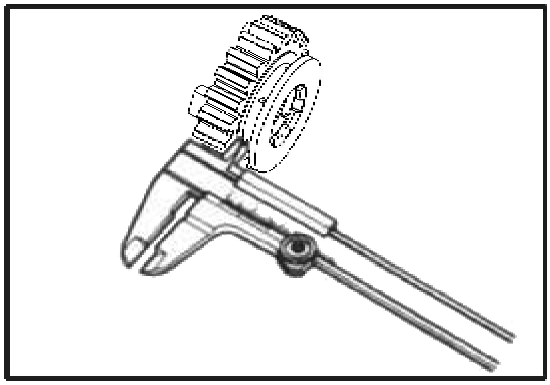
Shifting fork standard gap:
0.10mm～0.35mm

Service limit:**0.45mm**



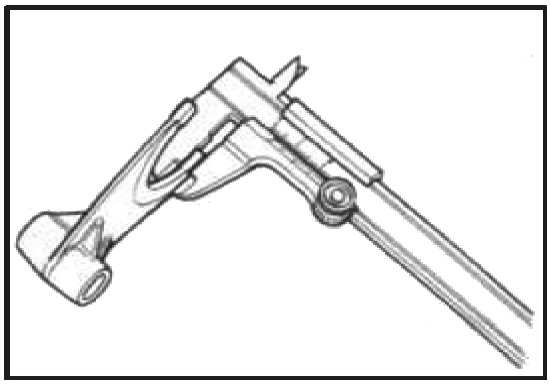
●To measure the width of shifting fork slot by vernier caliper

Standard values:6.05mm～6.15mm

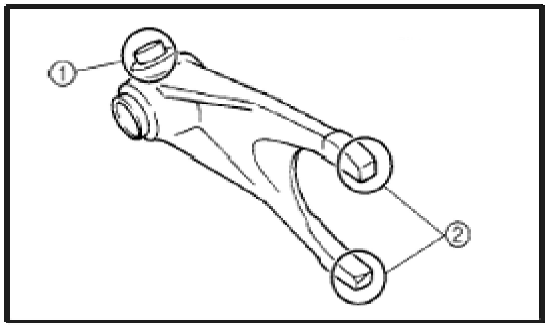


●To measure the thickness of shifting fork by vernier caliper

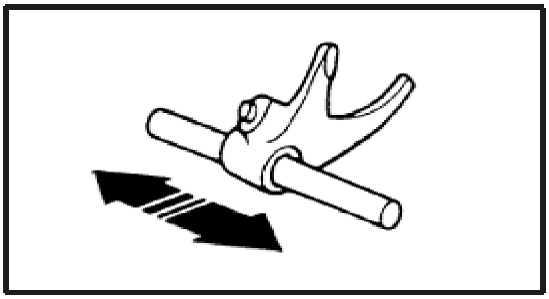
Standard values:5.80mm～5.90mm



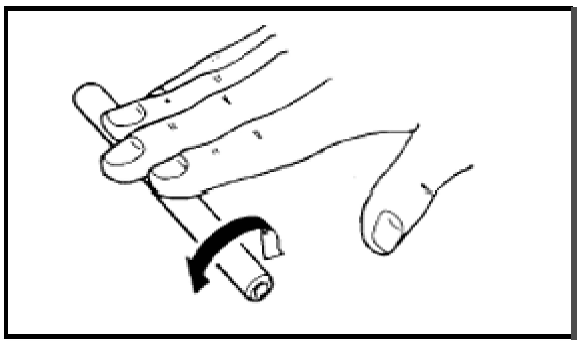
● To inspect shifting fork ① and ② for damage,curve. Replace it if with defects.



● Install shift fork on the shift fork rod to move it by left and right. If not smooth.Replace it.

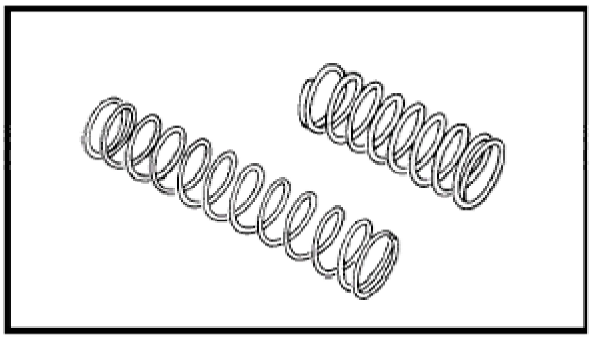


● To roll th shift fork rod on the slab. Replace it if curve

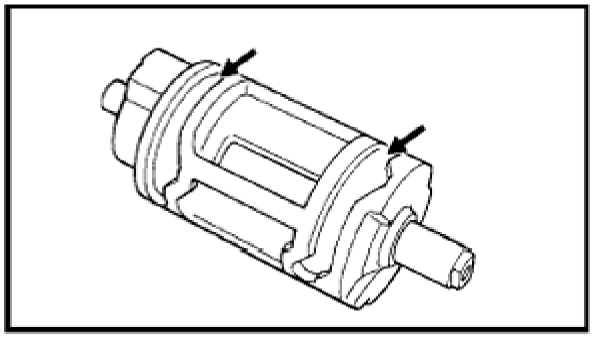


Caution: Don't try to straightening the Shift fork rod.

● To inspect the shift fork spring for broken, damage. Replace it if any defects.



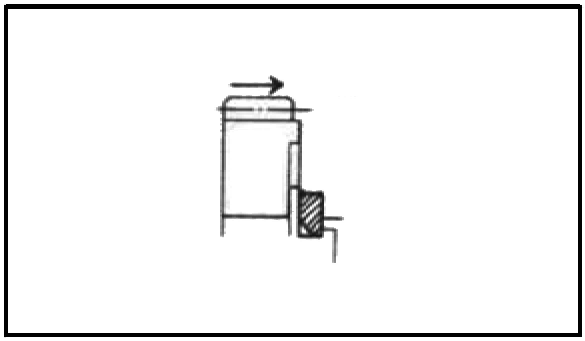
● To inspect Shift Drum Cam for crack, wear. Replace it if any defects.



Installation

Reverse process for installation and removal.Attention as follows:

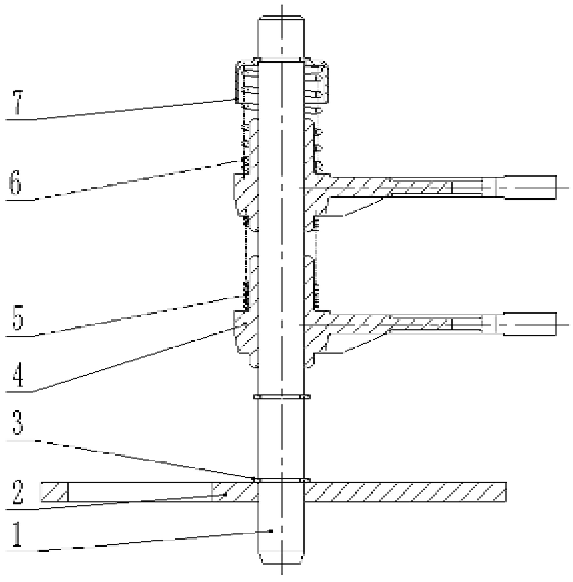
Note:
With right installation process to install the new retainer
To install it base on picture indication
Gears or shaft should be installed with engine lubrication oil



Caution:
Retainer ring could't reuse if removed it from shaft Install a new one.
Don't too wide open when install retainer ring.
To confirm the retainer ring has been fully installed after assembled.

● Don't reverse install the shift fork and spring when assemble the shift fork.

1.shift fork,shaft. 2.Parking Arm;
3.Retainer ring 4.shift fork
5.Thin shift fork spring
6 Thick shift fork spring
7.Spring seat

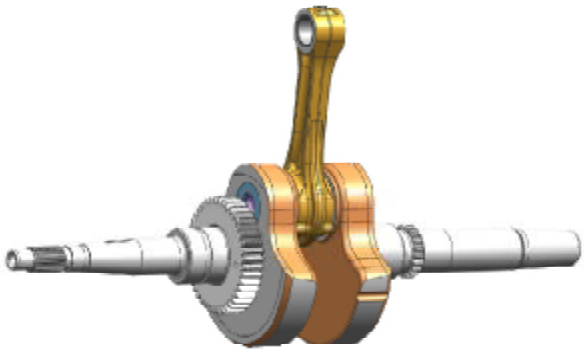


Crankshaft Inspection

NOTE: Check each bearing journal of crankshaft for scoring,scuffing,cracks and other signs of wear.

NOTE: Replace the crankshaft if the gears are worn or otherwise damaged.

CAUTION: Components with less than the service limit always have to be replaced. Otherwise servere damage may be caused to the engine.

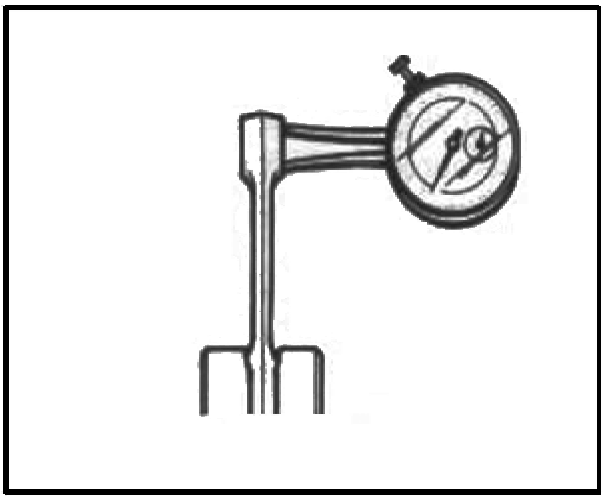


Connecting Rod Small End Inner Diameter

● To measure connecting rod small end inner Diameter by bore dial indicator. Replace it if out of service limit

Service limit：**22.060mm**

Tool:Bore dial indicator(18mm～35mm)



Crankshaft Axial Play

NOTE: Axial play of crankshaft needs to be measured before splitting the crankcase.

● Use dial gauge to measure crankshaft axial play at MAG side.

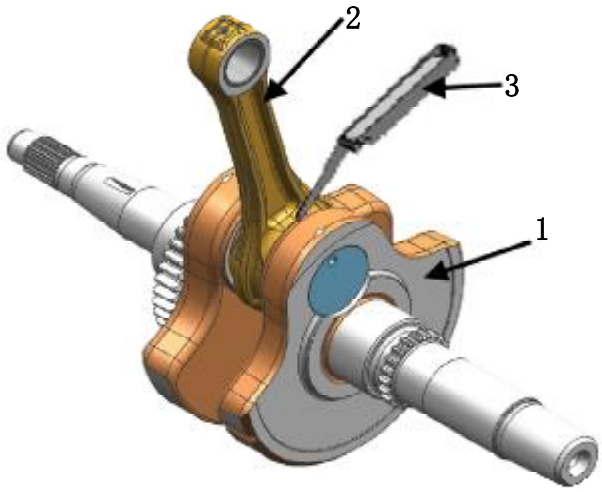
Crankshaft Axial Play	
New	0.050～0.450
Service Limit	0.6mm

If play is out of specification, replace crankcase and/ or crankshaft.

Connecting Rod Big End Axial Play

● Using a feeler gauge,measure the distance between butting face of connecting rods and crankshaft counterweight.

Connecting Rod Big End Axial Play	
New	0.100～0.450
Service Limit	0.7mm



1.Crankshaft
2.Connecting Rod
3.Gauge

Crankshaft runout

● Keep crankshaft connection rod on the "V"block and slow running it to measure crankshaft runout by dial indicator as picture indication.

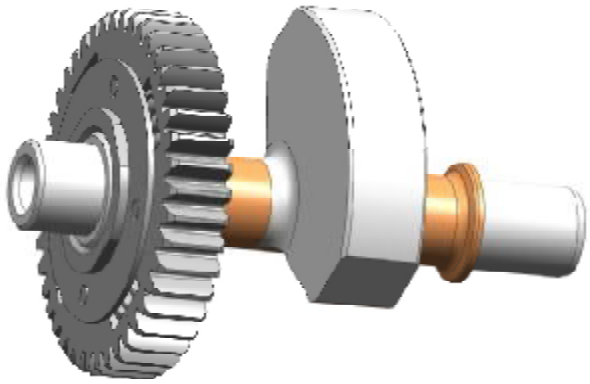
Replace or adjust it if runout out of service limit.

Crankshaft runout limit value:0.055mm

Tool:Dia Indicator,

"V" Magnetism Stand

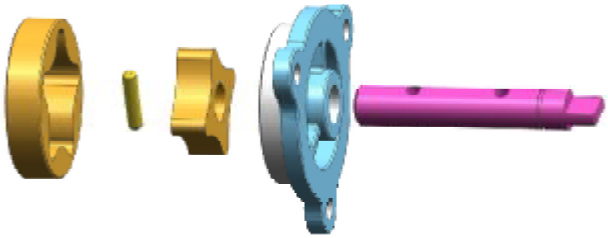
Trunnion Shaft



● To inspect Trunnion shaft and trunnion shaft gear Replace it if damage.

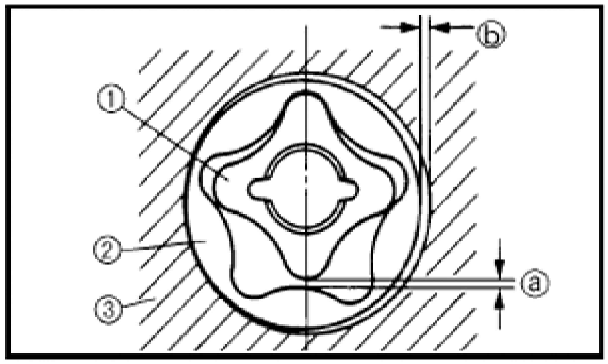
● To inspect Trunnion shaft gears for crack, scratch or others. Replace it if damage

Oil Pump Inspection



● To inspect all parts of Oil Pump. Replace it if any defects.

● To measure bottom clearance a (clearance between inner and outer rotor) and backlash b(clearance between outer rotor and crankcase), Replace oil pump if out of service limit



Bottom Clearance standard value:

0.07mm～0.15mm

Limit value:0.2mm

Backlash Standard value：

0.03mm～0.10mm

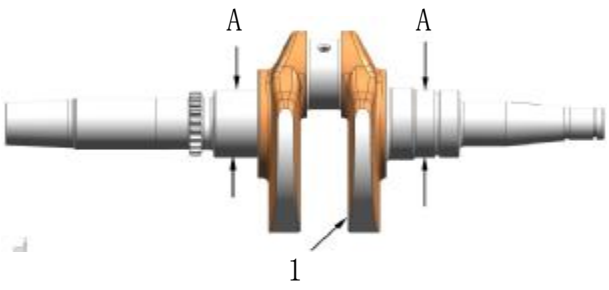
Limit value：0.12mm

Crankshaft Radial Play

Measure crankshaft on CVT/MAG side and compare to inside diameter of CVT/MAG plain bearing (see CRANKCASE)

Diameter of Crankshaft CVT/MAG Side	
Standard	41.960mm~41.970mm (1.652in~1.6524 in)
Service Limit	41.935 mm(1.651 in)

Clearance between Main Crankpin and Crankcase Hole	
Service Limit	0.09 mm (0.0035in)

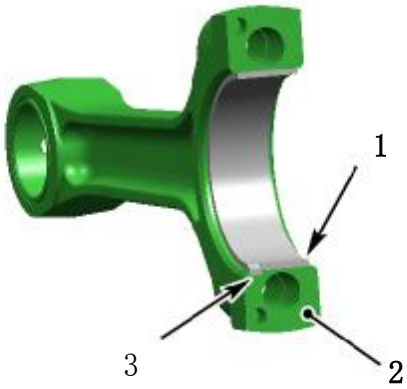


1.Crankshaft
A.Diameter of CVT Side Crankshaft
B.Diameter of MAG Side Crankshaft

Crankshaft Assembly

NOTE: Follow the table below to assemble crankshaft, connecting rod and connecting rod plain bearing.

Inside Diameter of Connecting Rod Big End	Crankpin	Bearing of Connecting Rod
I	A	Black
II		Blue
I	B	Red
II		Black



1.Plain Bearing of Connecting Rod Big End
2.Split Surface of the Connecting Rod
3.Nose of Plain Bearing in line with Connecting Rod Groove

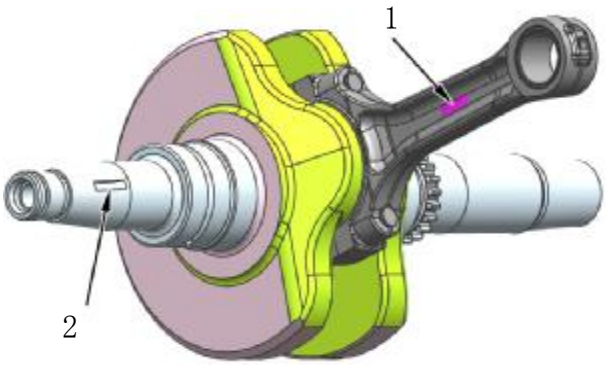
Crankshaft assembly procedure is the reverse of disassembly procedure. However, the following details should be noted:

Replace and use new connecting rod bearing when inside diameter of connecting rod big end is less than service limit.

Use compressed air to clean connecting rod split surface after installing bearing into big end of connecting rod

NOTE: Oil is needed in inner surface of connecting rod plain bearing and crankshaft pin before installation.

The side with “CFMOTO” mark of connecting rod is facing to the key groove of crankshaft.



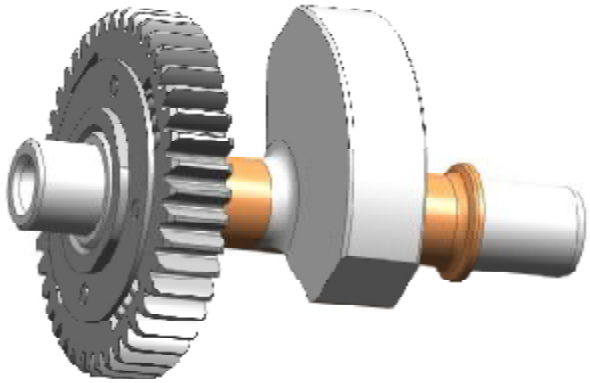
1.”CFMOTO”mark
2.Key Groove

Screw of connecting rod should be tightened by following methods.
-Firstly torque to 10N • m(7.5 lbf • ft)，
Do not apply thread locker
-Then torque to 20N • m(15 lbf • ft)。
-Finally torque to 50N • m(35.25 lbf • ft)

CAUTION: Improper installation will cause screw looseness and engine damage.

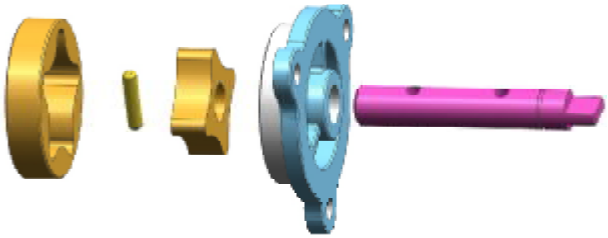
ATTENTION: Bearing of connecting rod big end and piston pin's rotation way cannot be changed.

Trunnion Shaft



● To inspect Trunnion shaft and trunnion shaft gear Replace it if damage.
●To inspect Trunnion shaft gears for crack, scratch or others. Replace it if damage

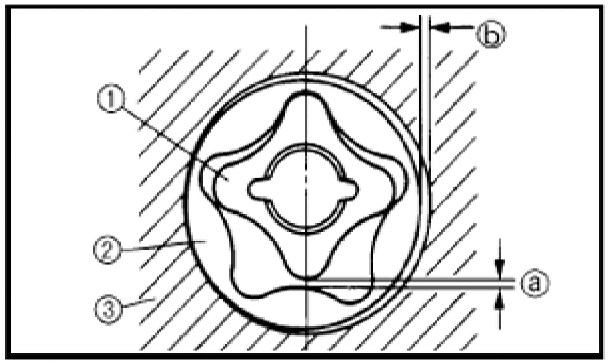
Oil Pump Inspection



●To inspect all parts of Oil Pump. Replace it if any defects.

● To measure bottom clearance a (clearance between inner and outer rotor) and backlash b(clearance between outer rotor and crankcase), Replace oil pump if out of service limit

Bottom Clearance standard value:
0.07mm～0.15mm
Limit value:0.2mm
Backlash Standard value：
0.03mm～0.10mm
Limit value：0.12mm



Ⅲ Engine Installation

The installation essentially the reverse of the remove procedure, special attention as follows:

Note: Clean all parts before install. Without any cracks for all parts before install All motion parts should with lubrication oil before install Oil seal lips and O ring seal with lubrication grease

Caution: Without any grease in belt, drive and driven pulley

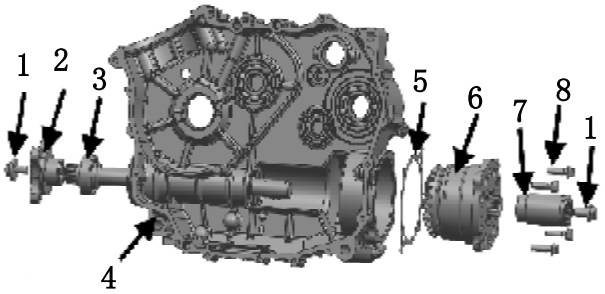
Middle parts of Engine Installation

Crankcase(right),Front output shaft,Driven Bevel Gear

● To install Crankcase(right),Front output shaft,Driven Bevel Gear and fasten bolt as standard torque,Detail as picture indication.

Front output pulley erection bolt standard torque：55N • m

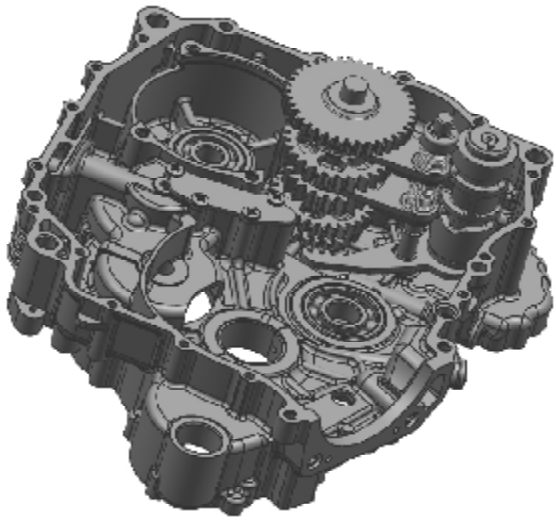
Driven Bevel Gear Seat erection bolt standard torque:28N • m



1.Bolt *5.Adjusting Spacer*
2.Land *6.Driven Bevel Gear*
3.front output shaft *7.Drive sleeve*
4.Crankcase(right) *8.Bolt*

Shifting Drum,Shifting frok, Drive layshaft

● Insert the shifting frok into the sliding sleeve,then install the drive layshaft,shifting fork,shifting drum into crankcase(left)



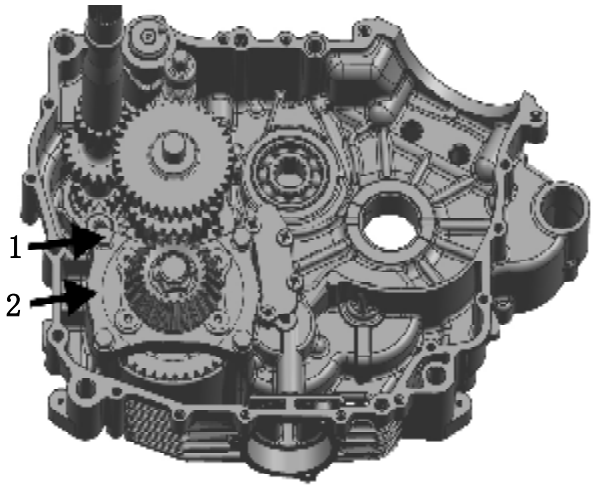
Main Shaft

● Install the Mail Shaft

Drive Bevel Gear

● Install Drive Bevel 2 and tighten 4 Nuts (1)

Erection Bolt torque(M8X 28):32N • m



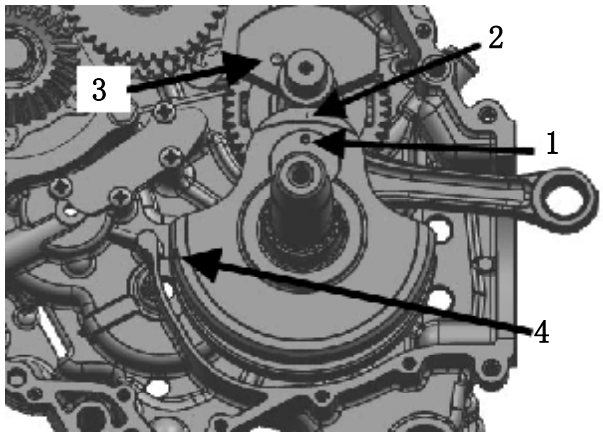
Trunnion Shaft,Crankshaft,Connection rod

Install trunnion shaft

● Turn the trunnion shaft into proper position (as picture indication),install inot crankshaft

● Keep a strip of straight line for crank pin bore, marks on crankshaft,oil bore of trunnion shft neck

Running the crankshaft and trunnion shaft to Inspect whether match for trunnion shaft bore and gap of crankshaft.if not, reinstall



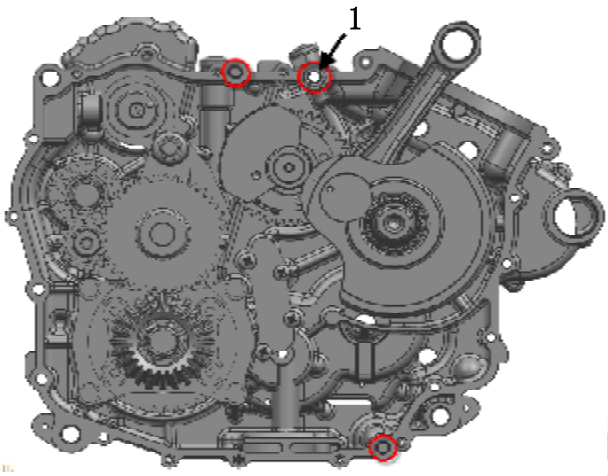
1.Crank Pin bore 3.runnion shaft bore
2.Marks,Crankshaft 4. Crankshaft gap

Crankcase(right)

● Wipe Sealant on the crankcase(left) junction surface

Note: Sealant shuld be uniformity and continuous threadiness

● Install three locating pin andO ring seal as picture indicated



● Mould assembling,light touch to well done by rubber hammer

● Tighten the bolt as standard torque

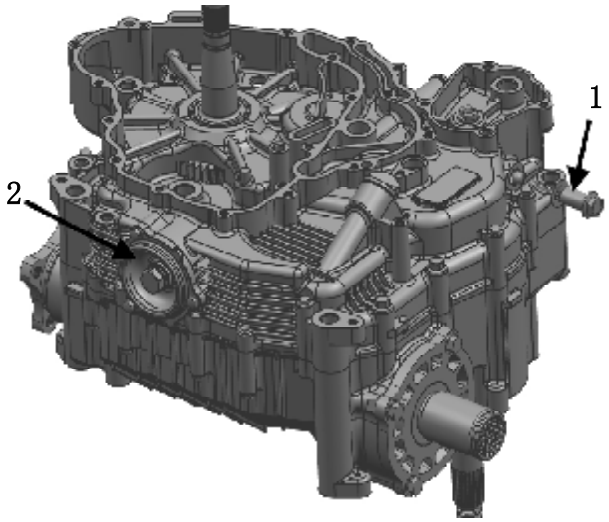
Torque: M6:10N • m
M8:25N • m

Note: opposite angles cross and grading to tighten the bolt.

Gears Set Bolt

● Put in steel ball,install the set bolt(1), tighten It as standard torque

Standard torque:18N • m



Primary Strainer

● Install primary strainer and cover(2)

● Tighten bolt as standard torque

Standard torque:8N • m

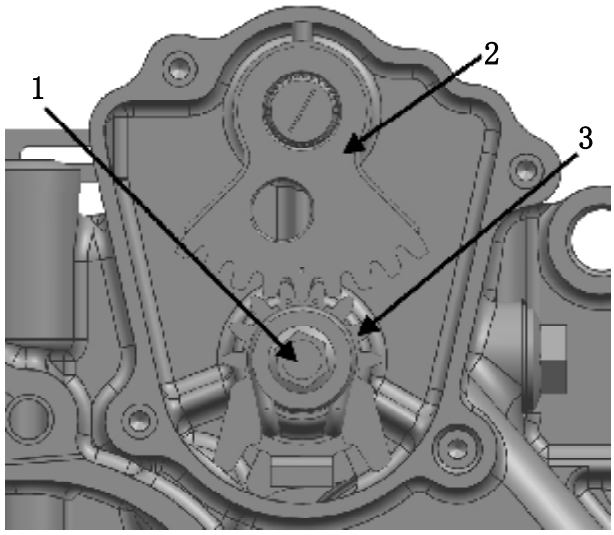
Shift Sector Gear

● Install shift sector gear,tighten bolt

● Install locating pin and gasket

● Close the shift cover. Tighten bolt

●To inspect gears for smooth changing or others. If not, recheck all parts and install again.



1 .Bolt

2 .Shifting Drive Sector Gear

3 .Shifting Driven Sector Fear

Engine(left parts)Installation

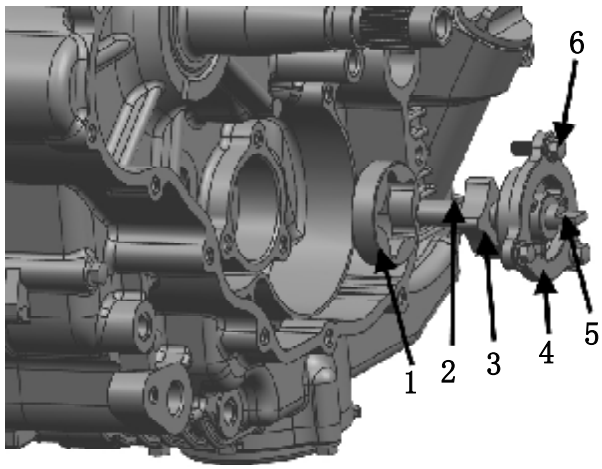
Oil Pump

● Install oil pump as right picture indication

● Tighten bolt

●Inspect oil pump for smooth running that hold by pliers. Replace and reinstall it if not

Standard Torque ： 7N • m



1.Outer rotor,Oil pump 4.Oil Pump

2.Roller pin 5.Oil pump shaft

3.Inner rotor,Oil pump 6.Bolt

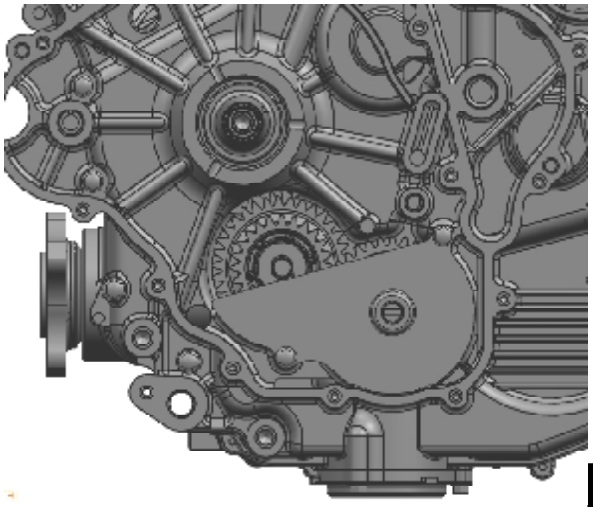
Oil Pump driving gear,Oil pump dual gear

● Install dual gear and driving gear.
● Install circlip by circlip plier

Note: Don't too open when install,and the new circlip have to be used.

●Install oil baffle plate,tighten bolt as standard torque.

Torque:8N • m

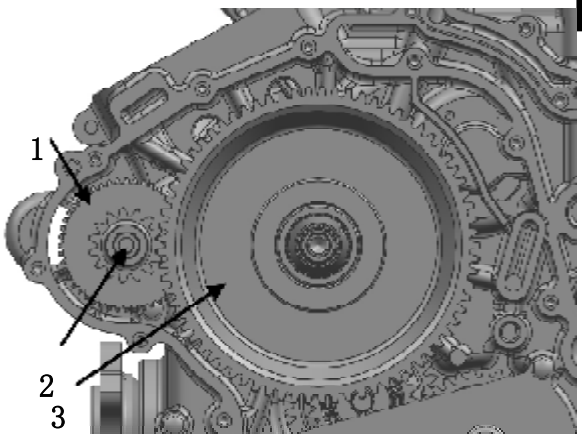


Dual gear

● Install dual gear(1) and dual gear shaft (2)

Driven gear

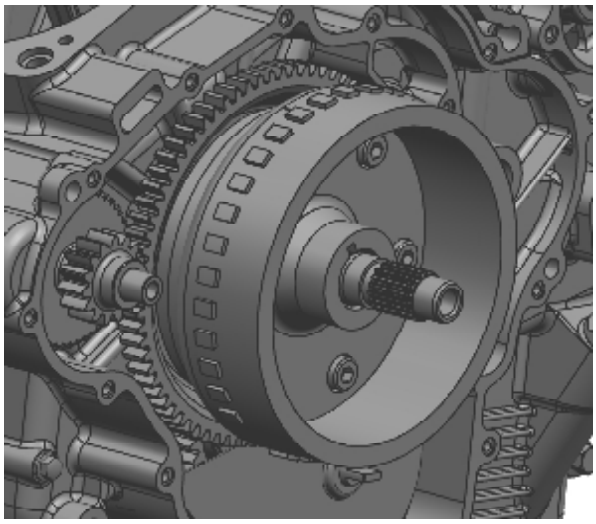
● Install driven gear(3)



Magnetor Rotor Combination

● Install woodruff key into crankshaft key groove
● Install Magnetor Rotor Combination

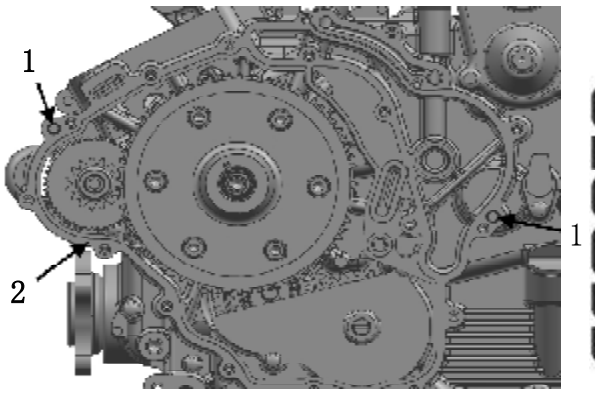
Caution:Clean out grease on the surface of Magnetor Rotor and Crankshaft Conical surface by noncombustible materials and keep drying.

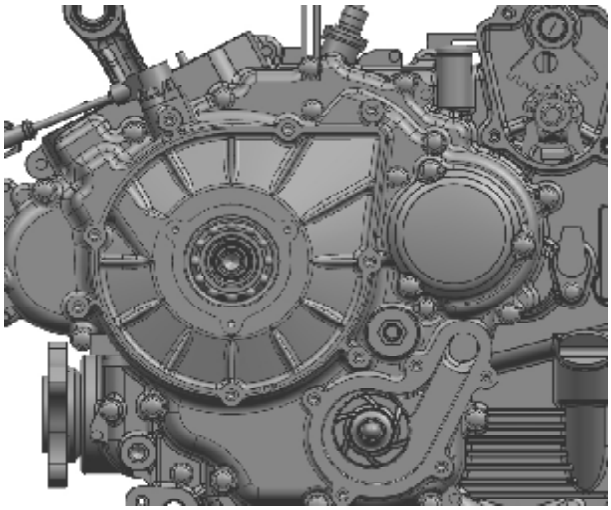


Left Crankcase

● Install Locating Pin(1) and sealing gasket(2)

Note: Use new sealing gasket

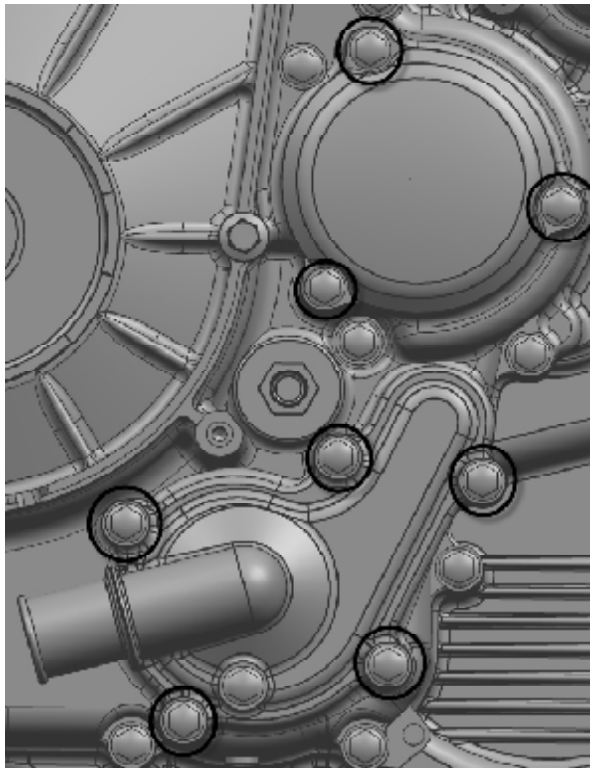




● Install left crankcase
● Install left crankcase fastening bolt

Shaft Sleeve,Blanking Cap

● Install shaft sleeve
● Install blanking cap and tighten bolt.
Installation keep the Reverse procedure with removal



Oil filter

● Install new oil filter and O ring seal, tighten bolt.

Water Pump Cover

● Install water pump cover and tighten bolt.

Starting motor

● Install starting motor, tighten fixed bolt

Engine right side

Timing chain

● Install timing chain

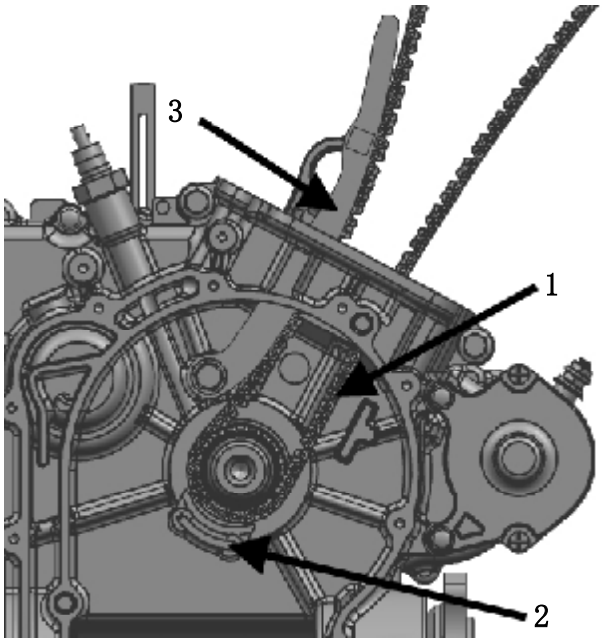
NOTE: Hook up timing chain to prevent It from falling into crankcase

Timing chain upper guide

● Install timing chain upper guide

Tensioner

● Install tensioner, tighten bolt



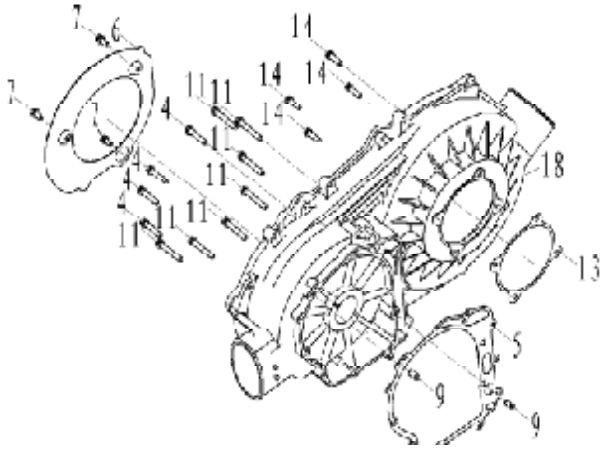
1. Timing chain
2. Timing chain upper guide
3. Tensioner

CVT case

● Install dowel pin 9, gasket 5 and gasket 13, install CVT case to the right crankcase.

● Install bolt 4, bolt 11 and bolt 14

● Install guide 6 and screw 7



Primary sheave, Secondary sheave, drive belt

● Use special tool to open fixed plate and sliding plate

● Install drive belt on primary sheave and secondary sheave

WARNING:
Drive belt contact surface should be free from any grease or oil.

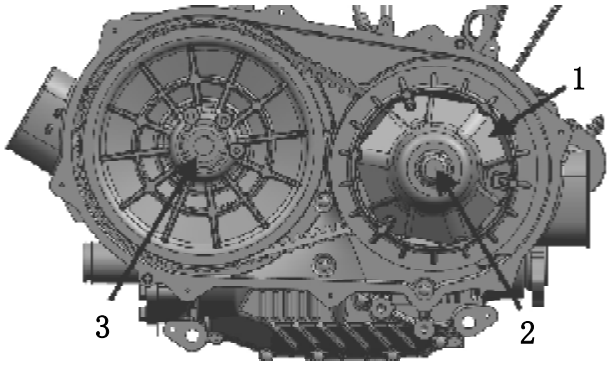
Tool: Separator of sliding plate and fixed plate of secondary sheave（0800-052000-922-003）

1. Separator of dynamic plate and fixed plate of secondary sheave (0800-052000-922-003)
2. Secondary sheave
3. Drive belt

●Install CVT assy and tighten bolt and nut to the specified torque

NOTE: Install bolt of primary sheave anticlockwise

Primary sheave bolt tightening torque:
40N • m
Drive sheave nut tightening torque:
115N • m



1. CVT assy *2. Bolt*
3. Nut

Engine top side

Piston

● Install the piston rings in the order of oil ring, ② ring, ① ring.

● the first member to go to the oil ring groove is spacer ①, after placing the spacer fit the two side rails ②.

WARNING: When installing the spacer ①, do not overlap its two ends in the groove.

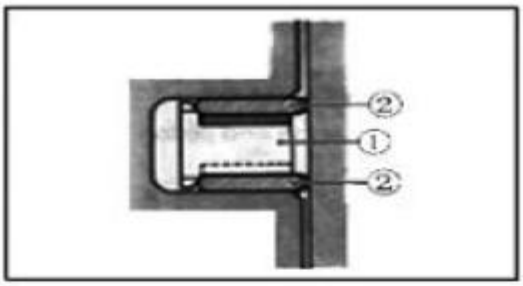
●Install the second ring A and the first ring B.

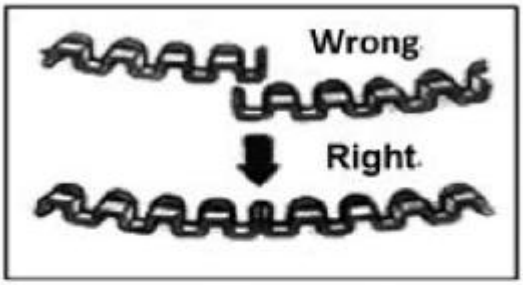
NOTE: Ring 1 and ring 2 differ in shape. Ring 1 and ring 2 marks “N and TOP” The marks should be face up when installing

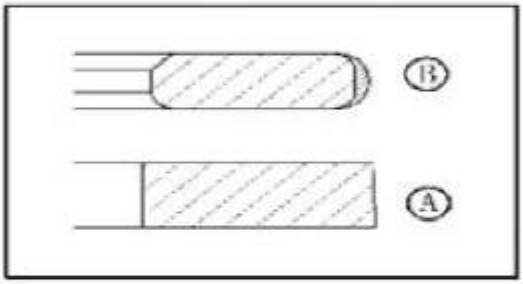
● After installing, inspect the smoothness of piston ring moving.

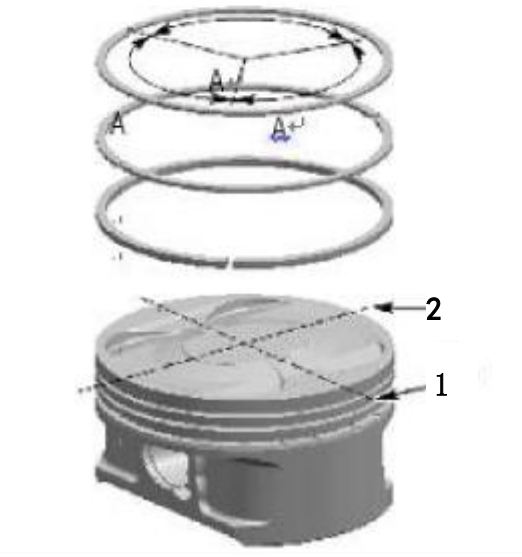
● The gaps of three rings should tagger 120° , and the gaps should not face the axial direction of piston pin or the main push surface of piston.

1. Do not face to the main push surface of piston.
2. Do not face to the axial direction of piston pin.
A.120°









●Apply a light coat of moly oil to the piston pin.

●Install piston pin into holes of piston and connecting rod small end

NOTE: When installing the piston, the "▲" mark on piston top is located to the intake side

NOTE: Piston and cylinder should be installed according to grouping pairing

●place a clean rag beneath piston and install piston pin circlip ①;

NOTE: While rotating crankshaft, pull the cam chain upward, or the chain will be caught between sprocket and crankcase.

● Install the dowel pins and the new cylinder gasket.

WARNING: Use a new cylinder gasket to prevent oil leakage

Cylinder

●Apply engine oil to piston skirt and cylinder wall.

● Hold each piston ring with proper position, insert piston into the cylinder.

NOTE: Pull timing chain from chain cavity, and then install cylinder properly.

NOTE: Piston and cylinder should be installed cording to grouping pairing

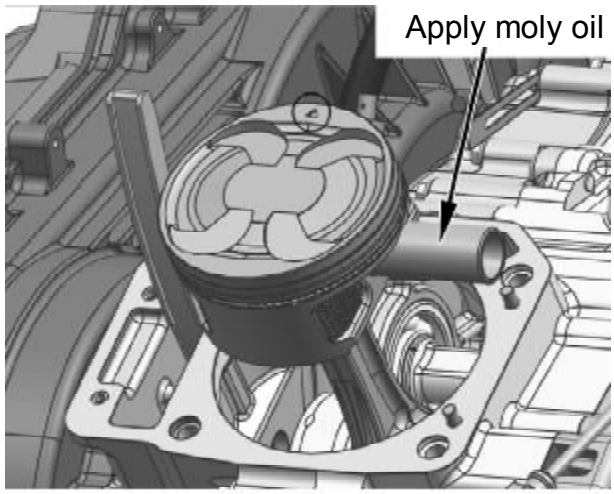
Chain Guide

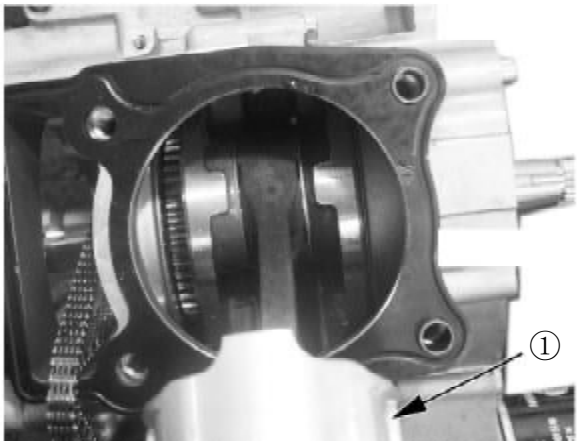
● Install chain guide 2

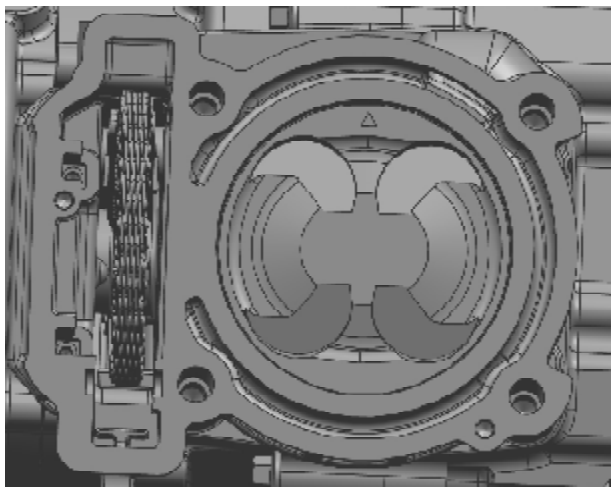
●Install dowel pin 1 and new cylinder gasket 3

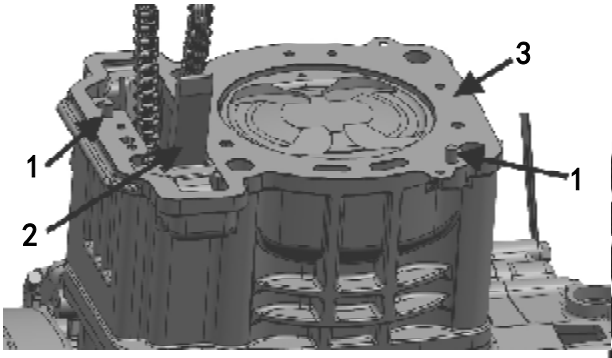
WARNING: Use new cylinder gasket to prevent oil leakage.

● Rotating crankshaft, and rotate the piston to upper dead center of crankshaft









1. Dowel pin *2. Chain guide*
3. Cylinder gasket

5

Cylinder head cover

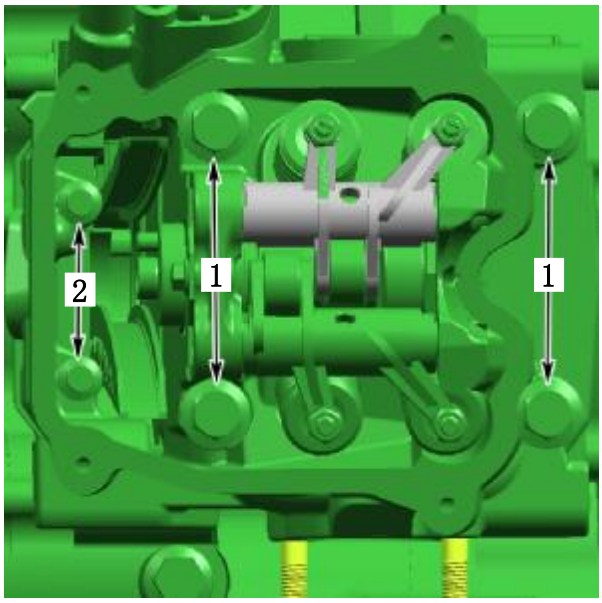
● Install cylinder head cover, tighten bolts diagonally to the specified torque.

Cylinder head cover bolt tightening torque:

Initial: 20N • m

Final: 40N • m

● Install bolt M6



1. Cylinder head cover bolt M10

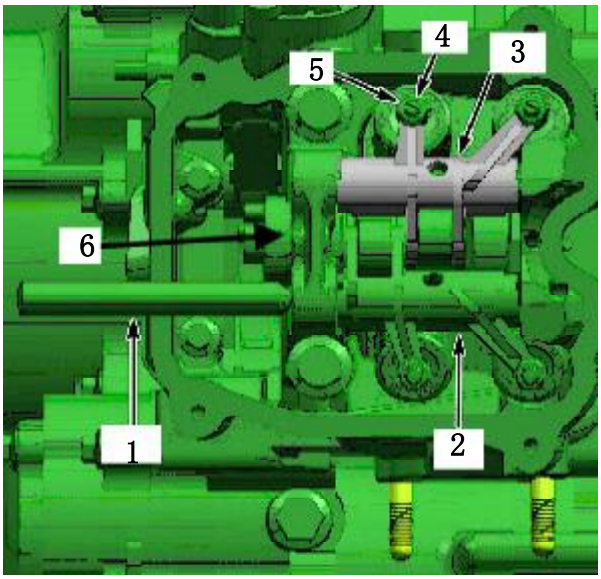
2. Nut M6

Camshaft, Rocker Arm

● Install camshaft

● Install rocker arm

● Install rocker shaft



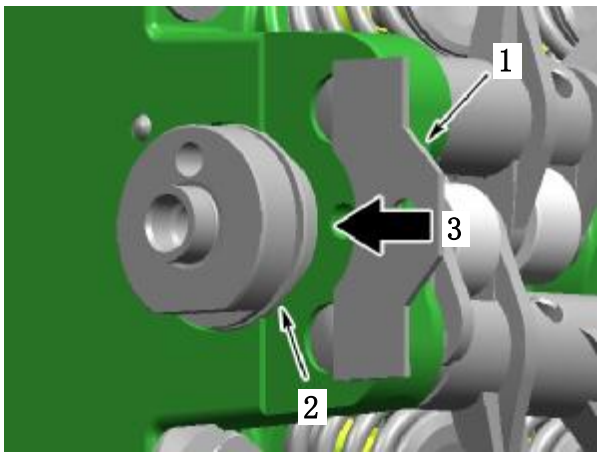
1. Rocker arm *4. Adjusting screw*

2. Exhaust rocker *5.* Nut

3. Intake rocker *6. Camshaft*

● Install camshaft holder into the groove of camshaft.

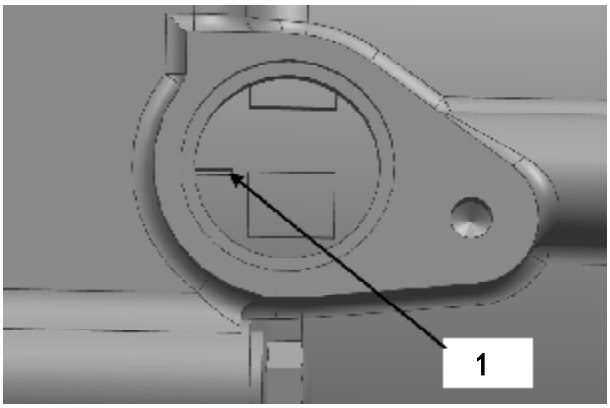
● Tighten nut



1. The position of camshaft holder
2. The locating groove of camshaft
3. The moving direction

Timing Driven Sprocket

● Remove speed sensor and align the carved line of magneto and mark of left cover. If not alignment, rotate camshaft and make them be aligned.



1 .carved line of magneto

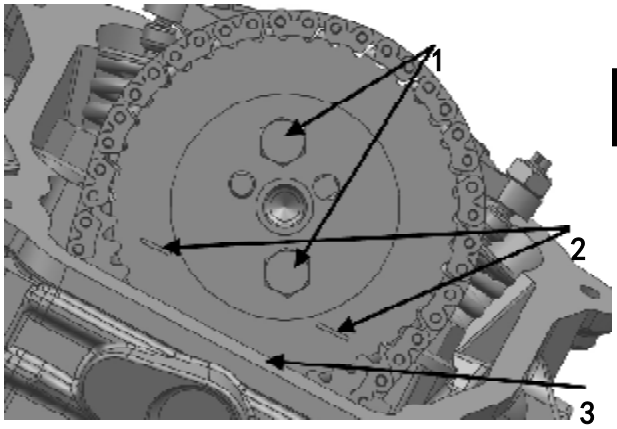
● Install timing driven sprocket, make the carved line of sprocket and the contact surface of cylinder head cover be parallel

● Hitch timing chain

● Tighten the fastening bolt to the specified torque

NOTE: make sure to apply screw locker on the fastening bolt of chain sprocket

Specified torque: 15N • m



1 .chain sprocket fastening bolt

2 .carved of timing chain sprocket

3 .the contact surface of cylinder head cove

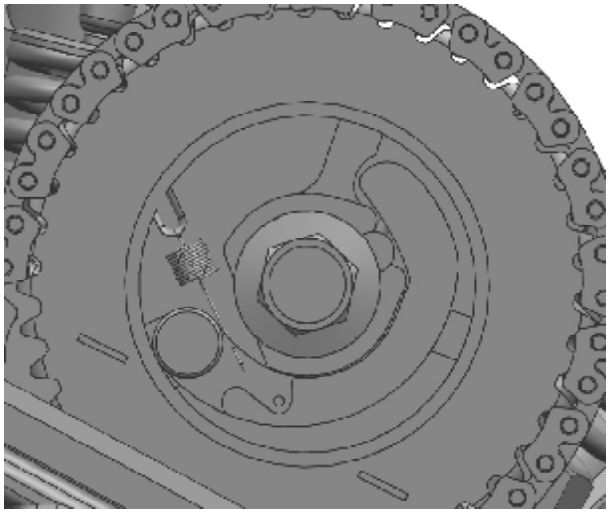
Decompressor Starter

● Install decompressor starter

● Tighten the bolt to the specified torque

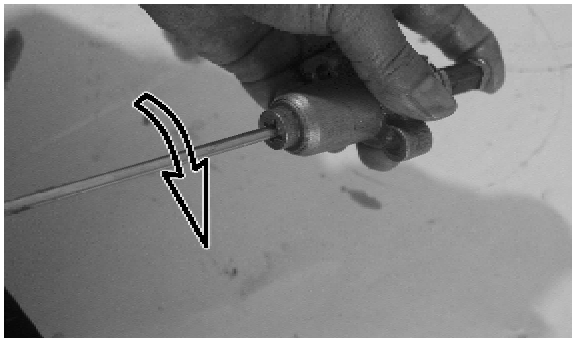
Decompressor starter bolt specified torque:

30N • m



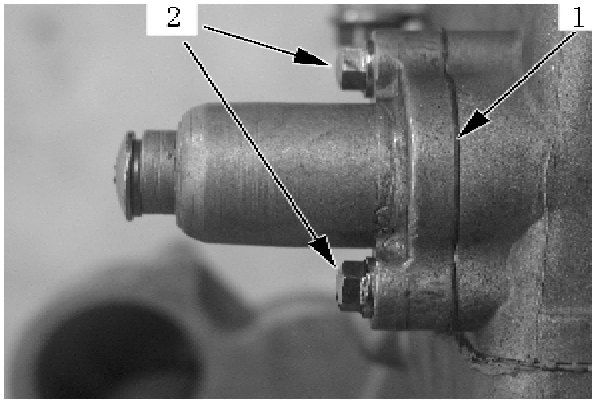
Timing Chain Tensioner

●Insert flat head screw driver into the end of tensioner groove, rotate clockwise and lock tensioner spring

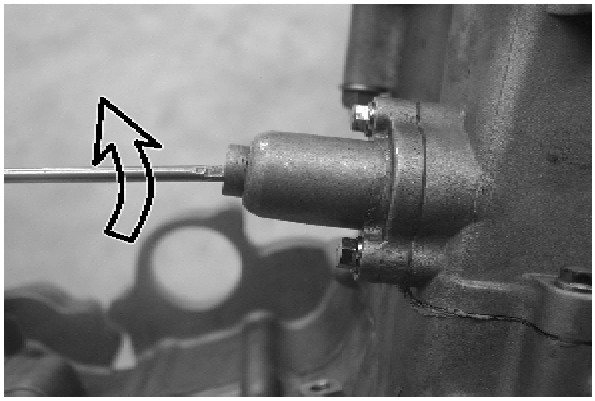


● Install timing chain tensioner and new seal gasket 1
● Install fixed bolt 2 and fasten it to the specified torque

Chain tensioner bolt specified torque:
10N • m

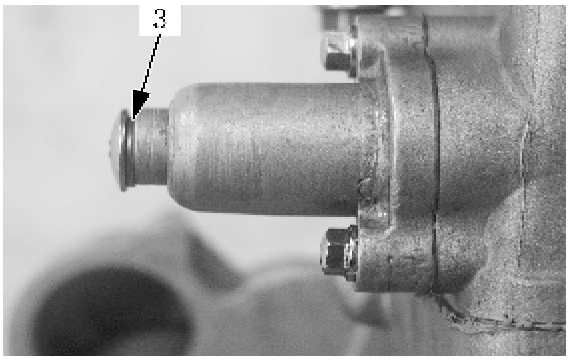


● after installing tensioner, use flat head screw driver to rotate it anticlockwise and make the spring press the tensioner adjuster to compress timing chain.



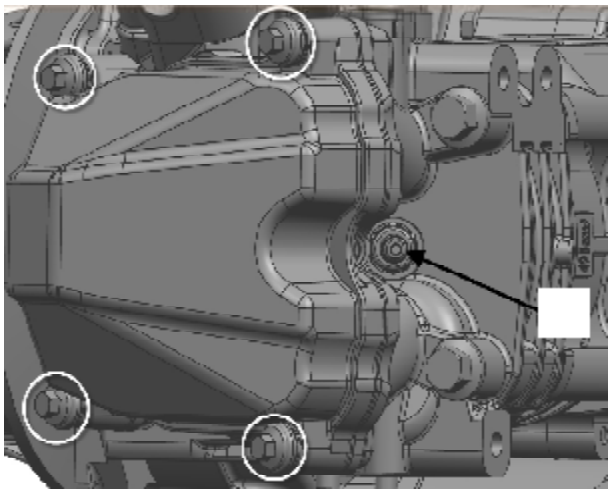
● Install new gasket 3
● Instal l tensioner screw to thespeci f ied torque；

Tensioner screw specified torque:
8N • m



Throttle body adjustment

●Adjust the gap of throttle body according to 2-3 throttle body gap adjustment procedure
● Install speed sensor, tighten the bolt



Cylinder Head Cover

● Put rubber ring on cylinder head cover
● install cylinder head cover
● tighten bolt

Spark plug

● install and tighten spark plug 1

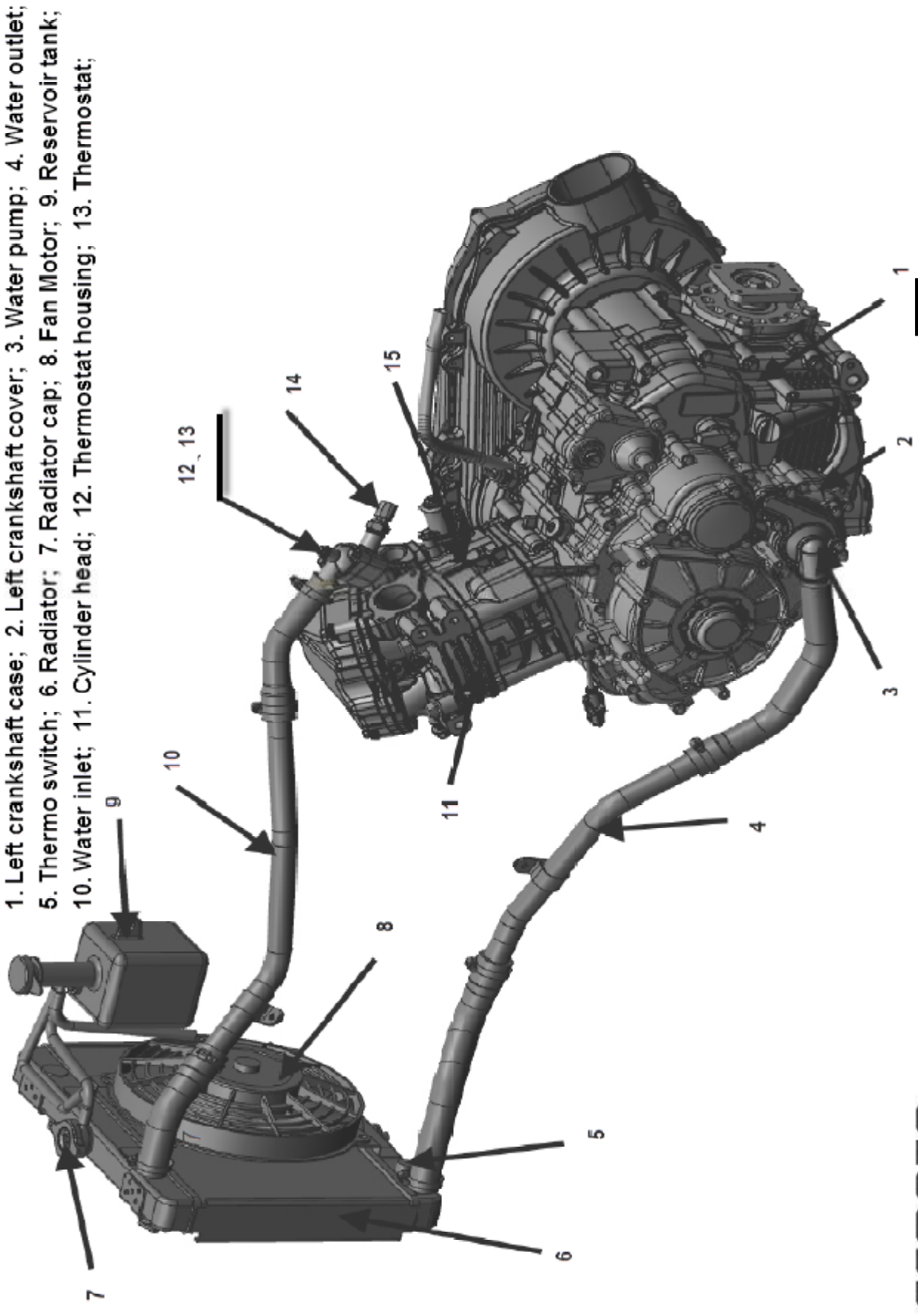
CVT cover

● install CVT cover and tighten bolt

Blank page for technology improvement

5.4 Cooling and lubrication system

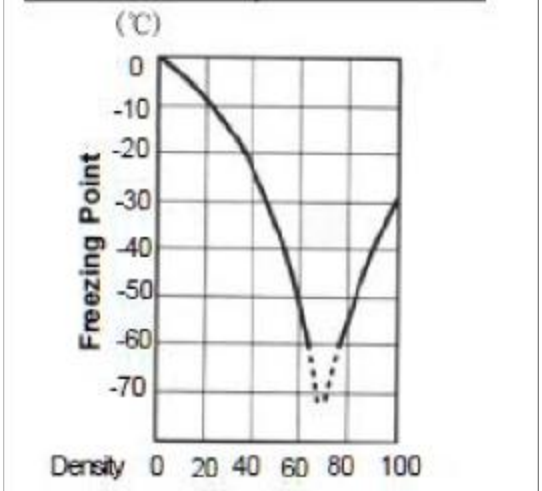
5.4.1 191R Engine cooling system chart

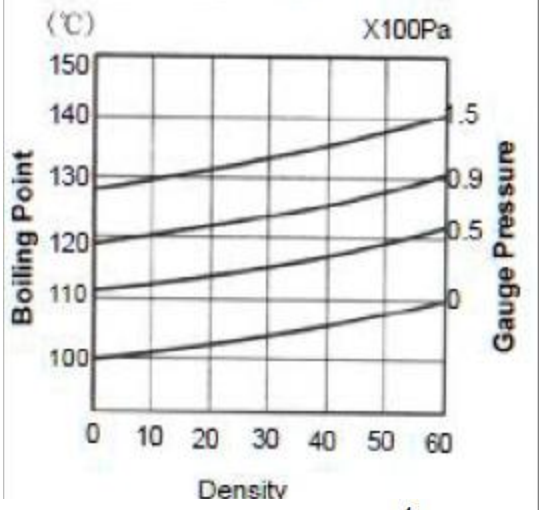


5.4.2 Engine Coolant

The cooling used in cooling system is mixture of 50% distilled water and 50% ethylene glycol antifreeze. This 50:50 mixture provides the optimized corrosion resistance and the fine heat protection. The coolant will protect the cooling system from freezing at temperature above -30℃, the mixing ratio of coolant should be increased to 55% or 60% according to the figure on the right.

Anti-Freeze Density	Freezing Point
50%	-30℃
55%	-40℃
60%	-55℃





WARNING:

Use high quality ethylene glycol base antifreeze and mixed with distilled water. Never mix alcohol base antifreeze and different brands of antifreeze

The ratio of antifreeze should not be more than 60% or less than 50%

Do not use anti-leak additive

DANGER:

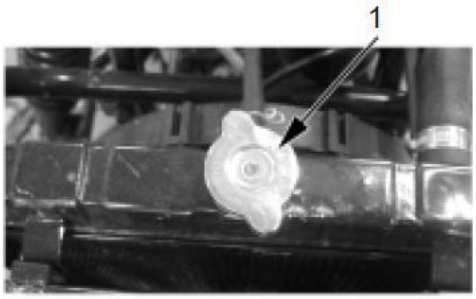
DO NOT open radiator cap when the engine is still hot. Or you may be injured by scalding fluid or steam;

Coolant is harmful. DO NOT swallow or stain your skin or eyes with coolant. In case of accidental swallow or stain, flush with plenty of water and consult the doctor immediately;

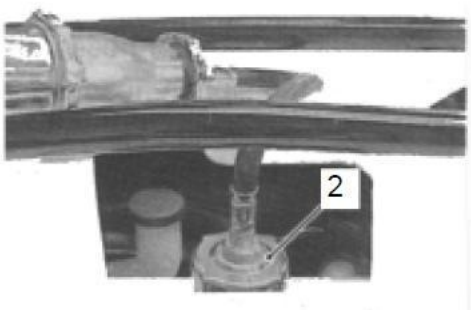
Keep coolant away from reach of children.

5.4.3 Inspection of cooling circuit

● Remove radiator ① and connect tester ② iller



DANGER:DO NOT open the radiator when the engine is still hot, or you may be injured by scalding fluid steam.



● Give a pressure of 105kPa, and check if the cap hold the pressure for at least 10 seconds

WARNING: When removing the radiator cap tester put a rag on the filler to prevent splash of coolant DO NOT allow a pressure to exceed the radiator cap release pressure.

WARNING: When removing the radiator cap tester put a rag on the filler to prevent splash of coolant DO NOT allow a pressure to exceed the radiator cap release pressure.

●If the pressure drops during 10 seconds, it indicates that there is leakage with the cooling system. In this case, check the complete system and replace the leaking parts or components.

5.4.4 Inspection and cooling of Radiator and Water Hoses Radiator Cap

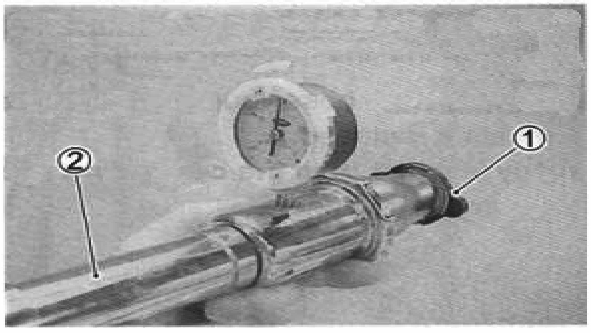
● Remover radiator cap ①

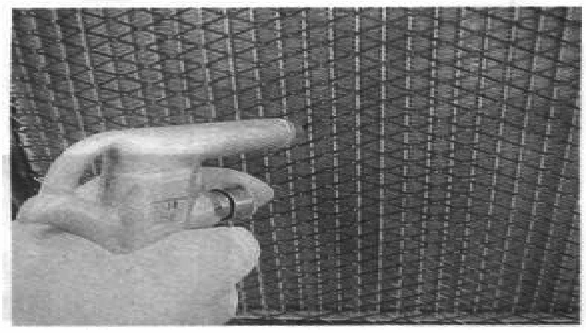
● Install radiator cap to cap tester ②

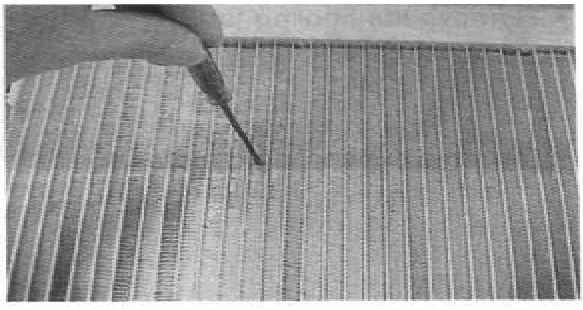
● slowly increase pressure to 108kPa and if thecap hold the pressure for at least 10 seconds

● If the cap cannot meet the pressure requirement, replace it.

Radiator Cap Valve Opening Pressure
Standard: 108kPa
Tool: Radiator Cap Tester





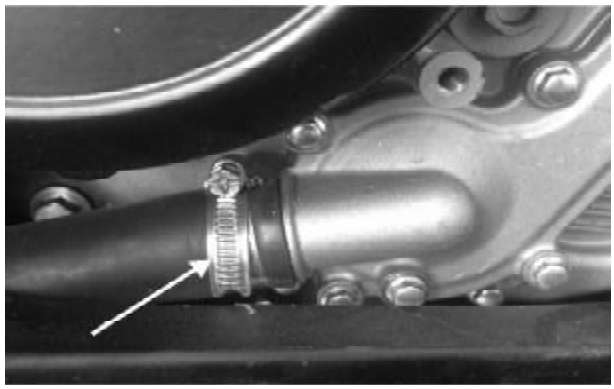


Radiator Inspection and Cleaning

● Remove dirt or trash from radiator with compressed air

● Correct the radiator fins with a small screwdriver

Radiator Hose Inspection



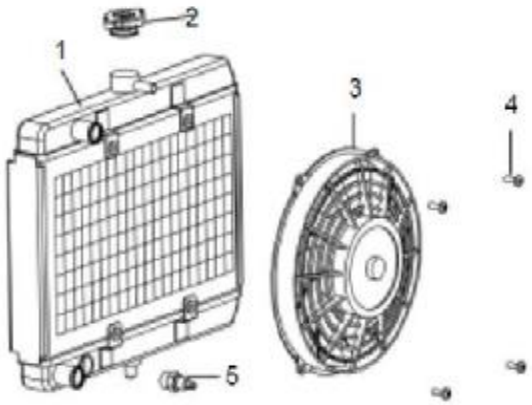
● Check radiator hoses leakage or damage. If the hoses are leakage and damaged, replace them

●Check tightening of clamps. Replace the clamps if necessary

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

5.4.5 Inspection of Fan Motor

1. Radiator; 2. Radiator Cap;
3. Fan Motor; 4.Mounting Bolt;
5. Fan Motor; 6. Thermoswitch



● Remove fan motor from radiator
● Turn the vanes and check if they can turn smoothly

●Check fan motor. Make sure that the battery applies 12 volts to the motor and the motor will run at full speed while the ammeter will indicate the ampere not more than 5A. 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:

10N • m

Inspection of Thermoswitch

● Remove thermoswtich

● Check the thermoswithch for closing or opening by testing it at the bench as illustrated. Connect the thermoswithch ¢Ù to the circuit tester, place it in a vessel with engine oil. Place the vessel above a stove.

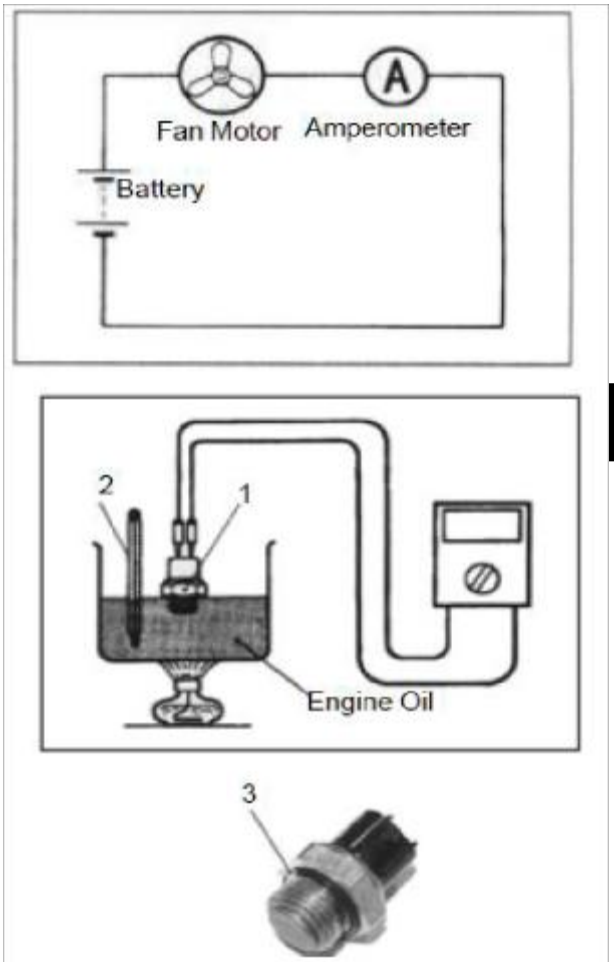
● Heat the oil to raise the temperature slowly and take the reading thermostat ②, when the thermoswitch closes and opens.

Tool: ammeter

Thermoswitch Operating Temperature:

Standard: (OFF-ON): Approx. 88℃

(ON-OFF): Approx. 82℃



WARNING:
Avoid sharp impact on thermoswitch.
Avoid contact of thermoswitch with thermometer or vessel.

● Installation: Use a new O-ring ③ and tighten the thermoswitch to the specified torque;

Thermoswitch Tightening Torque: 17N • m

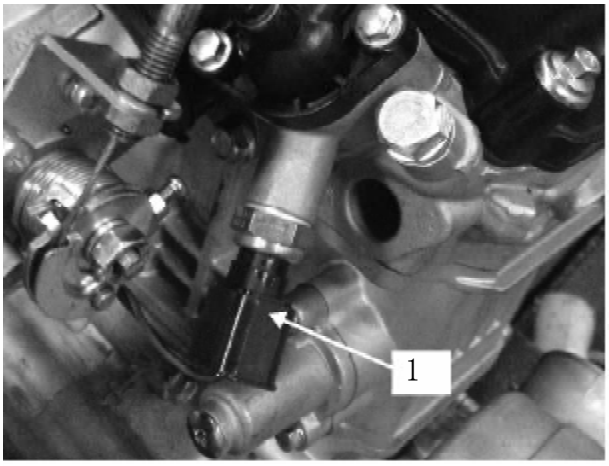
● Check coolant level after installation of thermoswitch. Fill coolant if necessary

5.4.6 Inspection of Water Temperature Sensor

● Place a rag under water temperature sensor 1 and remove it from cylinder head

● Check the resistance of water temperature sensor as illustrated on the right. Connect the temperature sensor 2 to the circuit tester, place it in a vessel with engine oil. Place the vessel above a stove

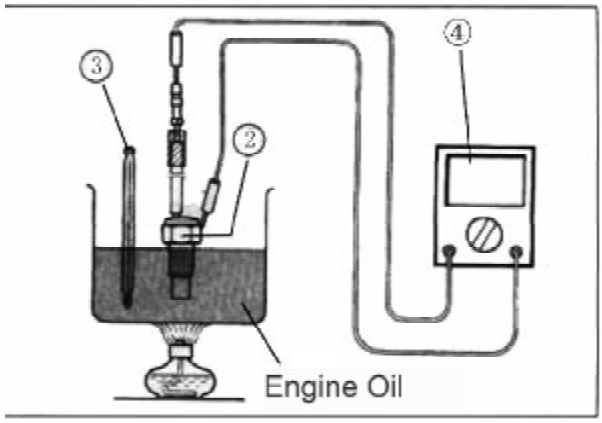
Tool: ohmmeter, thermometer



●Heat the oil raise the temperature slowly and take the reading from ohmmeter ④and thermometer ③

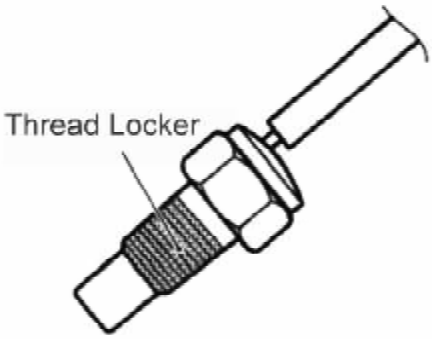
Resistance and Water Temperature

Temperature (℃)	50	80	100	120
Resistance (Ω)	154±16	52±4	27±3	16±2



● Installation: Apply a little thread locker and install it to the cylinder head by tightening to the specified torque

Water temperature Sensor Tightening Torque: 16N • m



WARNING:
Avoid sharp impact on temperature sensor; Avoid contact of temperature sensor with thermometer or vessel

●After installation, check the coolant level. Fill coolant if necessary

5.4.7 Inspection of Thermostat

● Remove thermostat housing

● Remove thermostat

● Check thermostat pellet for cracks. If necessary, replace it.

● Test the thermostat according to the following steps:

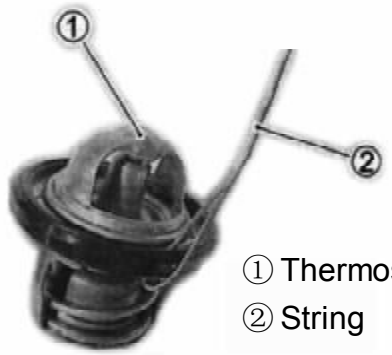
☆Pass a string between thermostat flange as illustrated on the right

☆Immerse the thermostat in a beaker with water. Make sure the thermostat is in the suspended position without contact to the vessel. Heat the water by placing the beaker above a stove and observe the temperature rise on a thermometer

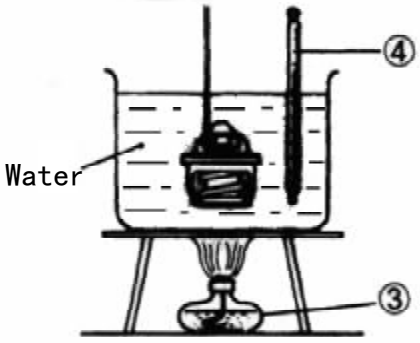
☆ Take the temperature reading from thermometer when the thermostat valve opens.

Thermostat Valve Opening Temperature:71℃± 3℃

Tool: Thermometer



① Thermostat
② String



③ Stove ④ Thermostat

☆ Keep heating the water to raise the water temperature. When the water temperature reaches the specified valve, the thermostat valve should have been lifted by 3.5mm~4.5mm

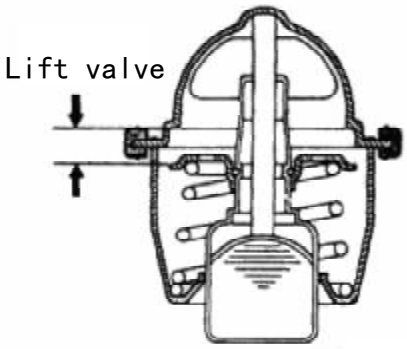
☆ If thermostat valve opening temperature or thermostat valve lift does not reach the standards, replace it.

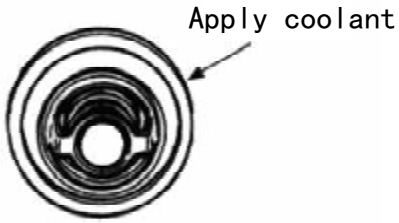
● Install thermostat: reserve the removal procedure for installation

☆Apply coolant to the rubber seal of thermostat

☆Install thermostat housing. Tighten to the specified torque:

Tightening Torques: 10N • m





5.4.8 Water Pump

Water pump cover

Water pump cover is on engine left crankshaft cover

Removal and Disassembly

WARNING:
When engine is hot, DO NOT remove radiator cap or loose coolant discharge plug screw to prevent from injury.

● Drain coolant
● Remove radiator water outlet from water pump cover
●Remove mounting bolt from water pump cover
● Remove water pump cover

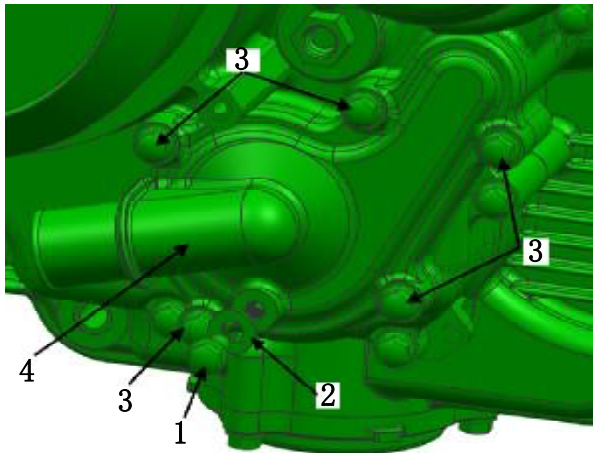


Illustration
1. coolant drain plug screw
2. Seal gasket
3. bolt
4. water pump cover

Inspection of water pump cover

● Check water pump cover seal gasket,if necessary, replace it

Installation of water pump cover

● Install water pump cover reverse the removal procedure for installation

WARNING:
Install seal gasket in the groove of water pump cover correctly to prevent from leakage.

● Tighten mounting bolts diagonal cross.

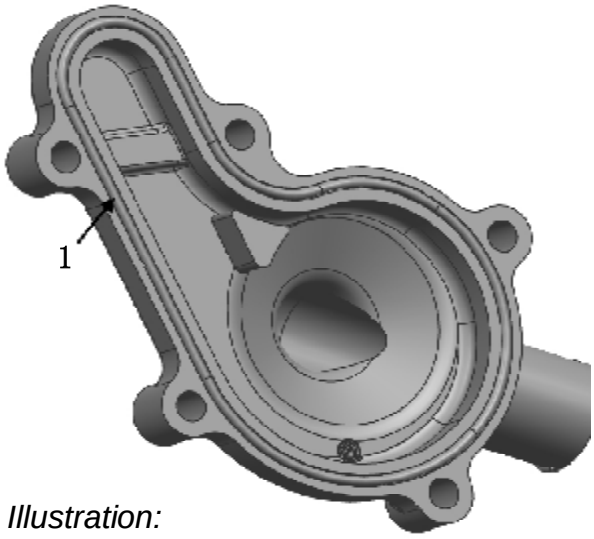
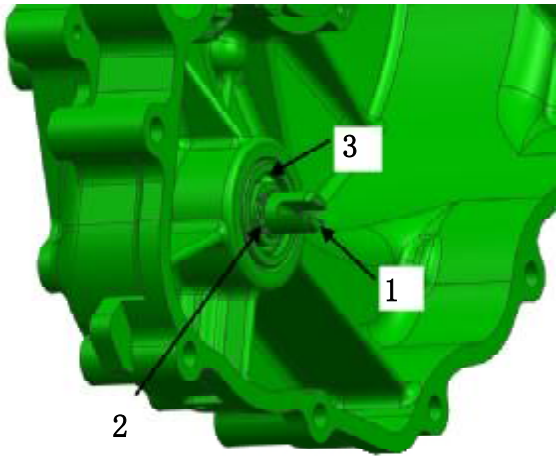


Illustration:
1. seal gasket

Removal of water pump impeller, water seal, oil seal, bearing and gears

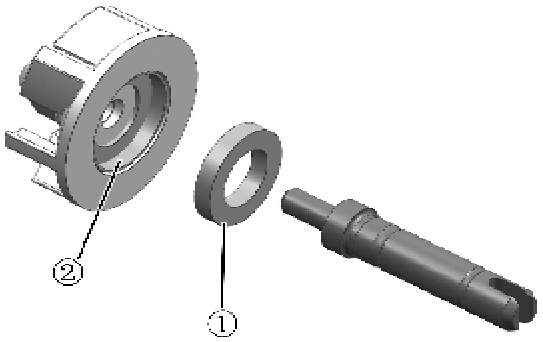
Drain coolant

● Remove water pump cover
● Remove left crankshaft case housing cover
●Use proper clipper to remove the retainer ring and discard it
● Remove water pump gears
● Remove bearing from water pump shaft



1. Water pump impeller
2. Retainer ring
3. Bearing

●Push water pump shaft to remove impeller from left crankshaft housing cover.



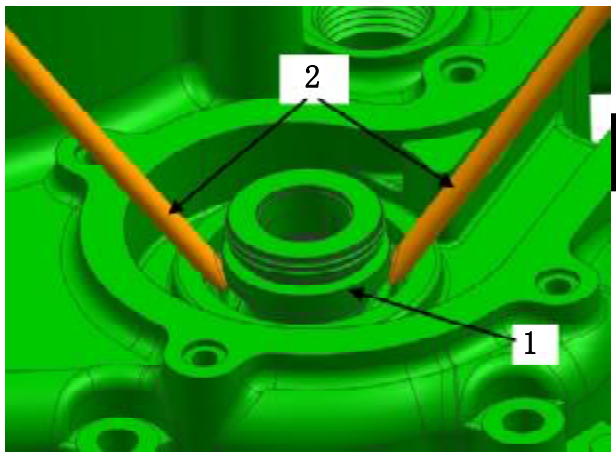
WARNING:
Avoid damaging water pump impeller.

● Remove seal ring ① and rubber seal ②

● Use flat head screwdriver to pry locate ring of seal.

NOTE:
The seal does not need to be removed, if there is no abnormal condition.

WARNING: DO NOT reuse a removed locate ring of seal.



1. locate ring
2. flat head screwdriver

● Leave a rag on water pump body

●Use flat head screwdriver to remove oil seal

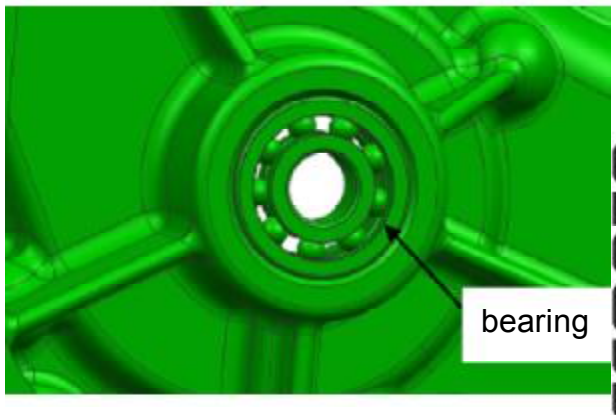
NOTE:
The oil seal does not need to be remove, if there is no abnormal condition.

WARNING:
DO NOT reuse a removed oil seal

● Remove bearing with special tool.

NOTE: The bearing does not to be removed,if there is no abnormal condition noise.

WARNING: DO NOT reuse a removed bearing.



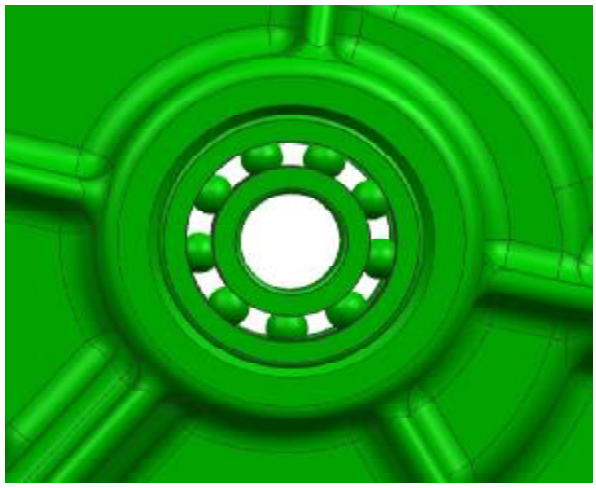
Inspection of Water Pump

☆ **Bearing**

● Check the bearing clearance by hand, while it is still in the water pump body.

● Turn inner race of bearing to check for abnormal noise and smooth rotation.

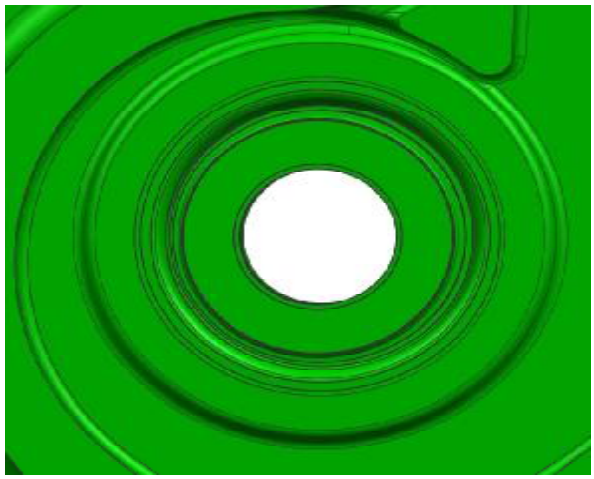
● Replace the bearing, if there is abnormal condition



☆ **Water Seal**

● Check water seal for damage, pay attention to the seal surface

● In case of leakage or damage, replace the water seal. If necessary, also replace the seal ring



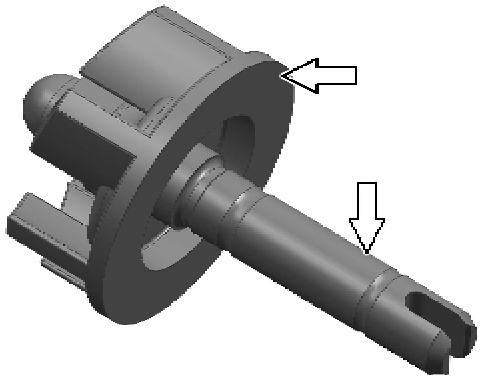
☆ **Oil Seal**

● Check oil seal for damaged. Pay attention to the oil seal lip.

● In case of damage or leakage, replace the oil seal.

☆ Left crankshaft housing cover

● Inspection left crankshaft housing cover and bearing, the connect surface of water seals. If necessary, replace new parts.



☆ Water Pump Impeller

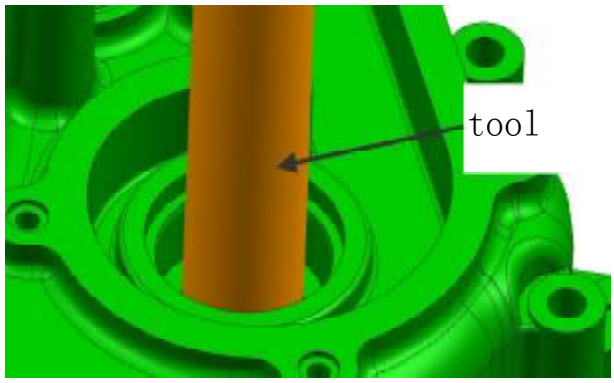
●Check the impeller and shaft for damage.

● If the impeller or shaft are damaged, replace a new part.

Assembly and Installation of Water Pump

● Install oil seal with special tool

Tool: Oil Seal Installer
(172MM-080005-923-001)

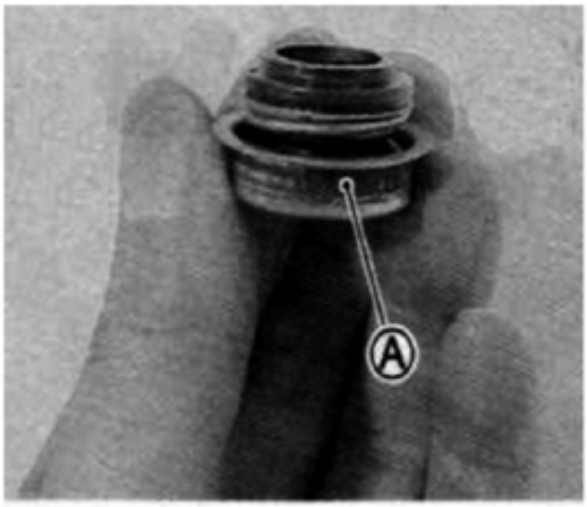


NOTE: The stamped mark on the oil seal faces outside.

● Apply a little grease to the oil seal lip

● Install new bearing with special tool

Tool: Bearing Installer
(1P72MM-081001-923-001)



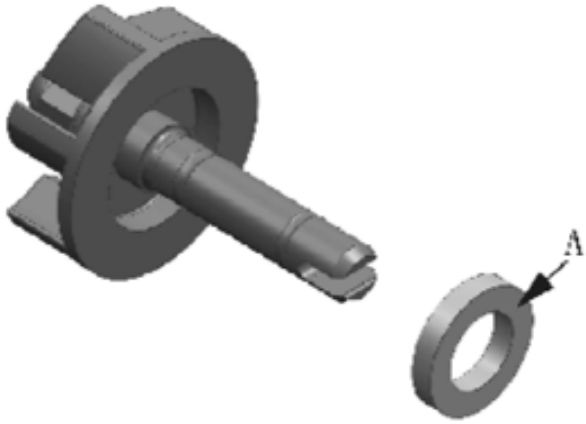
NOTE: the stamped mark on the bearing faces outside

● Install new water seal with proper wrench

NOTE: Apply sealant to "A" side of water seal

● Install seal ring to impeller

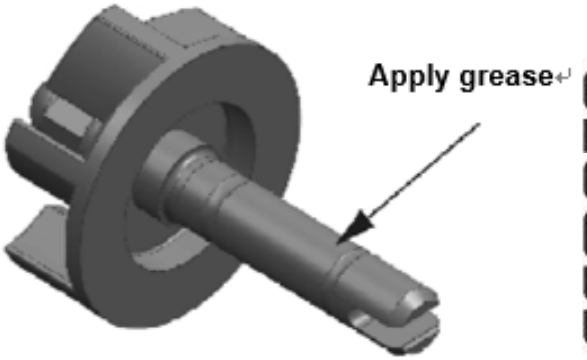
● Clean off the oil and grease from water seal and install into the impeller



NOTE: "A" side of water seal faces impeller

● Apply grease to impeller shaft

● Install impeller shaft to left crankshaft housing cover



● Install ring to water pump shaft

● Install water pump cover and tighten the bolts and bleed bolt

Water pump cover bolts tightening torque:

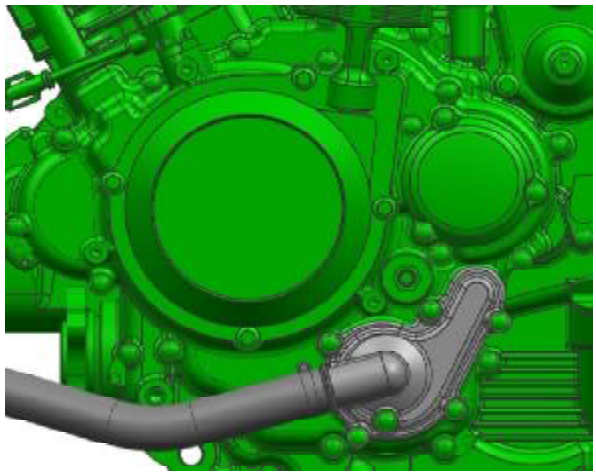
6N • m

● Check impeller for smooth turning

● Install left crankshaft housing cover (3-54)

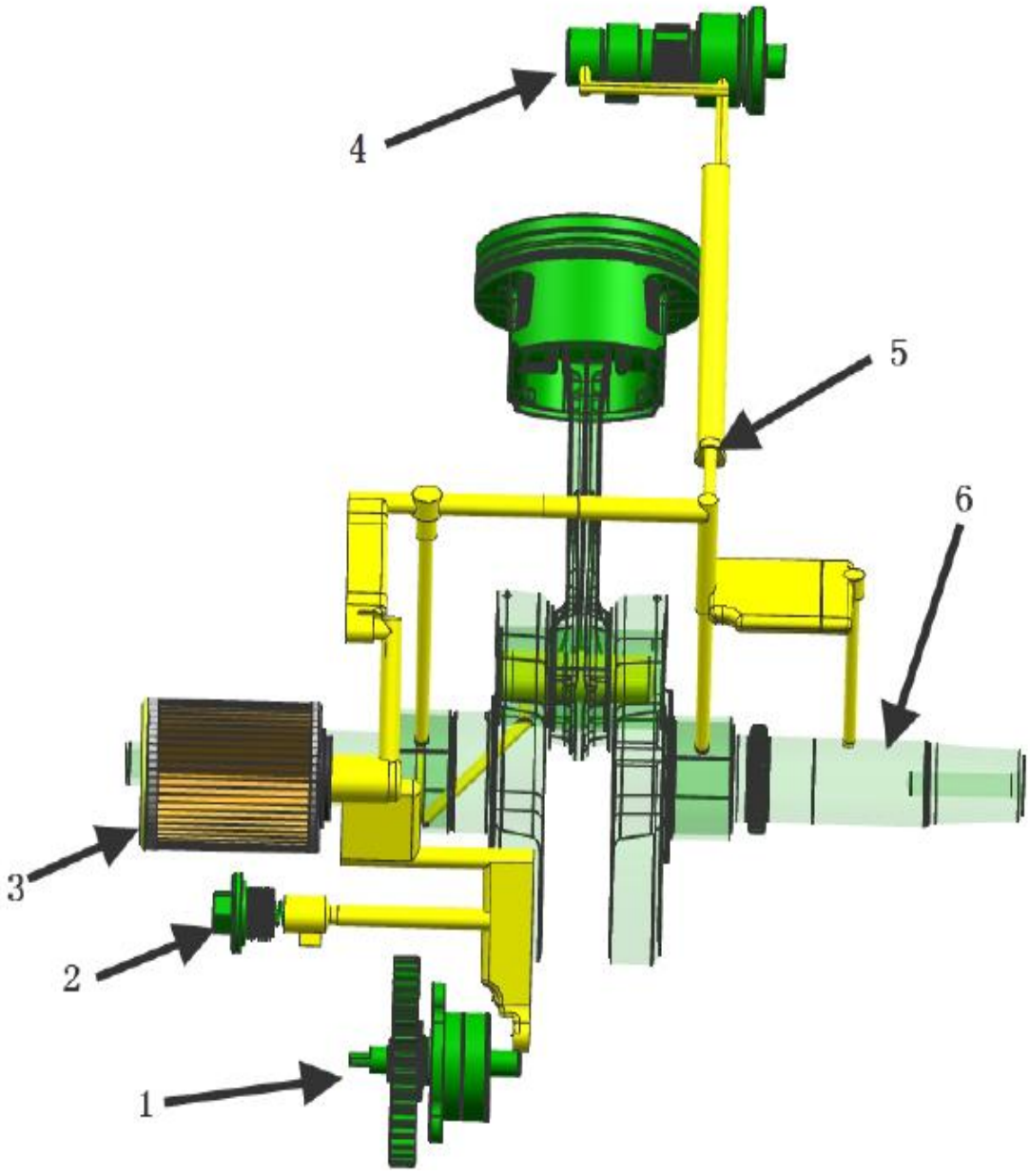
● Connect water tubes

● Inject coolant(refer to 2−10)



5.4.9 Illustration of Engine Lubrication System

1. Engine oil pump
2. Decompressor
3. Oil Filter
4. Camshaft
5. Oil path
6. Crankshaft connecting rod



Add oil to the engine parts (piston, cylinder body, camshaft and so on) which run at high speed.
Engine lubrication should be special oil.
Engine oil is not only used as lubrication, but also used to wash, rustproof, seal and cool.

5.4.10 Inspection of Lubrication system

(Refer to 5.2.8 inspection of lubrication system)

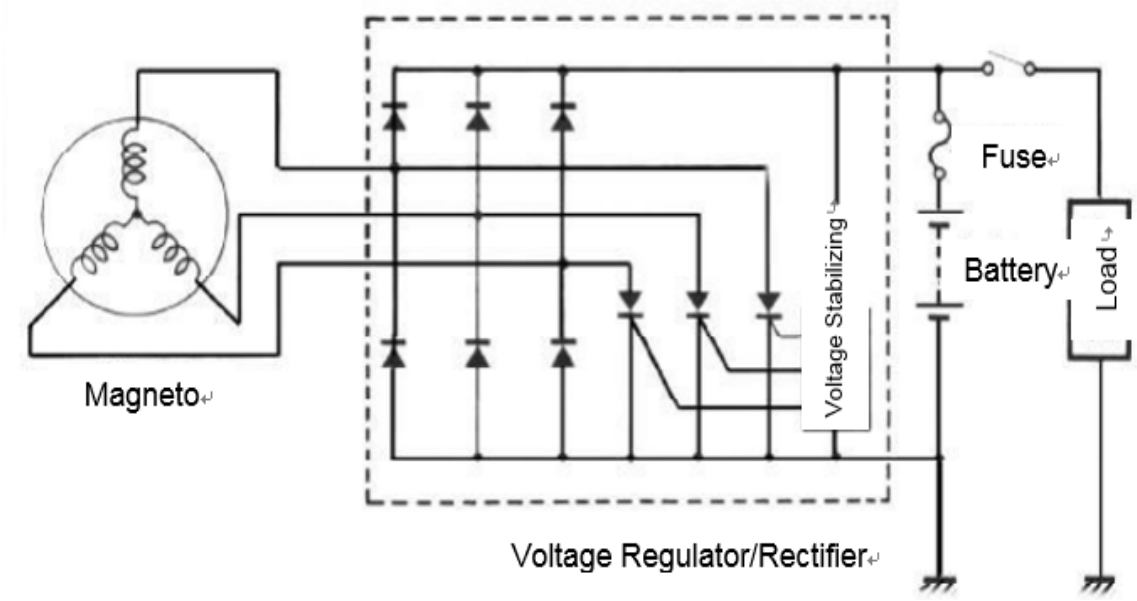
5.4.11 Inspection of engine oil pump

(Refer to 5-78)

5.5 Electrical System

5.5.1 Charging System

Charging Circuit



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 and core

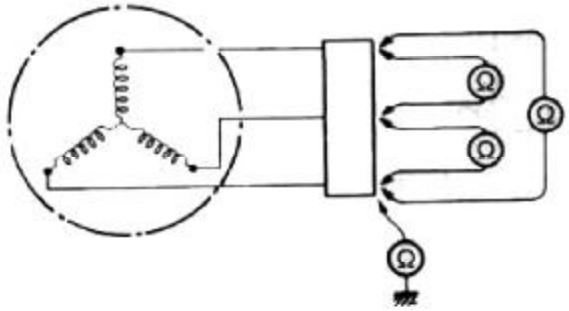
Turn multimeter to 1 × 10 Ω

MAG Coil Resistance:

0.5 Ω ~1.5 Ω (Yellow-Yellow)

Resistance between Stator Coil and Core:

∞ Ω (Yellow-Ground)



MAG Non-loaded Performance

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

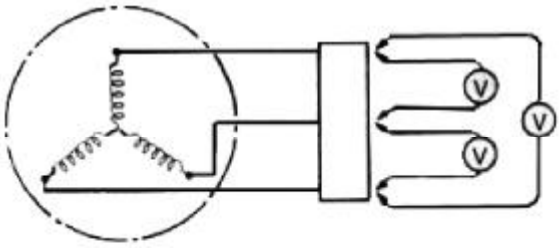
Use multimeter to measure the voltage between 3 output lines.

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

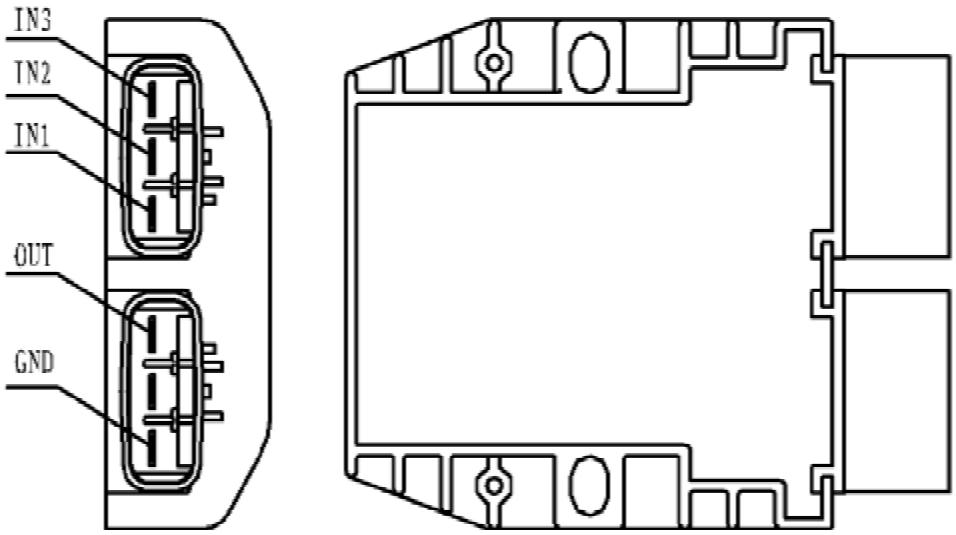
Turn Multimeter to V (AC)

Voltage between Output Lines When MAG Non-loaded:

>50V (AC) at 5000r/min



VOLTAGE REGULATOR/RECTIFIER



● Connect multimeter between terminals;
Read resistance;
If any reading is out of specification, replace with a new regulator.

Turn multimeter to DIODE.

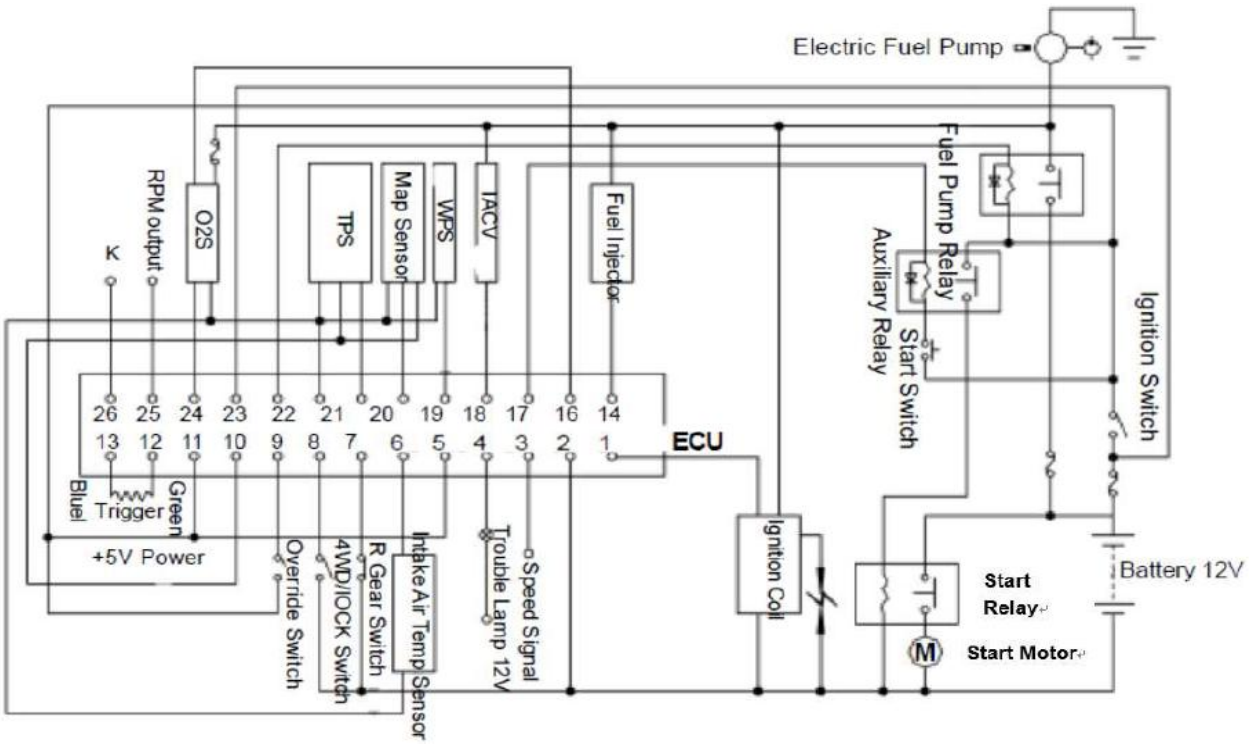
NOTE:
If multimeter reads below 1.4V when probes unconnected, replace its battery.

●After engine running and at the state of battery full charged, if the voltage between positive and negative terminal exceeds 15V or is lower 12V, replace with a new MAG.

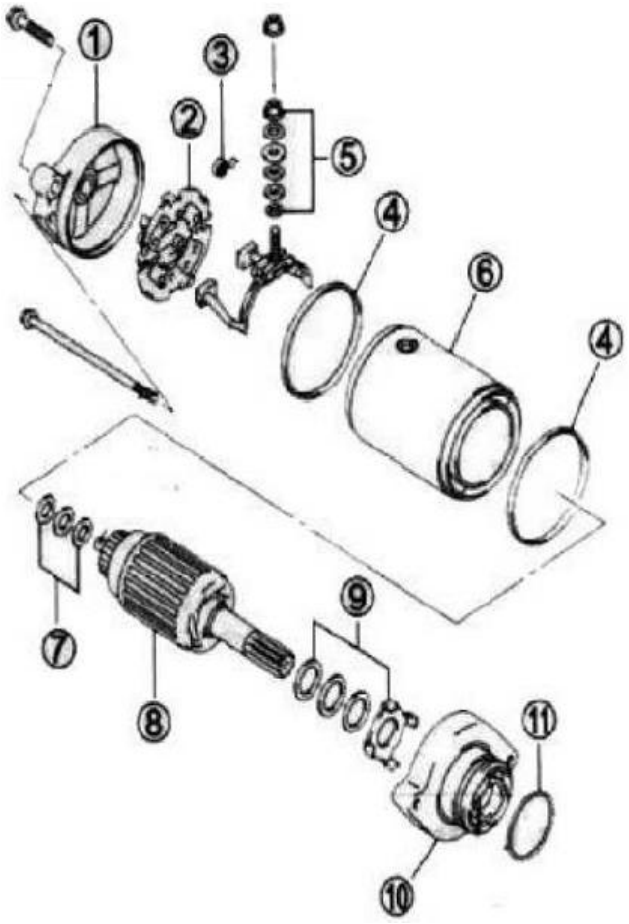
		Red ⊕				
		IN1	IN2	IN3	GND	OUT
Black ⊖	IN1		∞	∞	100~800	∞
	IN2	∞		∞	100~800	∞
	IN3	∞	∞		100~800	∞
	GND	∞	∞	∞		∞
	OUT	100~800	100~800	100~800	100~800	

5.5.2 STARTING SYSTEM

TRIGGER CIRCUIT DIAGRAM



Starter motor



1.Outer Cover
2.Brush Holder
3.Brush Spring
4.O-ring
5.Brush Terminal
6.Main Housing(yoke)
7.Washer
8.Armature
9.Washer
10.Cover Inner
11.O-ring

BRUSH

● Check brush for damages or cracks.

●If any damages, replace with a new brush.

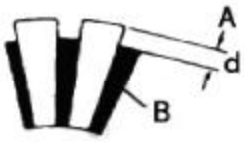
COMMUTATOR

● Check for color change, damages or 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.

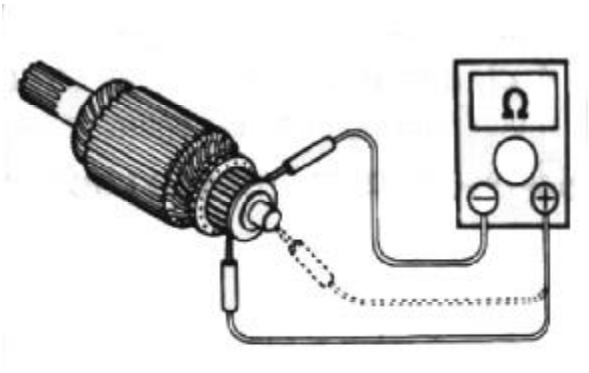
●If over wear, cut a part of insulator B and the distance between A and B as d.



$d \geqslant 1.5mm$

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.



OIL SEAL

Check for damages or leaks.

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

STARTER RELAY

● Put 12V between positive and negative terminal.

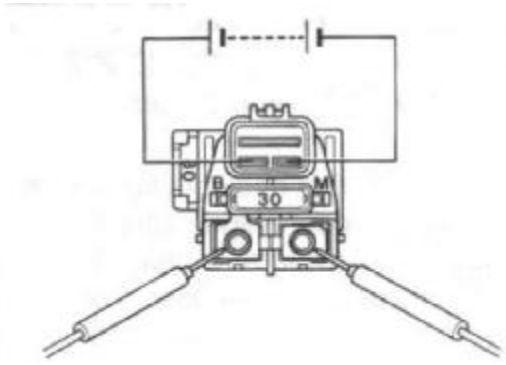
Use multimeter to check if there is continuity between 2 contacts.

● If multimeter clicks, there is continuity between contacts.

●If 12V is removed, no continuity remains between contacts.

● If both above 2 items are ok, it indicates the replay is ok.

Turn mulitimeter to DIODE.



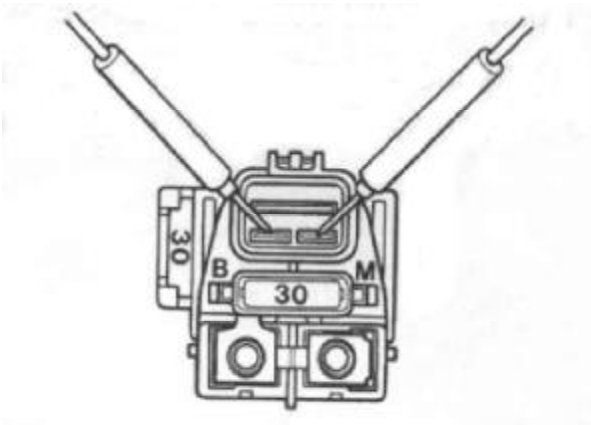
CAUTION:

The voltage loaded between terminals cannot exceed 2 minutes, 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 × 10 Ω

Starter Relay Coil Resistance: 3 Ω～5 Ω



AUXILIARY STARTER RELAY, FUEL PUMP 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.

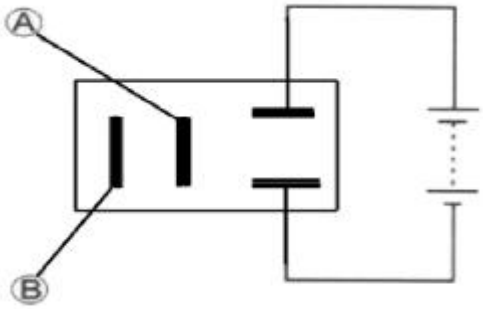
●If 12V is removed, no continuity remains between contacts.

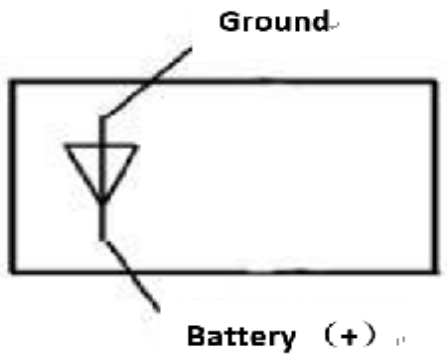
● If both above 2 items are ok, it indicates the replay is ok.

● Turn multimeter to 1 × 100 Ω; measure auxiliary starter relay resistance.

Auxiliary starter relay resistance:

90 Ω ~100 Ω





NOTE:
At the back of auxiliary starter relay, parallel to diode, it 's the relay coil positive terminal.

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:

0.3MPa ± 0.01MPa

● Place the transmission in Neutral.

● Check EFI with PDA for fault; if there is, eliminate the trouble according to DTC (Diagnostic Trouble Code).

●Close the throttle and turn the engine stop switch to "RUN", then push starter switch for 3～5 seconds to run the engine.

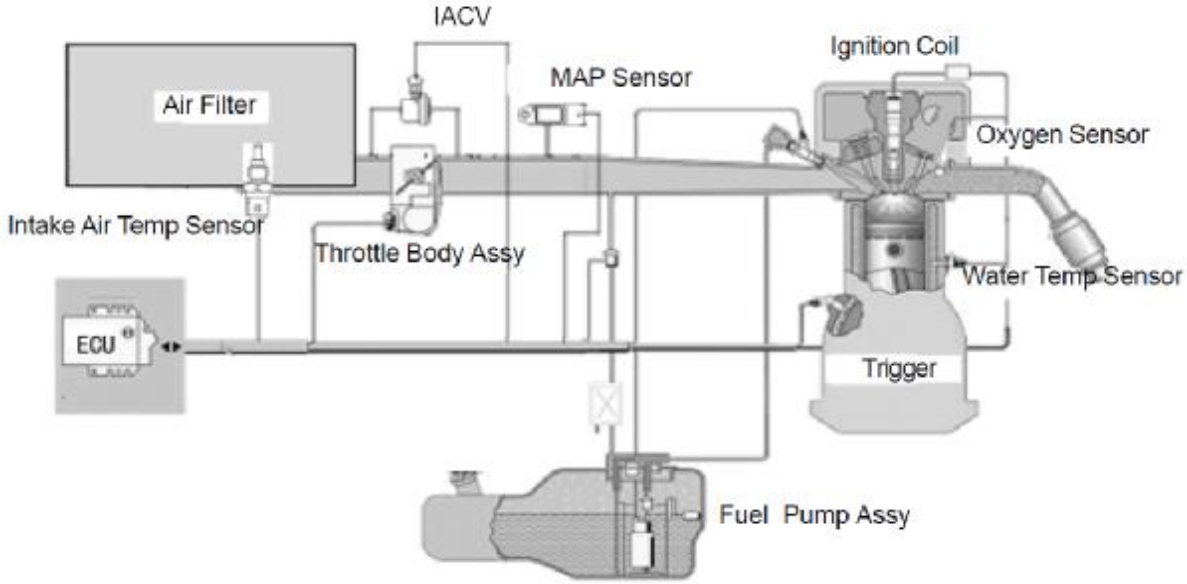
●After starting, warm up until idle speed is stable and check it.

Idle Speed: 1400 r/min ± 100r/min.

Fuel Pressure Gauge

5.5.3 ELECTRONIC FUEL INJECTION SYSTEM

5.5.3.1 EFI SYSTEM STRUCTURE



EFI system is composed of three subsystems:

(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 meter. Sensors in EFI system include:

● T-MAP sensor (Loading information, Air density information)

● Throttle Position Sensor (Loading information, loading range information, Acceleration information)

● Crankshaft Position Sensor (CPS) (Tigger) (Crankshaft position information)

● Water Temperature Sensor (Engine temperature information)

● Speed Sensor (Output shaft speed information)

● Gearing Position Sensor (Gear information)

● Oxygen Sensor (excess air coefficient above 1 or lower than 1)

● 4WD/Lock (4WD/Lock information)

● Over-ride Switch (Relieve speed limit information)

(2)ECU:

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

(3)Actuator:

Execute the EFI instruction. Main actuators include:

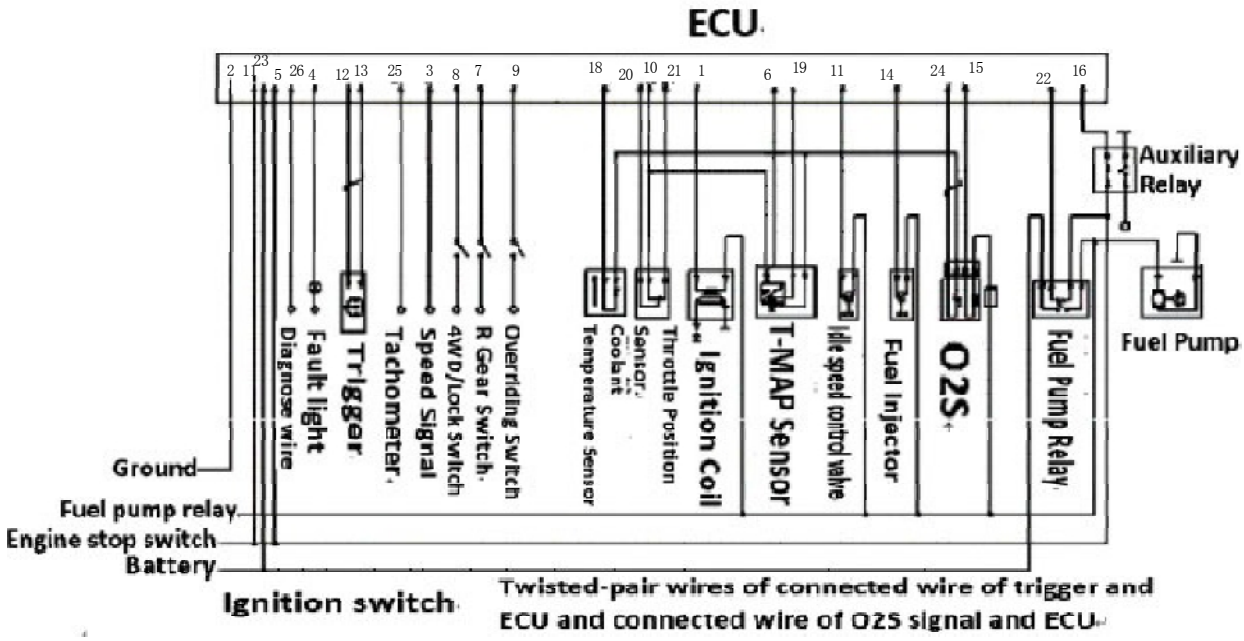
● Fuel Pump (supply high pressure fuel)

● Fuel Injector (inject fuel, make fuel spray excellent)

● Ignition Coil (Provide high pressure ignition energy to spark plug)

● Idle Air Control Valve (Provide idle speed air inlet)

5.5.3.2 EFI Wiring Diagram



5.5.3.3 EFI System Maintenance Notice

● Always use genuine CFMOTO parts for maintenance, otherwise it cannot assure a normal performance to EFI system.

● During the maintenance procedure, never try to break down 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 not permitted.

● The fuel pressure in EFI fuel supply system is very high (about 300kPa), accordingly,all fuel lines are high pressure resisting. Even if the engine is not running, the fuel pressure is 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 follow shows:

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 un-adjustable. 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.

5.5.3.4 EFI SERVICE TOOL

Tool Name: PDA

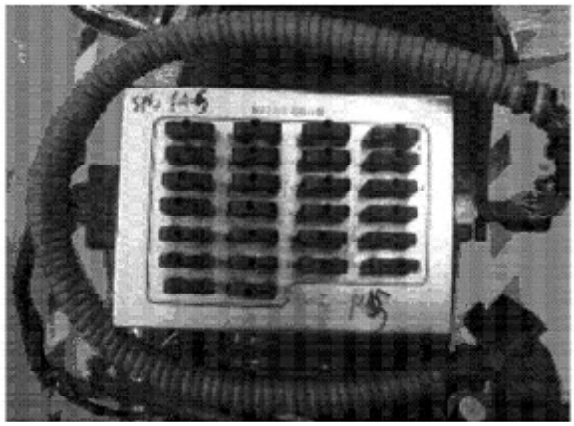
Function:

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

Tool Name: Connector

Function:

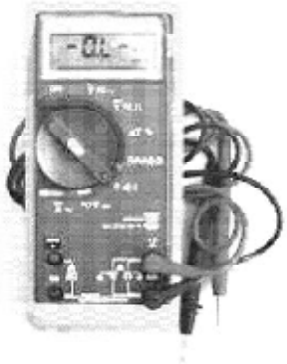
Check electric signal of pins of electric unit,check circuit situation.



Tool Name: DMM(digital muitimeter)

Function:

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



Tool Name: Vacuum Gauge

Function:

Check the manifold for air pressure.

Tool name: Timing Light

Function:

This light is used to check engine ignition timing.

Tool name: 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.

Tool Name: 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.

Tool Name: Fuel Injector Analyzer

Function:

This analyzer is used to clean and analyses fuel injectors.

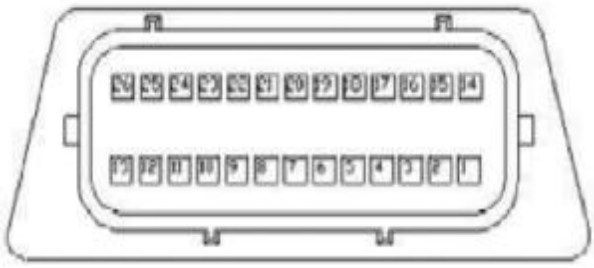
5.5.3.5 EFI COMPONENTS AND FUNCTION

(1)ECU:

ECU, it is the brain of the whole EFI system. It analyzes and process the information received by sensors, reach a conclusion, then transmit the conclusion to the actuator as instruction so as to make the engine operation in optimal state.

ECU

ECU pins functions:



ECU Pin Locations

1. Ignition coil control signal
2. Ground
3. Speed signal
4. Trouble light
5. Ignition switch power +
6. T-MAP sensor signal
7. Reverse gear signal
8. 4WD/Lock switch signal
9. Over-rider switch signal
10. +5V power output
11. Ignition switch power +
12. Tigger signal A
13. Tigger signal B
14. Fuel injector
15. Oxygen sensor heating
16. Auxiliary relay
17. Idle speed control valve (Canister control valve)
18. Water temperature sensor signal
19. Intake air pressure sensor signal
20. Throttle position sensor signal
21. Sensor
22. Fuel pump relay
23. Battery power
24. Oxygen sensor signal
25. Engine RMP output
26. K diagnose

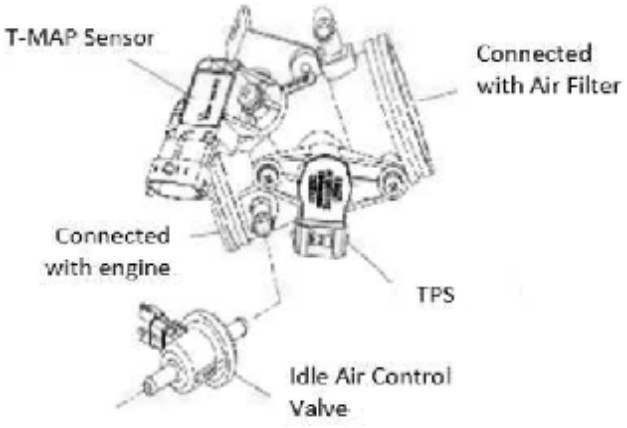
Limit Data:

Item		Value			Unit
		Min	Standard	Max	
Battery Voltage	Operation Normal	9.0	14.0±1	16.0	V
	Function Limited	6.0-9.0		16.0-18.0	V
Withstanded Overvoltage and Time	26.0V	Limited Function Such As Diagnosis		5.0	Min
Working Temp		-40		+70	℃
Storage Temp		-40		+70	℃

- It’s not allowed to apply a heavy load on ECU housing, or it may deform and damage ECU.
- Always handle ECU genteelly. Never drop it, especially on a hard surface.

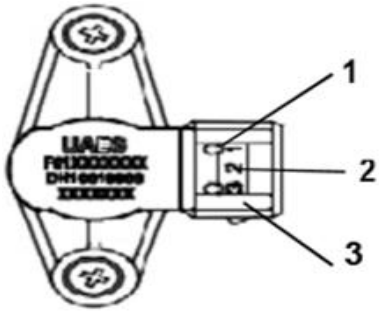
(2) THROTTLE BODY:

Connected between air filter and engine. When throttle lever is applied, the valve butterfly in throttle body would spin at a certain angle. Tips can monitor the position of valve butterfly and send the signal to ECU.



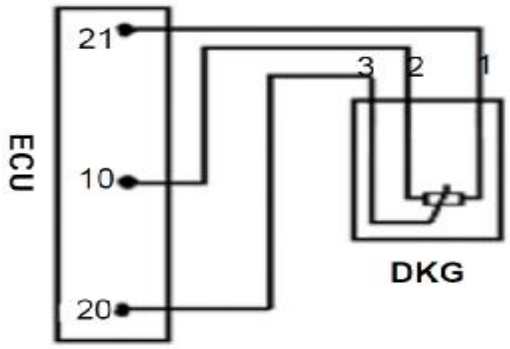
Pins and functions:

1. Ground
2. Connected to 5V power
3. Output voltage signal



TPS

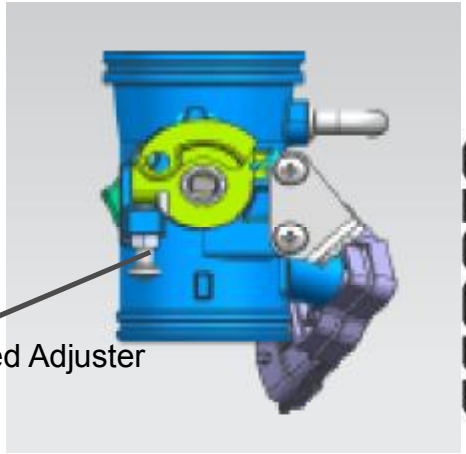
The right figure is the circuit with ECU



TPS Wiring Diagram

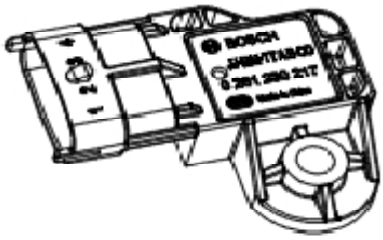
Idle speed limiter screw is not allowed to adjust.

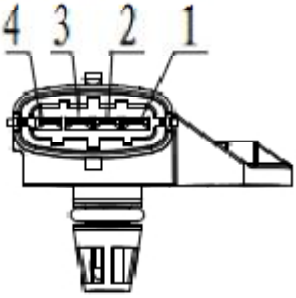
Idle speed is regulated by ECU.



(3) T-MAP SENSOR:

This sensor integrates Inlet Air Temperature Sensor and Manifold Absolute Sensor. It's used to detect both inlet air temperature and manifold absolute pressure, providing ECU the signal of engine load.

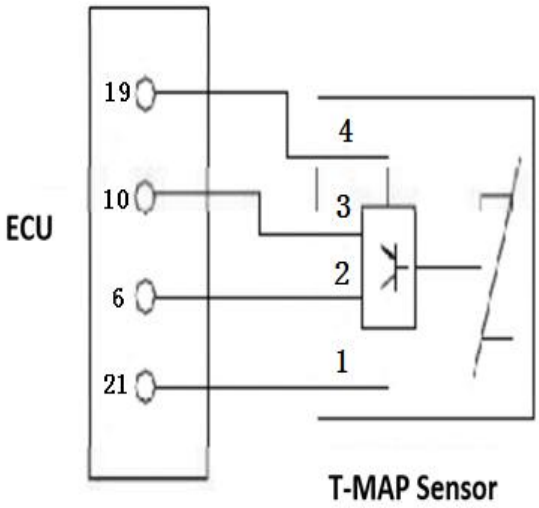




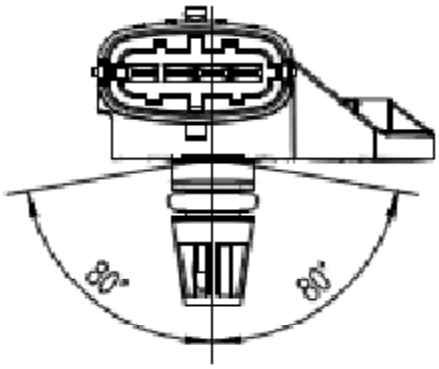
Pins and Function:

1. Ground
2. Intake air temperature (NTC) signal
3. Connected with 5V power
4. Intake air pressure signal

The right figure is the circuit with ECU



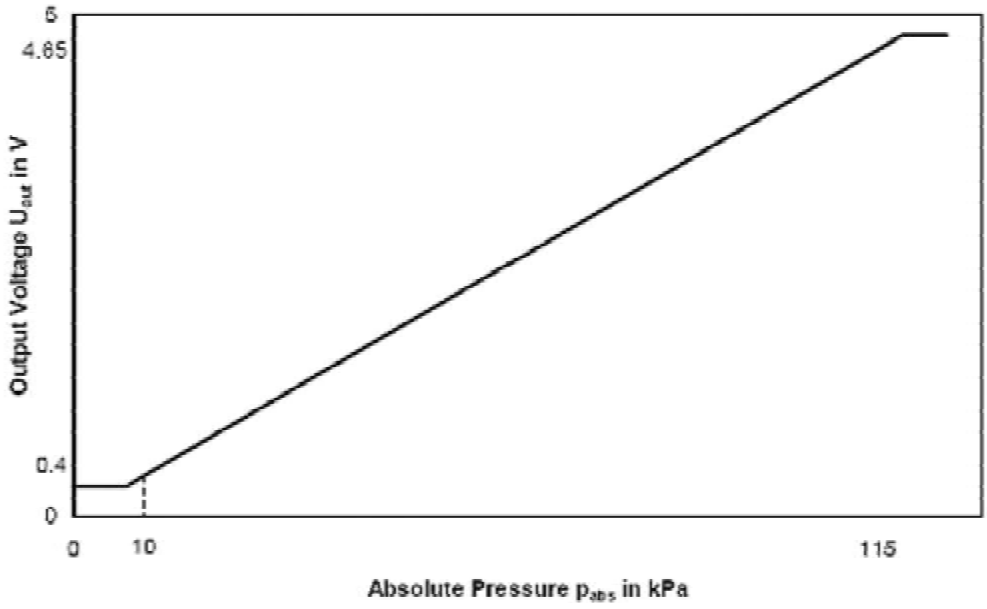
The right figure illustrates the allowed installation angle to avoid condensate water built up in T-MAP sensor,causing pressure sensitive elements damage.



The following figure refers to output voltage-pressure relation.

1. Monitor pressure range: 10kPa～115kPa

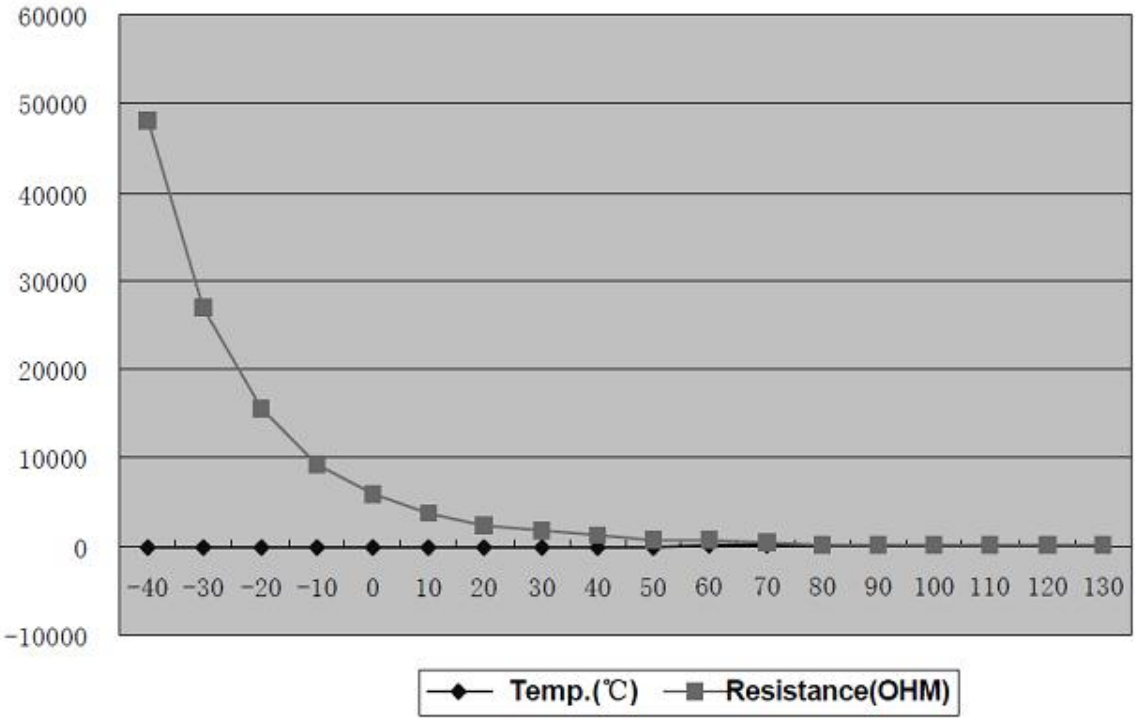
2. Output power pressure:（35 ± 5）kPa,(1.412 ± 0.065)V（95 ± 8）kPa,(3.84 ± 0.065)V



Intake air temperature (NTC) data:

Sensor is the thermistor a negative temperature coefficient（NTC）.The thermistor decrease with coolant temperature, but they are not linearity. Temperature sensor and sensor are assembled together. Pressure temperature sensor all-in resistance（2500 ± 125）Ω,
environment temperature 20℃.

The following chart explains resistance-temperature relation.

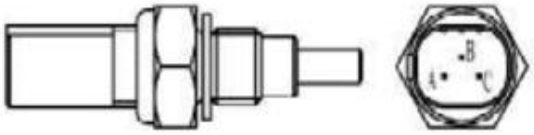


(5) Water TEMPERATURE SENSOR (CTS):

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, and the other is for meter display.

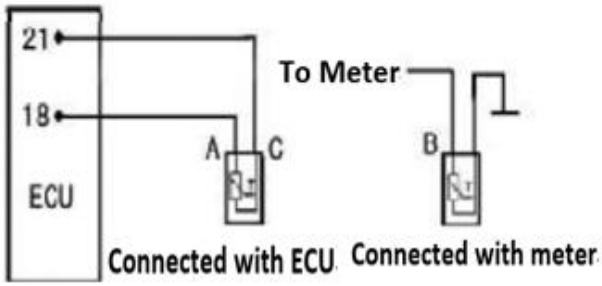
A and C consists of one group, which provides signal for ECU.

B and threaded portion consists of one group, which provides signal for coolant emperature gauge.



Coolant temperature Sensor Exterior

Right figure is circuit of sensor, ECU and meter



The right chart explains pin B and threaded portion coolant temperature relation. The signal is for meter.

Temp Range(℃)	B to End Resistance(Ω)
50±0.2	176～280
80±0.2	63.4～81.4
100±0.2	24.6～30.6

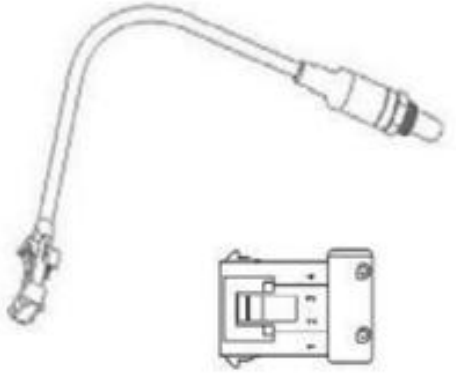
The right chart explains pin A, C-coolant temperature relation. The signal is for ECU.

Temp Range(℃)	A.C to Case End Resistance(kΩ)
-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

(6) OXYGEN SENSOR:

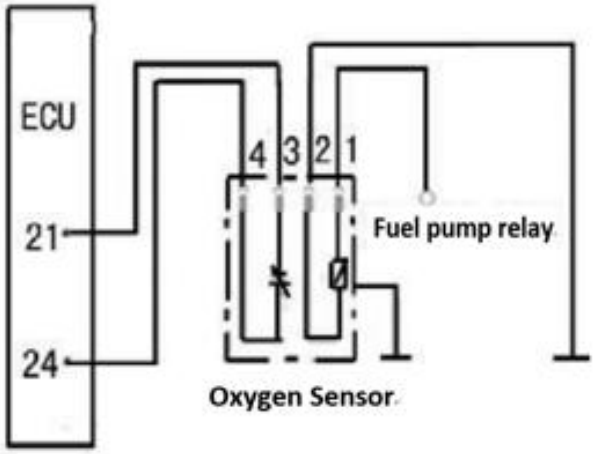
This sensor is used in closed-loop feed-back-controlled fuel injection to improve the air-to-fuel ratio accuracy and control the emission.

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 unburnt fuel and make catalytic converter convert HC, CO and oxides of Nitrogen efficiently.



Pins and Function:

1. Connected with positive terminal, heating power(white)
2. Connected with negative terminal, heating power(white)
3. Connected with negative terminal, signal output(grey)
4. Connected with positive terminal, signal output(black)



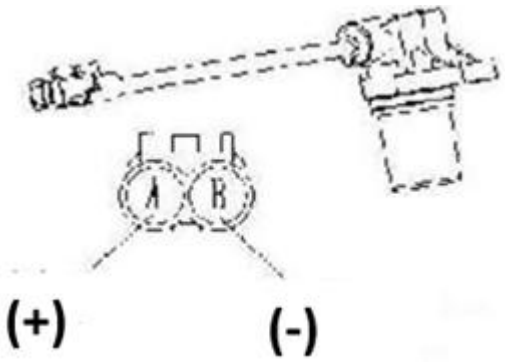
Right figure is circuit of sensors and ECU

The following table explains the oxygen sensor working parameters.

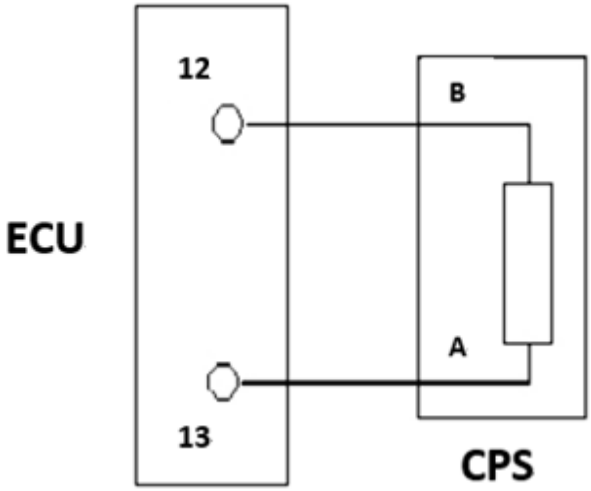
Parameter	New oxgen sensor		After 500 hours bench test	
Exhaust temp.at acertain duty ratio	350℃	850℃	350℃	850℃
Sensor voltage (mV) when λ=0.97(Co=1%)	840±70	710±70	840±80	710±70
Sensor voltage (mV) when λ=1.10	20±50	55±30	20±50	40±40
Sensor inner resistance	≤1.0	≤1.0	≤1.5	≤0.3
Response time(ms)(800mV～300mV)	≤150	≤150	≤300	≤200
Response time(ms)(300mV～600mV)	≤150	≤150	≤300	≤200

(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.



Right figure is the circuit of CPS and ECU



CPS Resistance:

● Set multimeter to 1 × 2k Ω range;

CPS resistance: 950 Ω ± 50 Ω（20℃）

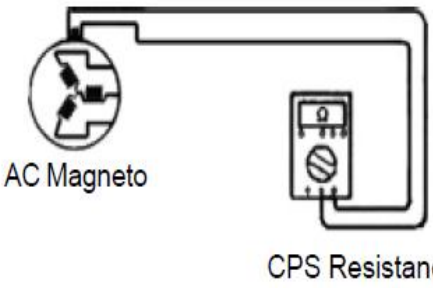
● If the CPS resistance reading is out of specification above, replace.

Test CPS Peak Voltage

● Connect multimeter and peak voltage adapter as right wiring diagram illustrates;

+ Probe: Green Lead

- Probe: Blue Lead



NOTE:

When using peak voltage adapter, refer to some instructions.

● Set multimeter to **V** range;

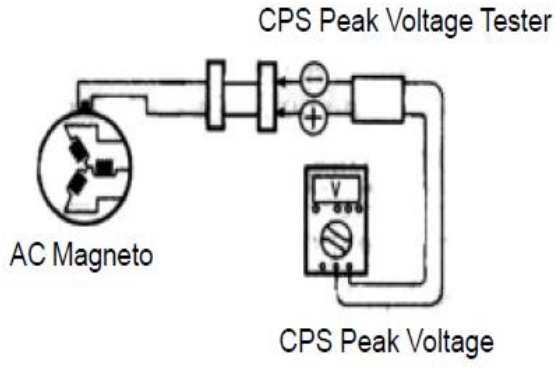
● Place the transmission in **N** and turn the ignition switch to "**ON**"

● 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: ≥ 2V (300r/min)

● If the CPS peak voltage reading is out of above specification, replace.

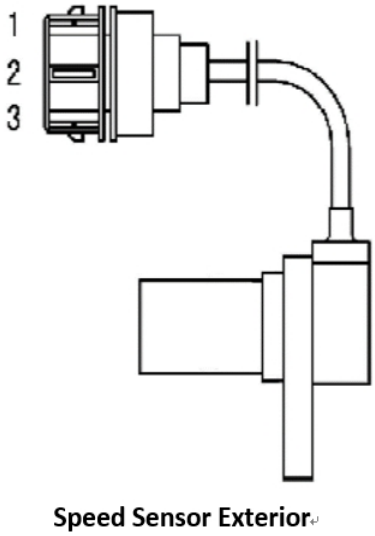


(8) SPEED SENSOR:

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.

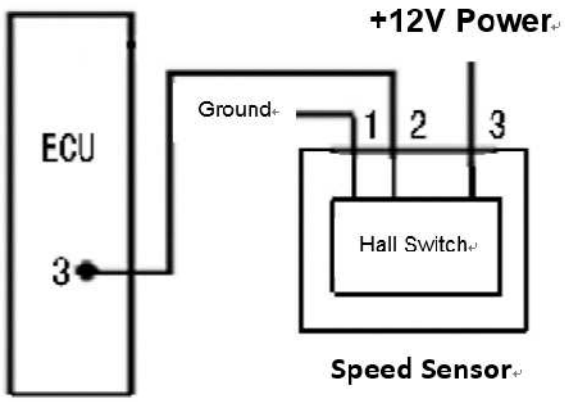
Pins and Function:

1. Ground
2. Output voltage signal (>80% input power voltage)
3. Power+DC12V



Speed Sensor Exterior

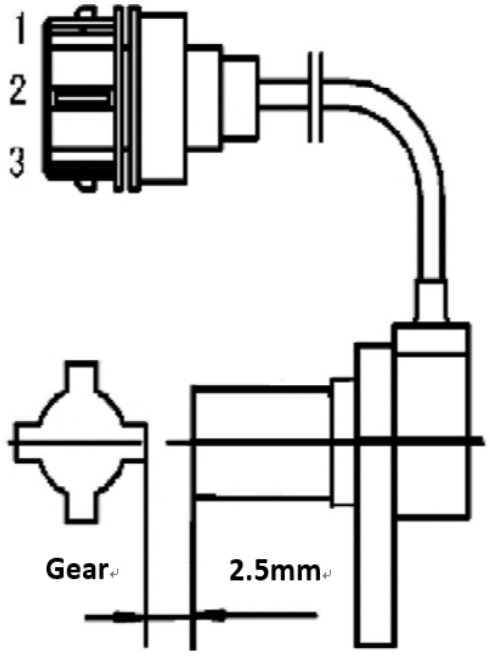
Right figure is circuit of sensor and ECU



Speed Sensor

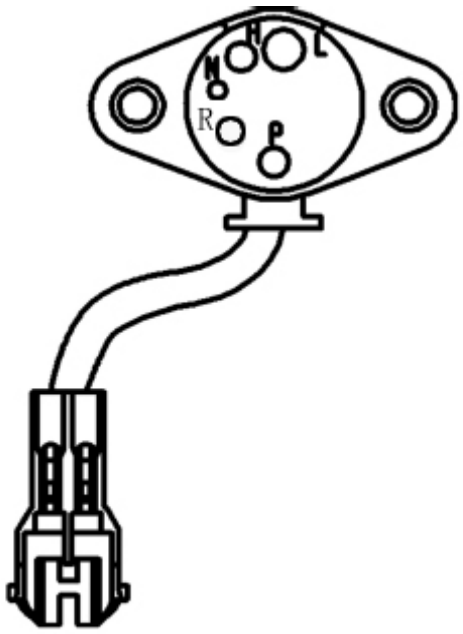
Speed Sensor Test:

- Ground pin 1and 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, that indicates the sensor is defective and needs to be replaced.



(9) Gear position sensor:

This sensor is used to provide the gear position signal for meter display.Meanwhile, it cooperates with cable as starting protection.



Gear position sensor exterior

Pins and Function:

Yellow/Blue-L(Low Gear)
Orange/Blue-H(High Gear)
Yellow/Black-P(Park Gear)
White/Yellow-N(Neutral)
Sky Blue/White-R (Reverse Gear)

● When each pin at a certain gear position, there is continuity between this pin and engine. Otherwise, no continuity.

(10) Caution when driving in reverse

When driving in reverse, gear position sensor sends the reverse signal to ECU and meter.

ECU would limit the vehicle speed in response to the reverse signal.

(11)Fuel pump:

The Fuel pump assy includes fuel pump, plastic support, preliminary filter, fine filter and pressure regulator. It supplies fuel for engine under a certain pressure and flow.

Functions of the pins:

1. Blue (Ground)
2. Red (connectted with fuel pump relay output terminal)

Parameters:

Pressure regulator opening pressure:

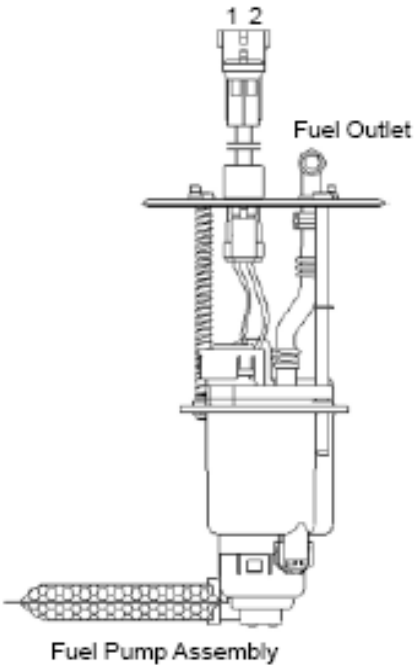
0 .3MPa ± 0. 01MPa

Flow: ＞ 3 5 L/h

● This fuel pump is located in fuel tank.

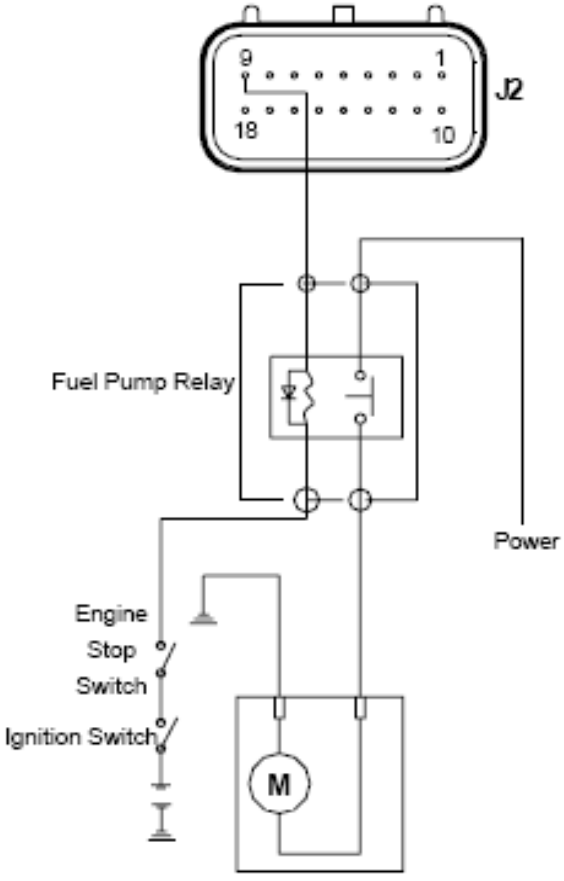
● Do not operate the fuel pump in dry condition in order to prevent damage.

● Always handle the fuel pump gently. Never drop the fuel pump, especially on a hard surface. Such a shock to pump can caused damage.



Fuel Pump Wiring

Battery supplies power for fuel pump assembly via fuel pump relay, which connects the fuel pump circuit only with engine started.



Fuel pressure test:

● Connect the fuel pressure gauge with fuel outlet and tighten the joint with a clamp to prevent fuel leaks.

● Route accords 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 fuel pump stops running, the holding pressure should be at 0.25MPa for at least 5 minutes, otherwise, replace it

Pressure of fuel pipe release:

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 is not recommended to remove fuel lines before pressure relief.

Follow the procedure below to perform pressure relief:

Remove fuel pump reply, start the engine and allow it to idle unitil the engine stops automatically.

(12)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:

● Connector with the mark "+" connected with fuel pump relay output terminal.

Connector without mark: connected with Fuel Injector Resistance:12 Ω ± 1 Ω（20 ℃）

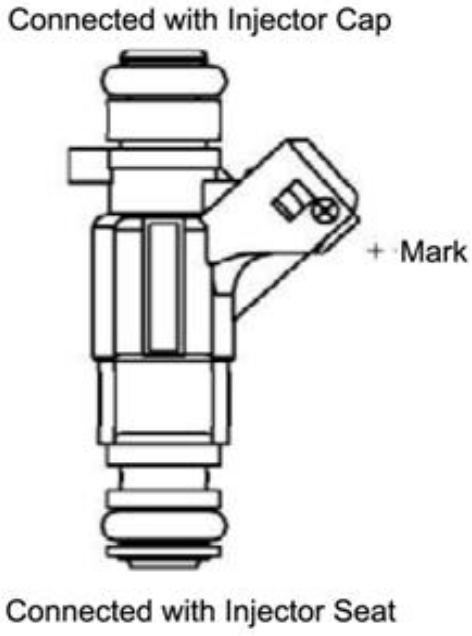
Fuel Injector Circuit:

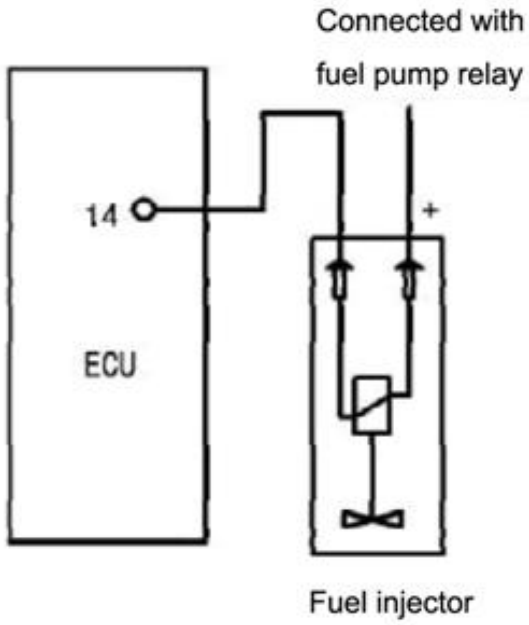
● Install fuel injector manually. Never knock fuel injector with a hammer.

● When removing and installing fuel injector, the O-rings on both ends must be replaced;

● Perform pressure relief before fuel injector removal if necessary;

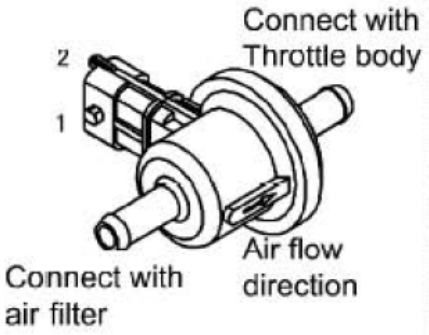
● Test the fuel injector sealing after installation to ensure no leaks.





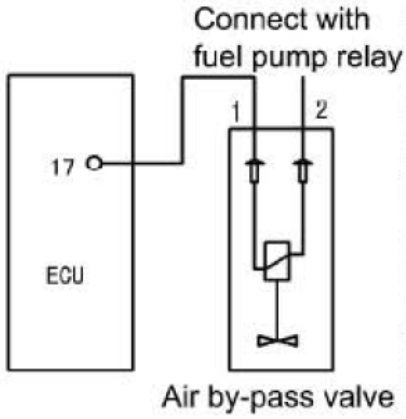
(13) Idle Air Control vale (Canister Control vale):

IACV is used to control the air flow of by-pass.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.



Pins and Function:

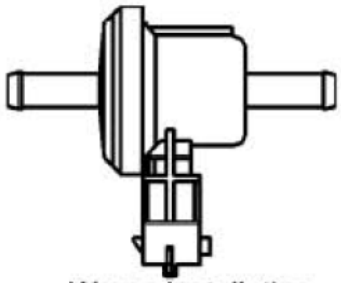
1. Connect with 17 pins of ECU
2. Connect with outlet end of fuel pump relay.



Idle Air Control Valve Circuit:

● 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.

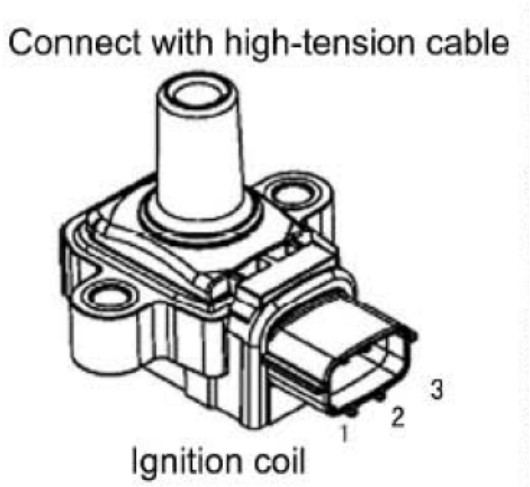


Idle Air Control Valve Parameters:

Item	Value			Unit
	Min	Standard	Max	
Rated Voltage		13.5		V
Resistance(+20℃)		16		Ω
Rated Current		0.85		A
Control Pulse Frequency			30	Hz
Standard Control Pulse Width		≈8		ms
Air Flow(When Pressure Difference=700mbr, Duty Ratio=100%)		5.0		m^3/h

(14)Ignition coil：

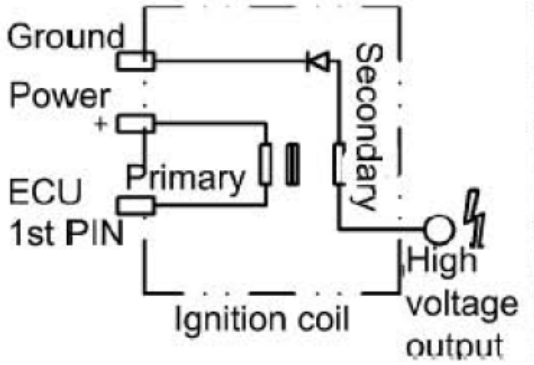
Ignition coil transforms the low voltage of primary coil to high voltage of secondary coil needed to spark the spark plug and ignite the mixture of air and fuel in cylinder.



Pins and Function:

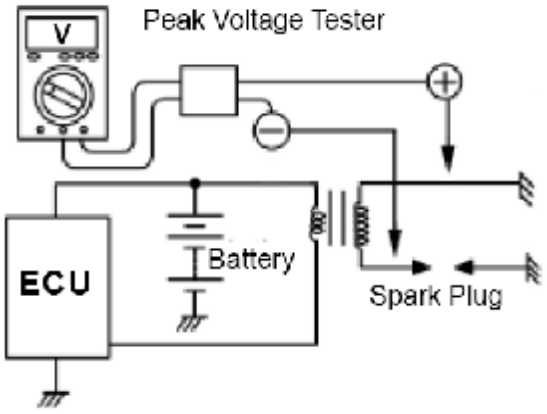
1. Ground;
2. Connect power +;
3. Connect ECU pin;

Ignition Coil Circuit:



Secondary Ignition Voltage Test:

- Connect the engine according to EFI wiring diagram;
- Connect the peak voltage tester according to the right diagram;
- Start the enigne;
- Secondary ignition voltage should be ＞15000V;

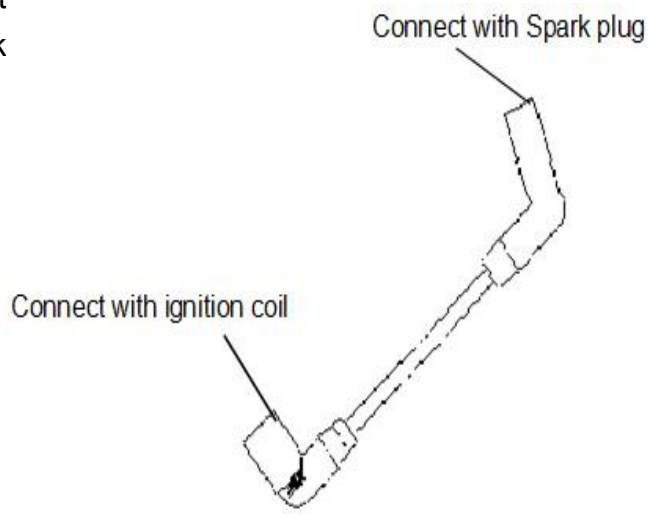


Ignition Coil Parameters:

Item		Value			Unit
		Min	Standard	Max	
Stated Voltage			14		V
Operating Voltage		6		16.5	V
Resistance (20℃～25℃)	Primary Winding Resistance	0.74	0.76	0.78	Ω
	Secondary Winding Resistance	10.1	10.6	11.1	kΩ
Primary Current			7		A

(15)HIGH PRESSURE IGNITION COIL

One end of High-tension cable connects with ignition coil and the other end of High-tension cable connects with spark plug. It transforms high voltage to spark the spark plug.



- The surface of high-tension cable should be smooth, no flaw and no bubble.
- The two ends connect tightly with ignition coil and Spark plug to avoid come off.
- Measure the Resistance value by Multimeter：8.5KΩ ±2KΩ
- High-tension cable if any damage, burnt, electric leakage, replaces the new one immediately.

5.5.3.6 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.

Faults 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.

(1) MIL (or FI Indicator):

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 4, ECU should be less than 0.5A.

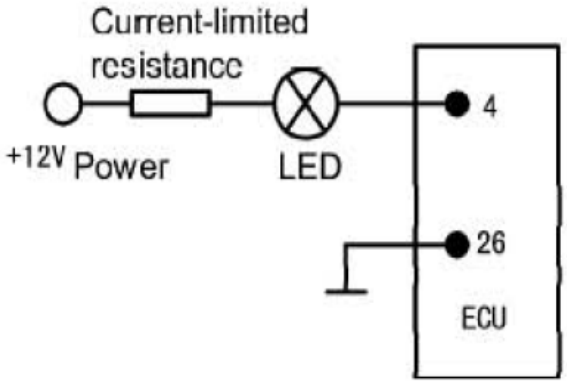
MIL Flash principles:

a. In flash code model, trouble-free 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 5 seconds. And after 1 second interval, MIL flashes in 2 Hz flash frequency. It indicates troublefree until turn ignition

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 5 seconds. And after 1 second iinterval, 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.

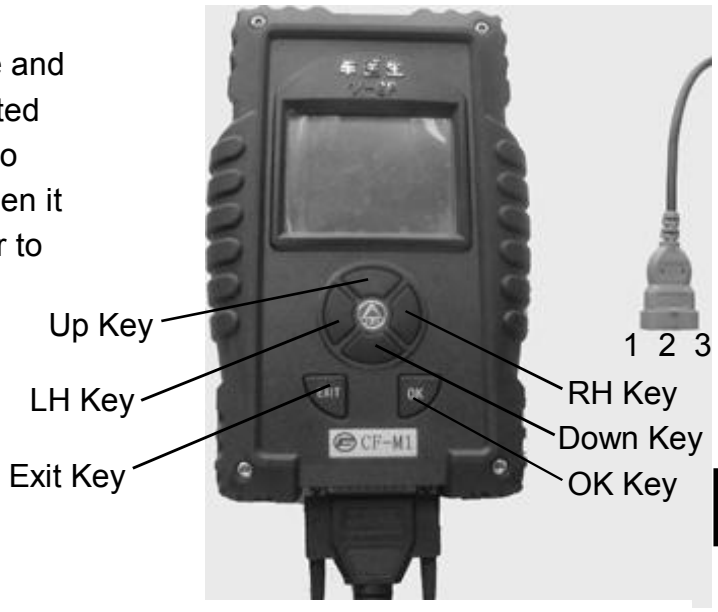
c. Read the troubles by flash code.

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 10 times-Interval- flashes for 2 times-Interval- flashes for 10 times-Interval-flashes for 3 times

（2）**PDA：**

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.

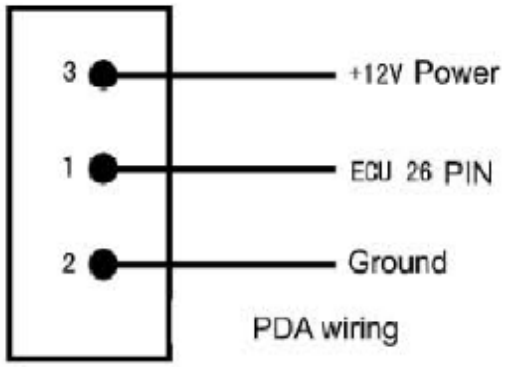


Pins and Function:

1. Connect with ECU pin 26 ECU (Cable K)
2. Ground
3. Connect with +12V power

Keys and Function:

LH Key: Page up
UP Key: Scroll up
RH Key: Page down
Down Key: Scroll down
OK Key: Entrance
Exit Key: Exit



PDA Function:

(1)Version Information Display

PDA can display engine, ECU hardware and soft ware information.

(2)Fault Display

PDA monitors IAP sensor, IAT sensor, water temperature sensor, TPS, Oxygen sensor,Oxygen sensor heating 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.

(3)Engine Parameters Display

PDA can display battery voltage, RPM, desired idle speed, vehicle speed, coolant temperature, water 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, Oxygen sensor voltage, engine relative load, canister load, IACV position, atmospheric pressure, altitude multiplier, engine operation time.

(4)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, lambda control activation, canister control valve activation, MIL status.

(5)Actuator Test Function

MIL, fuel pump, IACV, canister control valve, ignition and fuel injection.

Fault code table：

Ref No	Fault code	Instruction
1	P0030	Oxygen sensor HEATING CNTRL CIRCUIT OPEN
2	P0031	Oxygen sensor HEATING CNTRL CIRCUIT SHORT TO GND
3	P0032	Oxygen sensor HEATING CNTRL CIRCUIT SHORT TO BATT
4	P0107	Manifold Abs.Pressure or Bar.Pressure Low Input
5	P0108	Manifold Abs.Pressure or Bar.Pressure High Input
6	P0112	Intake Air Temp.Circ.Low Input
7	P0113	Intake Air Temp.Circ.High Input
8	P0117	Engine Coolant Temp. Circ. Low Input
9	P0118	Engine Coolant Temp. Circ. High Input
10	P0122	Throttle/Pedal Pos.Sensor A Circ.Low Input
11	P0123	Throttle/Pedal Pos.Sensor A Circ.High Input
12	P0130	O2 Sensor Circ., Bank1-Sensor1 Malfunction
13	P0131	O2 Sensor Circ., Bank1-Sensor1 Low Voltage
14	P0132	O2 Sensor Circ., Bank1-Sensor1 High Voltage
15	P0134	O2 Sensor Circ., Bank1-Sensor1 No Activity Detected
16	P0201	Cylinder 1-Injector Circuit
17	P0261	Cylinder 1-Injector Circuit Low
18	P0262	Cylinder 1-Injector Circuit High
19	P0321	Ign/Distributor Eng.Speed Inp.Circ. Range/Performance
20	P0322	Ign/Distributor Eng.Speed Inp.Circ.No. Signal
21	P0501	Vehicle Speed Sensor Range/Performance
22	P0560	System Voltage Malfunction
23	P0562	System Voltage Low Voltage
24	P0563	System Voltage High Voltage
25	P0627	Fuel Pump“A”Control Circuit/Open
26	P0628	Fuel Pump“A”Control Circuit Low
27	P0629	Fuel Pump“A”Control Circuit High
28	P0650	Malfunction Indicator Lamp Control Circ.
29	P1105	Idle Speed Actuator Circuit High
30	P1117	Idle Speed Actuator Circuit Low
31	P1118	Idle Speed Actuator Circuit Open

5.6 Troubleshooting

5.6.1 Engine troubleshooting

Complaint	Symptom and Possible Causes	Remedy
Engine will not start or is hard to start	**Compression is Too Low**	
	1. Worn cylinder	Replace
	2. Worn piston ring	Replace
	3. Leakage with cylinder gasket	Replace
	4. Wear valve guide or improper valve seating	Replace or repair
	5. Loose spark plug	Tighten
	6. Slow cranking of starting motor	Check electrical part
	7. Faulty valve timing	Adjust
	8. Improper valve clearance	Adjust
	No Sparking from Spark Plug	
	1. Fouled spark plug	Clean or Replace
	2. Wet spark plug	Clean and dry or replace
	3. Defective ignition coil	Replace
	4. Open or short circuit with pickup coil	Replace
	5. Faulty generator	Replace
	No Fuel Reach Into Carburetor	
	1. Clogged fuel tank vent tube	Clean or Replace
	2. Clogged or faulty fuel valve	Clean or Replace
	3. Faulty carburetor needle valve	Replace
	4. Clogged fuel hose	Replace
	5. Clogged fuel filter	Clean or Replace
	Transfer is not in Neutral position	Set to Neutral position
Engine stalls easily or has unstable idle speed	1. Improper valve clearance	Adjust
	2. Improper valve seating	Replace or Correct
	3. Faulty valve guide	Replace
	4. Worn rocker arm or rocker arm shaft	Replace
	5. Fouled spark plug	Replace
	6. Improper spark plug gap	Replace or Adjust
	7. Faulty ignition coil	Replace
	8. Clogged idle-vale inlet & exhaust pipe	Adjust Fuel level
	9. Faulty magneto	Replace

Complaint	Symptom and Possible Causes	Remedy
Poor engine running in high-speed range	1. Weak valve spring	Replace
	2. Worn camshaft	Replace
	3. Fouled spark plug	Clean or replace
	4. Insufficient spark plug gap	Adjust or replace
	5. Improper valve timing	Adjust
	6. Faulty ignition coil	Replace
	7. Weak high pressure oil pump, resulting in poor fuel supply	Adjust or replace
	8. Dirty air filter	Clean or replace
Exhaust smoke is dirty or thick	1. Excessive engine oil	Check oil level and drain
	2. Worn piston ring	Replace
	3. Worn valve guide	Replace
	4. Scored or scuffed cylinder wall	Replace
	5. Worn valve stem	Replace
	6. Worn valve stem oil seal	Replace
Engine lacks power	1. Improper valve clearance	Adjust
	2. Weak valve spring	Replace
	3. Improper valve timing	Adjust
	4. Worn cylinder	Replace
	5. Worn piston ring	Replace
	6. Improper valve seating	Replace or Correct
	7. Fouled spark plug	Clean or replace
	8. Improper spark plug gap	Clean or replace
	9. Clogged carburetor jet	Clean or replace
	10. Improper fuel level in fuel chamber	Adjust fuel level
	11. Dirty air filter	Clean or replace
	12. Worn rocker arm or rocker arm shaft	Replace
	13. Air leakage from air intake pipe	Tighten or replace
	14. Excessive engine oil	Check oil level and drain
Engine overheats	1. Carbon deposit on piston top	Clean
	2. Insufficient or excessive engine oil	Check level, add or drain
	3. Faulty oil pump	Replace
	4. Clogged oil passage	Clean
	5. Air leakage from air intake pipe	Tighten or replace
	6. Incorrect engine oil	Change engine oil
	7. Faulty cooling system(see 5.2.9)	

Complaint	Symptom and Possible Causes	Remedy
Engine is noisy	**Valve Chatter**	
	1. Excessive valve clearance	Adjust
	2. Worn or broken valve spring	Replace
	3. Worn rocker arm or camshaft	Replace
	Noise from Piston	
	1. Worn piston	Replace
	2. Worn cylinder	Replace
	3. Carbon deposit in combustion	Clean
	4. Worn piston pin or pin hole	Replace
	5. Worn piston ring or piston ring groove	Replace
	Noise from Timing chain	
	1. Stretched chain	Replace chain & sprocket
	2. Worn sprocket wheel	Replace chain & sprocket
	3. Faulty chain tensioner	Repair or replace
	Noise from Clutch	
	1. Worn or damaged crankshaft spline	Replace
	2. Worn inner race spline	Replace
	Noise from Crankshaft	
	1. Worn or burnt crank pin bearing	Replace
	2. Excessive thrust clearance	Replace
	Noise from CVT	
	1. Worn or slipping drive belt	Replace
	2. Worn rollers in primary sheave	Replace
	Noise from Transmission	
	1. Worn or damaged gear	Replace
	2. Worn or damaged input or output shafts	Replace
	3. Worn bearing	Replace
Slipping Clutch	1. Worn or damaged clutch shoes	Replace
	2. Weakened clutch shoe spring	Replace
	3. Worn clutch housing	Replace
	4. Worn or slipping drive belt	Replace

5.6.2 EFI troubleshooting by trouble code

Instruction:

1. Only after stable trouble is confirmed, then do checking and repair. Otherwise it will bring mistakes.

2. Below mentioned multimeter is only for digital multimeter, pointer multimeter is not allowed for checking EFI circuit.

3. If trouble code means voltage too low, it is short circuit to ground or open circuit. If trouble code means voltage too high, it is short circuit to power. If trouble code means circuit has something wrong, then there is open circuit or many circuits in trouble.

Diagnosis helps:

1. If trouble code cannot be removed, then it is stable trouble.
   If it is temporary trouble, please check wiring connectors.

2. During checking, do not neglect influences of vehicle maintenance, cylinder pressure and valve timing.

3. Replace ECU and test.
   If trouble code can be removed by replacement of ECU, then it is a trouble originated from ECU. If trouble code still exists, then install original ECU and check other parts step by step.

In the following, there are detailed descriptions about trouble codes and diagnosis procedures.

Trouble Code: P0030 Oxygen Sensor Heating Control Circuit Broken

Note: Troubles are probable as below 1) Circuit broken between ECU Pin and Oxygen Sensor Pin 2. 2) Circuit broken between Oxygen Sensor Pin 1 and Main Relay. 3) Circuit broken between Oxygen Sensor Pin 1 and Pin 2.	Note: Inspect as below 1) Check if resistance between ECU Connector Pin and Oxygen Sensor Pin 2 is normal or not. 2) Check if resistance between Oxygen Sensor Pin 1 and Main Relay is normal or not. 3) Check if resistance between Oxygen Sensor Pin 1 and Pin 2 is normal or not.

Trouble Code: P0031 Oxygen Sensor Heating Circuit Short to Ground

Note: Troubles are probable as below 1) Circuit connect to ECU Pin are short-to- ground.	Note: Inspect as below: 1) Check if resistance of ECU Pin to ground is normal or not.

Trouble Code: P0032 Oxygen Sensor Heating Circuit Short to Power

Note: Troubles are probable as below 1) Short Circuit between ECU Pin and Oxygen Sensor Pin 1. 2) Short Circuit between ECU Pin and other circuit.	Note: Inspect as below 1) Check if voltage of ECU is normal or not. 2) Check if resistance between ECU Pin and Oxygen Sensor Pin 1 circuit is normal or not.

Trouble Code:P0053 Inner Resistance of Oxygen Sensor Heating not correct
Explanation: ECU system measure the Oxygen Sensor Heating Resistance to decide if heating output is correct or not. In some conditions, Heated Oxygen Sensor would be damaged by precipitate, especially while making cold start.

Note: Troubles are probable as below 1) Oxygen Sensor Heating function disable; Replace Oxygen Sensor.	Note: Possible Troubles are as below 1) Check if resistance between Oxygen Sensor Pin 1 and Pin 2 is normal or not.

Trouble Code: P0105 Air Inlet Pressure Sensor no signal variable

Note: Troubles are probable as below 1) Air Inlet Pressure Sensor frozen or jammed. 2) Air Inlet Pressure Sensor seriously aging.	Note: Possible Troubles are as below 1) Re-install the Air Inlet Pressure Sensor after ice melted with indoor temperature.

Trouble Code: P0106 Air Inlet Pressure Sensor Signal irrationally failure

Note: Troubles are probable as below 1) Air leakage of Air Inlet Pressure Sensor. 2) Air Inlet Pressure Sensor broken. 3) Air leakage from assemble point. 4) Air Inlet Pressure Sensor characteristically defluxion.	

Trouble Code: P0107 Low Voltage of Air Inlet Pressure Sensor Circuit

Note: Troubles are probable as below 1) ECU found Air Inlet Pressure Sensor signal circuit short to ground.	Note: Inspect as below 1) Resistance between ECU Pin and Ground.

Trouble Code: P0108 High Voltage of Air Inlet Pressure Sensor Circuit

Note: Troubles are probable as below 1) ECU found Air Inlet Pressure Sensor signal circuit short to power.	Note Inspect as below 1) Voltage of ECU Pin.

Trouble Code: P0112 Air Inlet Temperature Sensor Signal Voltage Low

Note: Troubles are probable as below 1) Circuit between ECU Pin and Air Inlet Temperature Sensor Signal short to ground.	Note: Inspect as below 1) Check Resistance of circuit between ECU Pin Sensor Signal and Ground.

Trouble Code: P0113 Air Inlet Temperature Sensor Signal Voltage High

Note: Troubles are probable as below 1) Circuit between ECU Pin and Air Inlet Temperature Sensor Signal short to power.	Note Inspect as below 1) Check if voltage of Sensor Signal of ECU Pin is normal or not.

Trouble Code: P0116 Engine Water Temperature Sensor Indicated Temperature irrationally failure

Note Troubles are probable as below 1) Water Temperature Sensor need replacement.	

Trouble Code: P0117 Engine Water Temperature Sensor Circuit Voltage low.

Note: Troubles are probable as below 1) Circuit between ECU Pin and ground short.	Note: Inspect as below 1) Check resistance between ECU Pin and Ground.

Trouble Code: P0118 Engine Water Temperature Sensor Circuit Voltage high

Note: Troubles are probable as below 1) Short Circuit between ECU circuit and other circuit.	Note: Inspect as below 1) Check if voltage connected to ECU pin is normal or not.

Trouble Code: P0122 Voltage of Throttle Control Positioning Sensor Circuit lower than the lower limit

Note: Troubles are probable as below 1) ECU Pin short to ground.	Note: Inspect as below 1) Check resistance between ECU pin and ground.

Trouble Code: P0123 Voltage of Throttle Control Positioning Sensor Circuit higher than the higher limit

Note: Troubles are probable as below 1) Circuit between ECU Pin and other power circuit short.	Note: Inspect as below 1) Check if ECU Pin voltage is normal or not.

Trouble Code: P0130 Oxygen Sensor Signal irrationally failure
Explanation: When Oxygen Sensor Signal happens with situations as below, System decide Oxygen Sensor Signal irrationally failure Oxygen Sensor Signal Circuit coupling with Heating Circuit.

Note: Troubles are probable as below 1) Check if Oxygen Sensor Connector is correct or not. 2) Check if Oxygen Sensor Signal Circuit coupling with Heating Circuit.	

Trouble Code: P0131 Oxygen Sensor Circuit Voltage Low

Note: Troubles are probable as below 1) Signal Circuit connected with ECU Pin is short circuit to ground.	Note: Inspect as below 1) Check resistance between Signal Circuit connected with ECU Pin and ground.

Trouble Code: P0132 Oxygen Sensor Circuit Voltage High
Explanation: When engine starts, ECU check the Oxygen Sensor Circuit Voltage; when voltage is continuously higher than 1.5 Volt, system decides Oxygen Sensor Circuit Voltage is short to power.

Note: Troubles are probable as below 1) Short Circuit between Signal Circuit connects to ECU Pin and Oxygen Sensor Oxygen Sensor Pin 1. 2) Short Circuit between Signal Circuit connects to ECU Pin and other power circuit.	Note: Inspect as below 1) Check resistance between Signal Circuit connect to ECU Pin and Oxygen Sensor Oxygen Sensor Pin 1. 2) Check voltage of Signal Circuit connect to ECU Pin.

Trouble Code: P0133 Oxygen Sensor Aging
Explanation: Normally Air Fuel Ratio of Fuel and Air is shifting between Dense and Dilute; accordingly Oxygen Sensor signal variate among different values. When Oxygen Sensor is aging, it goes less sensitive to Fuel-Air-Mixture, which makes signals variate lower. ECU makes average cycle calculations to Signal Variation; when it finds cycling slower as set, it decides Oxygen Sensor Aging.

Note: Troubles are probable as below 1) Oxygen Sensor Aging, need replacement.	

Trouble Code: P0134 Oxygen Sensor Signal Failure
Explanation: When engine starts, ECU check the Oxygen Sensor Circuit Voltage; when ECU finds voltage stays between 0.4~0.6 volt, it decides Oxygen Sensor Signal Circuit Short.

Note: Troubles are probable as below 1) Short Circuit between Oxygen Sensor connected to ECU Pin. 2) Bad connection of Oxygen Sensor Connectors.(Socket Oxidized)	Note: Inspect as below 1) Check resistance between ECU connector and Oxygen Sensor 4.

Trouble Code: P0170 Self Studying found Closing Loop control Air Fuel Ratio irrational when making End of Line Testing.
Trouble Code: P0171 Self Studying found Closing Loop control Air Fuel Ratio too adulate when making End of Line Testing.
Trouble Code: P0172 Self Studying found Closing Loop control Air Fuel Ratio too dense when making End of Line Testing.
(Note: This Inspection Process is only suitable when Air Inlet Pressure Sensor, Canister Control Valve and Oxygen Sensor and so on has not shown with Trouble Code; If there is any other Trouble Code, solve other Troubles first, then inspect Fuel Route correct or not)
Trouble CodeP0201: Cylinder Injector Control Circuit Open

Note: Troubles are probable as below 1) Injector Coil Open Circuit 2) Injector Connector Socket to ECU Pin bad connection 3) Injector Connector Socket to Main Relay bad connection	Note: Inspect as below 1) Check resistance of Injector 2) Check cable is connected or not

Trouble Code: P0261 Control circuit of single cylinder injector short to ground

Note: Troubles are probable as below 1) All drivers ECU pin connected short to ground	Note: Inspect as below 1) Measure ECU pin connected resistance to ground

Trouble Code: P0262 Control circuit of single cylinder injector short circuit

Note: Troubles are probable as below 1) Short circuit between circuit ECU connected and other electrical source circuits	Note: Inspect as below 1) Measure the voltage of circuit ECU pin

Trouble Code: P0321 reference point of rotate speed sensor fault

Note: Troubles are probable as below 1) Circuits connect intermittently short circuit or intermittently open circuit. 2) Fixed position of crankshaft signal ring deviation declination. 3) Fixed position of rotate speed sensor declination.	Note: Inspect as below 1) Check the connection or breaking of cable related connection. 2) Check the quantity of magneto flywheel.

Trouble Code: P0322 Non-rotate speed sensor pulse signal (short circuit or open circuit)
Explanation: After starting engine, ECU will measure signal of trigger and other signals together, judging the loss of trigger signal by signal rationality system.

Note: Troubles are probable as below 1) Trigger rotate speed sensor ECU cable connected open circuit 2) Trigger circuit ECU connected short circuit. 3) Trigger coil open circuit.	Note: Inspect as below 1) Measure resistance between trigger and ECU cable connected 2) Measure resistance of trigger 3) Measure trigger peak value voltage

Trouble Code: P0444 Circuit of control voltage of idle air control valve open circuit

Note: Troubles are probable as below 1) Open circuit between ECU circuit connected and no.2 pin of idle air control valve. 2) The circuit that no.1 pin of idle air control valve connected to main relay open way. 3) Electromagnetism coil between no.1 pin and no.2 pin open way.	Note: Inspect as below 1) Check the connection or breaking of cable related connection. 2) Measure resistance of idle speed valve.

Trouble Code: P0458 Circuit of control voltage of idle air control valve Low voltage

Note: Troubles are probable as below 1) Circuit ECU connected is short circuit	Note: Inspect as below 1) Measure connected to the ECU pin-to-ground resistance whether proper or not

Trouble Code: P0459 Circuit of control voltage of idle air control valve high voltage

Note: Troubles are probable as below 1) Short circuit between ECU circuit connected and No.1 pin of idle air control valve. 2) Short circuit between circuit ECU pin connected and other electrical source circuits.	Note: Inspect as below 1) Measure the voltage of ECU pin whether normal or not 2) Measure resistance between ECU pin and No.1 pin of idle air control valve

Trouble Code: P0501Speed sensor signal improper
Explanation: When loose throttle and keep direct to free-wheel, ECU measure engine rotate speed and vehicle speed together. If engine lasting higher speed but vehicle speed display "0" or too low obviously, system will judge that vehicle speed signal faults.

Note: Troubles are probable as below 1) The signal circuit ECU connected and vehicle speed sensor short to ground or open to ground.	Note: Inspect as below 1) Check circuit resistance that connecter of ECU joint to vehicle speed signal sensor. 2) Check resistance to ground of ECU pin.

Trouble Code: P0506 Rotate speed of idle air control valve slower than target idle speed
Explanation: Engine rotate speed of idle speed control valve works by closed-loop control.
And it indicates fault if ECU performs idle speed controlling after a certain time, but the actual engine speed still slower than target idle speed.

Note: Troubles are probable as below 1) Idle air control valve not work. 2) Check adjust bolt of throttle valve, throttle cable, throttle operating condition etc., whether are in condition or not. 3) Too dirty inside of throttle valve body.	

Trouble Code: P0507 Rotate speed of idle speed faster than targeted rotate speed of idle speed.
Explanation: Engine rotate speed of idle speed works by closed-loop control. And it indicates fault if ECU performs idle speed controlling after a certain time, but the actual engine speed faster than target idle speed.

Note: Troubles are probable as below 1) Check adjust bolt of throttle valve, throttle cable, throttle if operate properly 2) Too dirty inside of throttle valve body 3) Check the enforced breather pipe of crankcase whether breaks off or leaks	

Trouble Code: P0560 improper signal of Battery voltage
Trouble Code: P0562 Battery low voltage
Trouble code: P0563 Battery high voltage

Note: Troubles are probable as below 1) Flywheel already broken and cannot generate power or battery power leakage 2) Open circuit of flywheel stator coil. 3) Regulator already damaged	Note: Inspect as below 1) Check flywheel power generation (By measuring flywheel voltage) 2) Measure regulator voltage

Trouble Code: P0627 Oil pump relay open circuit
Trouble Code: P0628 Oil pump relay short to ground
Trouble Code: P0629 Oil pump relay short circuit

Note: Troubles are probable as below 1) Open circuit/short to ground/short circuit between control circuit of oil pump relay connected to ECU and oil pump. 2) Open circuit between relay and main relay 3) Magnet coil of relay open circuit	Note: Inspect as below 1) Measure resistance or voltage of oil pump relay control circuit connected to ECU. 2) Resistance between relay and main relay 3) Resistance between the toes of relay

Trouble Code: P0650 MIL light drive circuit defective

Note: Troubles are probable as below 1) Open circuit/short to ground/short to power between ECU and MIL light drive circuit. 2) Open circuit between MIL and main relay 3) MIL light burnt	Note: Inspect as below 1) Measure resistance or voltage between ECU and MIL light drive circuit.

Trouble Code: P2177 Self-learning value of air-fuel ratio, closed-loop control exceeds upper limit
Trouble Code: P2178 Self-learning value of air-fuel ratio, closed-loop control exceeds lower limit
Introduction of theory and fault reason: In order to make catalytic converters for HC, CO and NOx to maximize conversion efficiency, the air-fuel ratio of mixture should be 14.7:1. When the engine occurs, parts manufacturing deviation, deposition of fuel colloid on fuel injector, intake or back of valve, gas leak of intake and exhaust system, will cause the air-fuel ratio(14.7:1) deviation in various degrees(partial dilute or partial concentration) which will lead to emission deterioration and poor engine performance. Engine control system will amend and self-learning fuel charge based on the extent and characteristics of air-fuel ratio deviation. When self-learning value reach the limit of system setting (gas mixture partial dilute or partial concentration, system amends the fuel charge constantly till Max), system will judge that self-learning value transfinite fault.

Note:
Troubles are probable as below
1) Injector clog needs cleaning
2) Intake and exhaust system leaks
3) Inlet or back of intake valve that fuel colloid accumulation of excessive need to be cleaned
4) Engine parts deviation
5) Valve clearance deviation
6) Fuel system pressure deviation

5.6.3 Diagnosis troubles according to engine fault phenomena

Before start to diagnosis fault, please take the primary inspection first:

1. Engine failure indicator light works regularly.
2. Affirm that no errors Code have been found by Diagnosis Analyze.
3. Affirm the fault that user complaint is exist, and affirm the condition of fault happened.

Then, take external inspection:

(1) Check fuel pipe whether has oil leak phenomena or not.
(2) Check vacuum tube if rupture, kink or incorrect connect.
(3) Check air intake pipe whether clogged, leaked, been staved or damaged or not.
(4) Check ignition coil of ignition system whether rupture, aged or not, firing sequence whether correct or not.
(5) Check ground pole of wiring harness whether clean or fast or not.
(6) Check joints of sensor or actuator whether loose or poor contacts or not.

Notice: Please maintain the faults as above in advance. If not, the further fault diagnosis will be affected.

Diagnosis help:

1. Engine has no fault records.
2. Affirm the complaint of fault happened.
3. Do not ignore vehicle maintenance working, cylinder pressure, mechanism timing, and fuel etc effect against system during overhaul.
4. Replace ECU and test it.

If Trouble Code is cleared, it means defective on ECU;

If Trouble Code is not cleared, put back original ECU and repeat inspecting procedure to start again overhaul inspections.

Troubleshooting:

- Starting Failure/Hard Starting
- Engine can rotate but starting failure
- Hard Starting in heating engine
- Hard Starting in cold engine
- Regular rotate speed, but engine starting hard at any time
- Engine works regularly but unsteady idle speed at any time
- Engine works regularly but unsteady idle speed when engine is in warming-up
- Engine starting normally, but idle speed unsteady after warming-up.
- Engine starting normally, but unsteady idle speed or power off when engine in partly loading (such as: opening head light).
- Engine starting regularly, but idle speed is too high.
- Rotate speed cannot increase or engine power off when in acceleration.
- React slowly when in acceleration.
- No power and poor performance when in acceleration

(1) **Starting Failure/Hard Starting**

Possible defective parts: 1. Battery; 2. Starter motor; 3. Wirings harness or ignition switch; 4. Engine mechanism part.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check the voltage between the two poles of battery by multimeter, the voltage whether is around 8V~12V or not when engin starting.	yes	next
		no	Replace battery
2	Keep ignition switch in engine starting station. Check positive pole of Starter motor by multimeter, the voltage whether above 8V or not.	yes	next
		no	Repair or replace wiring harness
3	Remove starter motor and check its work condition, if circuit break or starter motor locked because of improper lubricate.	yes	Repair or replace Starter Motor
		no	next
4	Fault only happens on winter, please check lubricating oil if is improper for engine which caused high resistance of starter motor.	yes	Replace appropriate grade of lubricating oil
		no	next
5	Check the resistance inside of engine mechanism whether is high or not, which makes starter motor stop rotates or rotate slowly.	yes	Overhaul the resistance inside of engine mechanism
		no	Repeat above steps

(2) Engine can rotate but starting failure

Possible defective parts: 1.no gasoline in tank 2.Fuel pump 3.Trigger 4.Ignition coil 5.Engine mechanism part.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Contact fuel pressure meter (contact front point of oil input pipe of injector) open ignition switch and repeat it if possible, or starting engine, check the fuel pressure whether is around 300kPa or not.	yes	next
		no	examine and repair oil support system
2	Contact Electronic injection diagnostic meter, observe item of “engine rotate speed”, starting engine, and observe the rotate speed signal if is normally output.	yes	next
		no	examine and repair sensor wiring of rotate speed
3	Pull out ignition coil, and contact with spark plug, keep pole of spark plug 5mm with body of engine, starting engine and check it whether has blue-white high pressure fire or not.	yes	next
		no	Examine and repair ignition system.
4	Check air pressure of cylinder and observe the pressure if is discrepantly.	yes	Eliminate engine mechanism fault
		no	next
5	Contact EFI commutator, open ignition switch, check ECU5#, 10#,13# stitch, the power whether supply normally or not, check 2# 21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(3) Hard Starting in normal status

Possible defective parts: 1.fuel containing water; 2.fuel pump; 3.engine water temperature sensor; 4.ignition coil.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Contact fuel pressure meter (contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not.	yes	next
		no	examine and repair oil support system
2	Pull out ignition coil, and contact with spark plug, keep pole of spark plug 5mm with body of engine, starting engine and check it whether has blue-white high pressure fire or not.	yes	next
		no	Examine and repair ignition system
3	Pull out connector of engine water temperature sensor, starting engine, observe engine whether succeed starting or not at this moment. (Or in series a 300 resistant instead of engine water temperature sensor, observe engine whether succeed starting or not at this moment.)	yes	Examine and repair wiring or replace sensor
		no	next
4	Check fuel and observe the fault if caused after fueling	yes	Replace fuel
		no	next
5	Contact EFI commutator, open ignition switch, check ECU5#, 10#,13# stitch the power whether supply normally or not, check 2# 21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(**4) Hard Starting in cold status**

Possible defective parts: 1.fuel containing water; 2.fuel pump; 3.engine water temperature sensor; 4.injector; 5.ignition coil; 6. throttle valve body and idle speed side air duct; 7.engine mechanism part

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Contact fuel pressure meter (contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not.	yes	next
		no	examine and repair oil support system
2	Pull out ignition coil, and contact with spark plug, keep pole of spark plug 5mm away of body of engine, starting engine and check it whether has blue-white high pressure fire or not.	yes	next
		no	Examine and repair ignition system.
3	Pull out connector of engine water temperature sensor, starting engine, observe engine whether succeed starting or not at this moment. (Or in series a 2500 resistant instead of engine water temperature sensor, observe engine whether succeed starting or not at this moment.)	yes	Examine and repair wiring or replace sensor
		no	next
4	Draw accelerograph gently, observe it whether starting engine easily or not.	yes	Clean throttle valve body and idle speed air duct
		no	next
5	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks or clogs.	yes	Replace
		no	next
6	Check fuel and observe the fault if caused after fueling.	yes	Replace fuel
		no	next

Ref No.	Operation	Test result	Next Steps
7	Check air pressure of cylinder and observe the pressure if it is discrepantly.	yes	Eliminate engine mechanism fault
		no	next
8	Contact EFI commutator, open ignition switch, check ECU5# 10# 13# stitch, the power whether supply normally or not, check 2# 21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(5) Regularly rotate speed, but engine starting hard at any time.

Possible defective part: 1.fuel containing water; 2.fuel pump; 3.engine water temperature sensor; 4.injector; 5.ignition coil; 6.throttle valve body and idle speed side air duct; 7.air inlet; 8.ignition timing; 9. spark plug; 10.engine mechanism part.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check air cleaner and input air duct whether are clogged or not.	yes	Examine and repair air input system
		no	next
2	Contact fuel pressure meter (contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not.	yes	next
		no	examine and repair oil support system
3	Pull out ignition coil, and contact with spark plug, keep pole of spark plug 5mm away with body of engine, starting engine and check it whether has blue-white high pressure fire or not.	yes	next
		no	examine and repair ignition system
4	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace

Ref No.	Operation	Test result	Next Steps
5	Pull out connector of engine water temperature sensor, starting engine, observe engine whether succeed starting or not at this moment.	yes	Examine and repair wiring or replace sensor
		no	next
6	Draw accelerograph gently, observe it whether starting engine easily or not.	yes	Clean throttle valve body and idle speed air duct
		no	next
7	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks or clogs.	yes	replace
		no	next
8	Check fuel and observe the fault if caused after fueling.	yes	Replace fuel
		no	next
9	Check air pressure of cylinder and observe the pressure if is discrepantly.	yes	Eliminate engine mechanism fault
		no	next
10	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing
11	Contact EFI commutator, open ignition switch, check ECU5#, 10#, 13# stitch the power whether supply normal or not, check 2#, 21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(**6) Engine works regularly but unsteady idle speed at any time**

Possible defective part:

1. Fuel containing water; 2.injector; 3.spark plug; 4.throttle valve body and idle speed side air duct; 5.input air duct; 6.idle speed valve; 7.ignition timing; 8.engine mechanism part.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check air cleaner and input air duct whether are clogged or not.	yes	Examine and repair air input system
		no	next
2	Check idle speed valve whether clogged or not.	yes	Clean or replace
		no	next
3	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
4	Check throttle valve body and idle speed side air duct whether have carbide accumulated or not.	yes	Clean
		no	next
5	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	Fault replacement
		no	next
6	Check fuel and observe the fault if caused after fueling.	yes	Replace fuel
		no	next
7	Check air pressure of cylinder and observe the pressure if is discrepantly.	yes	Eliminate engine mechanism fault
		no	next
8	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing
9	Contact EFI commutator, open ignition switch, check ECU5#, 10#, 13# stitch, the power whether supply normal or not, check 2#, 21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(7) Engine works regularly but unsteady idle speed when engine is in warming-up

Possible defective part: 1.fuel containing water; 2.engine water temperature sensor 3.spark plug; 4.throttle valve body and idle speed side air duct; 5.input air duct 6.idle speed valve; 7.engine mechanism part.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check air cleaner and input air duct whether are clogged or not.	yes	Examine and repair air input system
		no	next
2	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
3	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
4	Pull out connector of engine water temperature sensor, starting engine, observe idle speed whether is unsteady or not when engine is in warming-up.	yes	Examine and repair wiring or replace sensor
		no	next
5	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	Fault replacement
		no	next
6	Check fuel and observe the fault if caused after fueling.	yes	Replace fuel
		no	next
7	Check air pressure of cylinder and observe the pressure if it is discrepantly.	yes	Eliminate engine mechanism fault
		no	next

Ref No.	Operation	Test result	Next Steps
8	Contact EFI commutator, open ignition switch, check ECU5#, 10#, 23# stitch, the power whether supply normal or not, check 2#, 21# stitch whether put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(8) Engine starting normally, but idle speed unsteady after warming-up.

Possible defective part: 1.fuel containing water; 2.engine water temperature sensor;3.spark plug; 4.throttle valve body and idle speed side air duct; 5.input air duct; 6.idle speed valve; 7.engine mechanism part.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check air cleaner and input air duct whether are clogged or not.	yes	Examine and repair air input system
		no	next
2	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
3	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
4	Pull out connector of engine water temperature sensor, starting engine, observe idle speed whether is unsteady or not when engine is in warming-up.	yes	Examine and repair wiring or replace sensor
		no	next
5	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	Fault replacement
		no	next

Ref No.	Operation	Test result	Next Steps
6	Check fuel and observe the fault if caused after fueling.	yes	Replace fuel
		no	next
7	Check air pressure of cylinder and observe the pressure if it is discrepantly.	yes	Eliminate engine mechanism fault
		no	next
8	Contact EFI commutator, open ignition switch, check ECU5#, 10#, 23# stitch, the power whether supply normal or not, check 2#, 21# stitch whether Put up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(9) Engine starting normally, but unsteady idle speed or power off when engine in partly loading(such as: opening head light).

Possible defective part: 1. idle speed valve; 2. injector

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
2	Observe output power whether is increasing or not when begin loading work, namely observe the movement of ignition advance angle injection pulse width and air intake flowrate by EFI diagnosis instrument.	yes	Turn step no.4
		no	next
		no	Examine and repair air condition system
3	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	Fault replacement
		no	next

Ref No.	Operation	Test result	Next Steps
4	Contact EFI commutator, open ignition switch, check ECU5#, 10#, 23# stitch, the power whether supply normal or not, check 2#, 21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(10) Engine starting regularly, but idle speed is too high.

Possible defective part: 1.throttle valve body and idle speed side air duct; 2.injector seat; 3.idle speed valve; 4.engine water temperature sensor; 5.ignition timing.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check the throttle cable if is clipped or too tight.	yes	adjust
		no	next
2	Check air intake system and connector of injector seat, the air if is leaking.	yes	Examine and repair air intake system
		no	next
3	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
4	Pull out connector of engine water temperature sensor, starting engine, observe idle speed whether is unsteady or not when engine is in warming-up.	yes	Examine and repair wiring or replace sensor
		no	next
5	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing

Ref No.	Operation	Test result	Next Steps
6	Contact with EFI commutator, open ignition switch, check ECU5#, 10#, 23# stitch, the power whether supply normal or not, check 2#, 21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(**11) Rotate speed cannot increase or engine power off when in accelera**

Possible defective part: 1.fuel containing water; 2.air intake pressure sensor and throttle position sensor; 3.spark plug; 4.throttle valve body and idle speed side air duct; 5.input air duct; 6.idle speed valve; 7.fuel injector; 8.ignition timing; 9.muffler

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check air cleaner if is clogged.	yes	Examine and repair air input system
		no	next
2	Contact fuel pressure meter (contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not.	yes	next
		no	examine and repair oil support system
3	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
4	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
5	Check air intake pressure sensor throttle position sensor and their wiring whether works regularly or not.	yes	next
		no	examine and repair wiring or replace sensor

Ref No.	Operation	Test result	Next Steps
6	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	Fault replacement
		no	next
7	Check fuel and observe the fault if caused after fueling.	yes	Replace fuel
		no	next
8	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing
9	Check the exhaust gas from muffler if exhausts smoothly.	yes	next
		no	Repair or replace muffler
10	Contact with EFI commutator, open ignition switch, check ECU5#, 10#, 23# stitch, the power whether supply normal or not, check 2#, 21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(12) Reaction slowly when in acceleration.

Possible defective part: 1.fuel containing water; 2.air intake pressure sensor and throttle position sensor; 3.spark plug; 4.throttle valve body and idle speed side air duct; 5.input air duct; 6.idle speed valve; 7.fuel injector; 8.ignition timing; 9.muffler

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check air cleaner if is clogged.	yes	Examine and repair air input system
		no	next

Ref No.	Operation	Test result	Next Steps
2	Contact fuel pressure meter (contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not.	yes	next
		no	examine and repair oil support system
3	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace
4	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
5	Check air intake pressure sensor throttle position sensor and their wiring whether works regularly or not.	yes	next
		no	examine and repair wiring or replace sensor
6	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks, clogs or flux discrepantly.	yes	Fault replacement
		no	next
7	Check fuel and observe the fault if caused after fueling.	yes	Replace fue
		no	next
8	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing
9	Check the exhaust gas from muffler if exhausts smoothly.	yes	next
		no	Repair or replace muffler

Ref No.	Operation	Test result	Next Steps
10	Contact with EFI commutator, open ignition switch, check ECU5#, 10#, 23# stitch, the power whether supply normal or not, check 2#, 21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

(13) No power and poor performance when in acceleration.

Possible defective part: 1.fuel containing water; 2.air intake pressure sensor and throttle position sensor; 3.spark plug; 4.ignition coil; 5.throttle valve body and idle speed side air duct; 6.input air duct; 7.idle speed valve; 8.fuel injector; 9.ignition timing; 10.muffler.

Overhaul:

Ref No.	Operation	Test result	Next Steps
1	Check the faults if exist clutch skid, low tyre pressure, lagged brake, improper tyre size etc.	yes	repair
		no	next
2	Check air cleaner if is clogged.	yes	Examine and repair air input system
		no	next
3	Contact fuel pressure meter (contact front point of oil input pipe of injector), starting engine, check the fuel pressure whether is around 300kPa or not.	yes	next
		no	examine and repair oil support system
4	Pull out ignition coil, and contact with spark plug, keep pole of spark plug 5mm away with body of engine, starting engine and check the high pressure fire whether is normal or not.	yes	next
		no	examine and repair ignition system
5	Check spark plug, look its type and gap if accords with standard.	yes	next
		no	Adjust or replace

Ref No.	Operation	Test result	Next Steps
6	Disassembly idle speed valve and check the throttle valve body, idle speed valve and idle speed side air duct whether have carbide accumulated or not.	yes	Clean related parts
		no	next
7	Check air intake pressure sensor, throttle position sensor and their wiring if works regularly.	yes	next
		no	examine and repair wiring or replace sensor
8	Disassembly injector, and check the injector by special washing analysis instrument if exists the phenomena of leaks and clogs.	yes	Fault replacement
		no	next
9	Check fuel and observe the fault if caused after fueling.	yes	Replace fuel
		no	next
10	Check engine ignition timing if accords with standard.	yes	next
		no	examine and repair ignition timing
11	Check the exhaust gas from muffler if exhausts smoothly.	yes	next
		no	Repair or replace muffler
12	Contact with EFI commutator, open ignition switch, check ECU5#, 10#, 23# stitch, the power whether supply normal or not, check 2#, 21# stitch whether is putting up iron or not.	yes	Diagnosis help
		no	Examine and repair relevant wiring

6 Vehicle chassis

MAINTENANCE INFORMATION

Operation Cautions

• Securely support the vehicle when doing check and repair

• The overhaul or inspection of Light, meter, switch refers to related sections.

• Do not overexert on the wheel, avoid any damage to the wheel.

• When removing tire, use the special tire lever and rim protector.

Overhaul standard

Item			Standard	Service limits
Front wheel	Wheel runout	Radial	0.8mm	2.0mm
		Axial	0.8mm	2.0mm
	Tire	Tread Depth	-	3.0mm
		Air pressure	56kPa(0.57kgf/cm^2)/ 42kPa(0.43kgf/cm^2)	
Front Brake	Brake Lever Free Play		0mm	

Tightening Torque

Ref No	Items	Parts code	Troque N·m(kgf·m)
1	Nut, Steering Tie-Rod	GB9457 M10 ×1.25	(30～40)N·m
2	Lock Nut. Steering stem	GB6187 M14 ×1.5	(100～120)N·m
3	Bolt, front brake disc	901-08.00.03	(25～35)N·m
4	Bolt, front brake caliper	GB5789 M8 ×16	(15～25)N·m
5	Wheels nut	GB9459 M24 ×2	(320～350)N·m
6	Bolt, front shock absorber	GB5789 M10 ×1.25 ×50、GB5789 M10 ×1.25 ×70	(40～50)N·m
7	Mounting nut, rim	9010-070002	(70～80)N·m
8	Bolt, A-arm	GB5789 M10 ×1.25 ×70	(40～50)N·m

Special tools：

air wrench	S17	air wrench	S15
air wrench	S13	air wrench	S35
allen wrench	M8	allen wrench	M6
allen wrench	M5	speed wrench	S10
speed wrench	S13	speed wrench	S15
open end wrench	S8-S10	open end wrench	S14-S17
open end wrench	S18	slotted screwdriver	
cross screwdriver		nipper pliers	
hammer		outside spring pliers	
Assemble tools shaft			

6.1 Troubleshooting

Handle bar heavy

¤Upper thread is over tightened
¤Steering bearing is damaged or worn
¤Inner & outer bearing races are damaged or not well tightened.
¤Steering stem is distorted
¤Low tire pressure
¤Tire worn

Excessive handlebar free play

¤Steering bearing is damaged or not well tightened.
¤LH and RH shock absorber not matched
¤Deflected tires
¤Deformed frame
¤Worn tire
¤Shaking wheel bearing

Severe front wheel runout

¤Wheel rim distorted
¤Faulty wheel bearing
¤Faulty tires
¤Improper balance of wheels
¤Improper tightening of wheel shaft

Wheel cannot turn freely

¤Faulty wheel bearing
¤Wheel installed improperly
¤Brake drag

Front suspension too soft

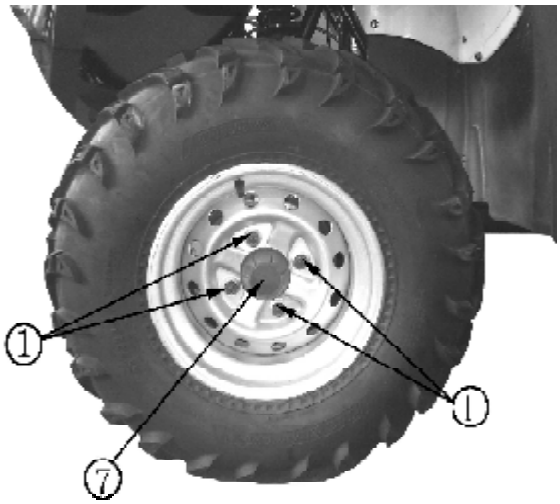
¤Weakened front shock absorber
¤Tire pressure is too low

Front suspension too hard

¤Front shock absorber is damaged
¤Tire pressure is too high

Noise from front shock absorber

¤Faulty front shock absorber
¤Loosened tightening parts of front shock absorber



Picture 6-1

Poor brake performance

¤Faulty brake adjustment
¤Stained brake disc
¤Brake pads worn

6.2 Front wheel

Removal (Picture 6-1)

Securely support front wheels;

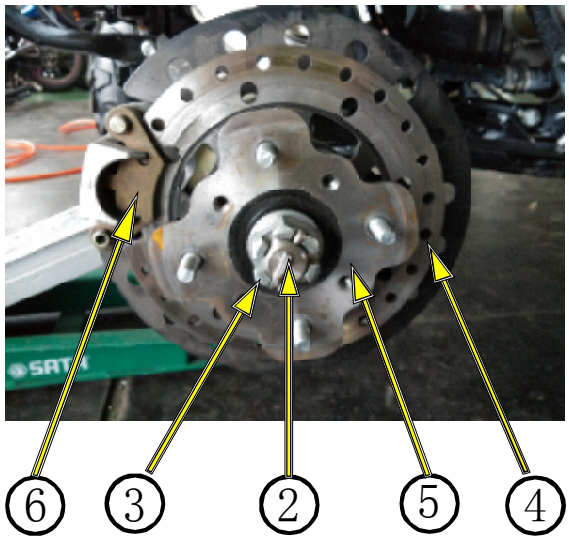
Remove wheel cap ;
Remove the 4 wheel nuts no.1;
Remove front wheel.

Rim & Inspection

Check rim for damages, deformation, nicks. If any abnormal condition has been found, replace it.
Slowly turn wheel.
Use a dial gauge to measure the rim runout
Service limit: 2.0 mm (Axial)
2.0 mm (Radial)

Installation

Press rim into tire with special tool;
Fix wheel on the hub;Wheel nuts tightening torque:70N • m～80 N • m

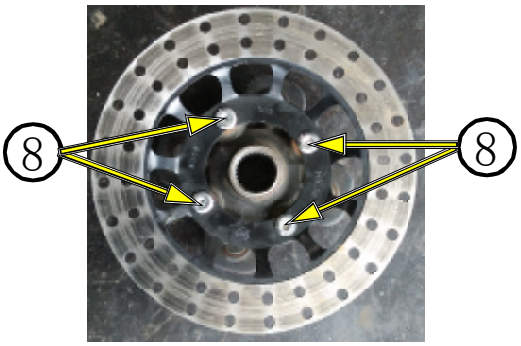


FRONT WHEEL HUB

Removal
Remove front wheel
Remove front brake caliper 6
Take out cotter pin 2 Remove rim axle nut no. 3
Remove brake disc and hub together;
Remove the 4 brake disc bolts no. 8
Remove front wheel hub no.4

nstallation

Reverse the removal procedure for installation.
Tightening torque of axle nut: 320N • m～350N • m
Tightening torque of brake disc bolts no.8: 25N • m~35N • m
(Apply thread locker)



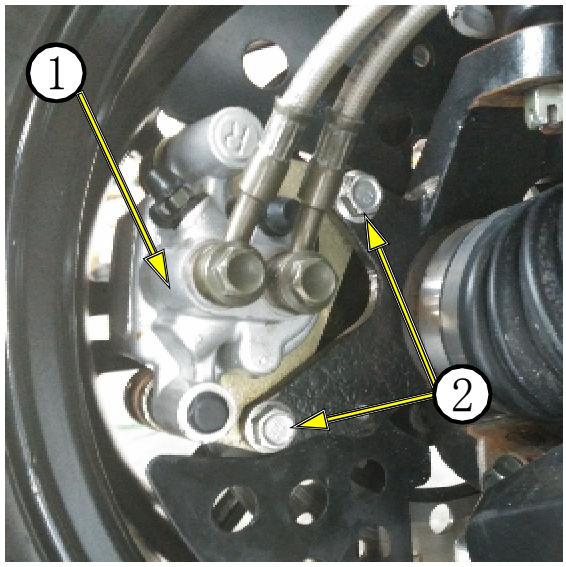
6.3 FRONT BRAKE SYSTEM

Front Brake Caliper

Removal
Remove front wheel
Remove the two bolts no.2;
Remove caliper no.1.

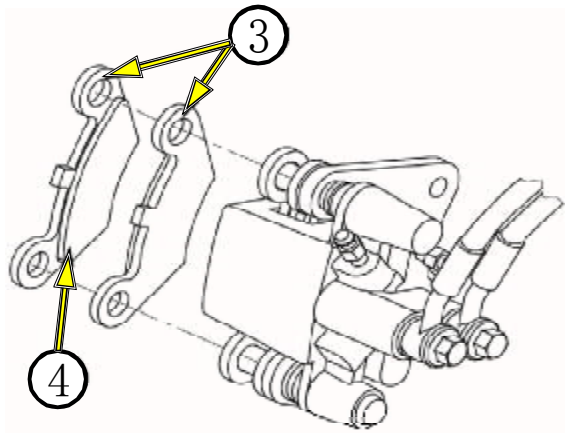
Inspection

Check any cracks of brake calipers and oil leaks from tightening areas.Replace if necessary Tightening torque of brake caliper bolt 2:15N • m～25N • m（Apply thread locker）



Brake pads

Removal
Remove main sliding shaft of brake pads with Allen wrench;
Remove brake pads;
Measure thickness of brake pad friction surface no.4,
if it is less than 1mm, then replace both pads at the same time.



BRAKE DISC

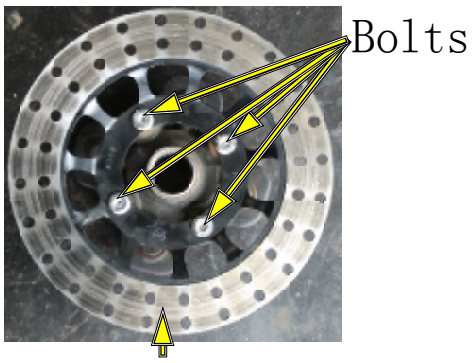
Removal

Remove front wheel, Remove brake calipers

Remove brake disc and wheel hub from vehicle

Remove the 4 brake disc bolts shown in the right picture,

then remove brake disc.



Inspection

Thickness of brake disc: If less than 2.5mm, replace it.

Installation:

Reverse the removal procedure for installation.

Tightening torque of brake disc bolts:

25N • m~30N • m

FRONT BRAKE MASTER CYLINDER

Removal

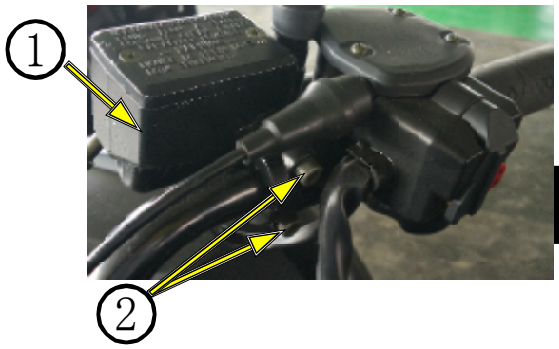
Remove top cover of handlebar;

Remove right hand guard;

Remove bolt no.2;

Separate the master cylinder no.1 of front brake from handlebar.

It's not necessary to remove it if replacement is not required.



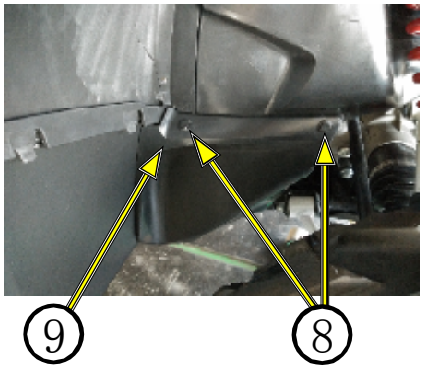
Attention:

Do not hang the master cylinder by brake line,

Keep master cylinder in place (not inclined) while installing it to avoid air entering brake line.

Keep brake line routed properly (refer to Chapter1) and ensure it is not kinked.

After installation of brake system, check brake performance.



MASTER CYLINDER

Removal

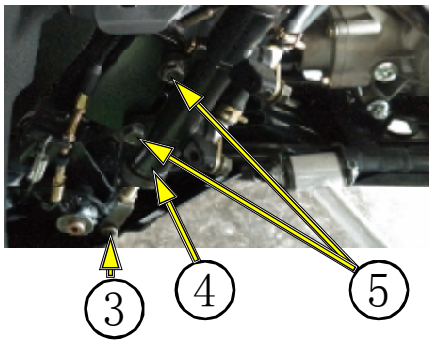
Remove expansion screw 8, remove master cylinder 9

Remove footrest board, remove bolt 5,

Remove bolt 7

Remove cotter pin and pin roll 3

Remove master cylinder 4 and fluid reservoir 6 from vehicle

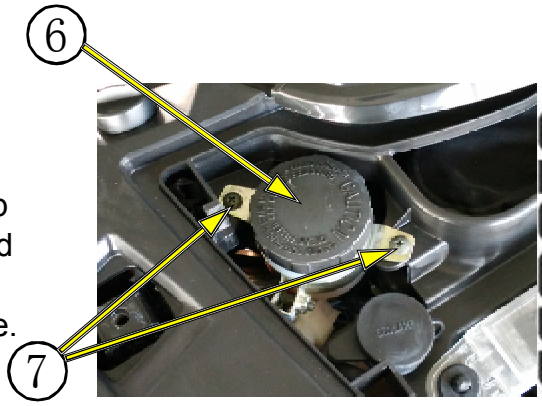


Installation

Reverse the removal procedure for installation.

Attention:

In order to avoid air entering master cylinder, keep it in place while installing it. Keep brake line routed properly (refer to Chapter 1) and ensure it is not kinked. After installation, check brake performance.



T-FITTING

Removal

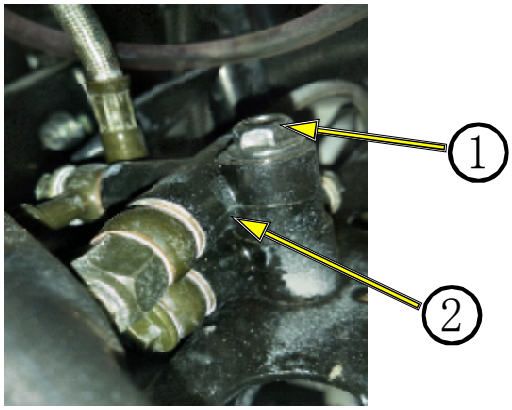
Remove bolt no.1 and T-fitting 2.

Installation

Reverse the removal procedure for installation.

Attention: Keep brake line routed properly (Refer to Chapter 1) and ensure it is not kinked.

After installation, check if 4-wheel brake lever or brake pedal can control front brake.



REAR BRAKE CALIPER

Removal

Remove bolt 3 and then disassemble rear brake caliper 4

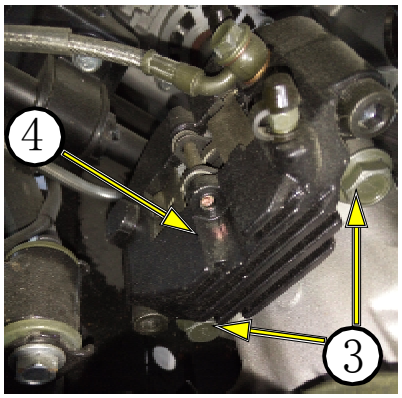
Installation

Reverse the removal procedure for installation

Attention: Keep brake line routed properly (refer to Chapter 1) and ensure it is not kinked.

After installation,check if 4-wheel brake lever or brake pedal can control front brake.

Maintain brake fluid level between “UPPER” and “LOWER”, if necessary; add DOT 4 fluid (CFMOTO recommended) into brake fluid reservoir. Check brake light and switch.



6.4 FRONT SUSPENSION

Front LH Suspension

Removal

ATTENTION: Do not remove left and right suspension at the same time, Otherwise, vehicle may tip or fall.

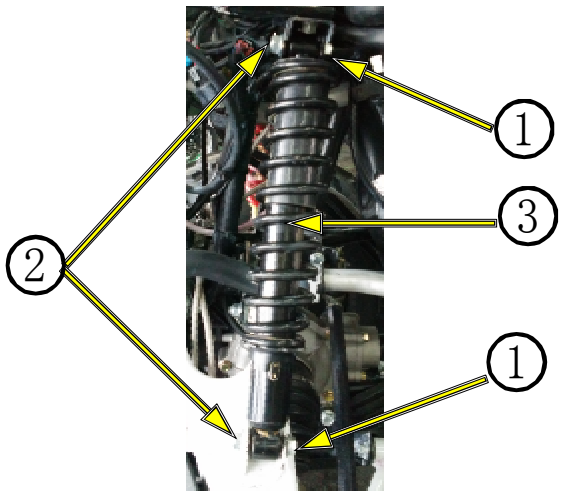
Park the vehicle on a level ground and securely support the front part of vehicle.

Remove LH front protector of suspension

Remove front wheel;Remove brake caliper

Remove front wheel hub

Remove bolts 1 and nuts no.2 of front LH shock absorber 3

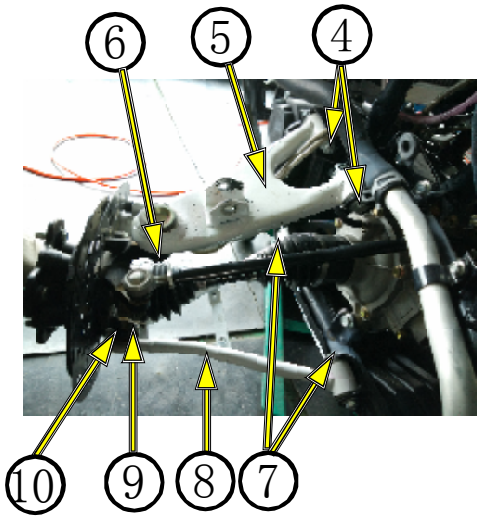


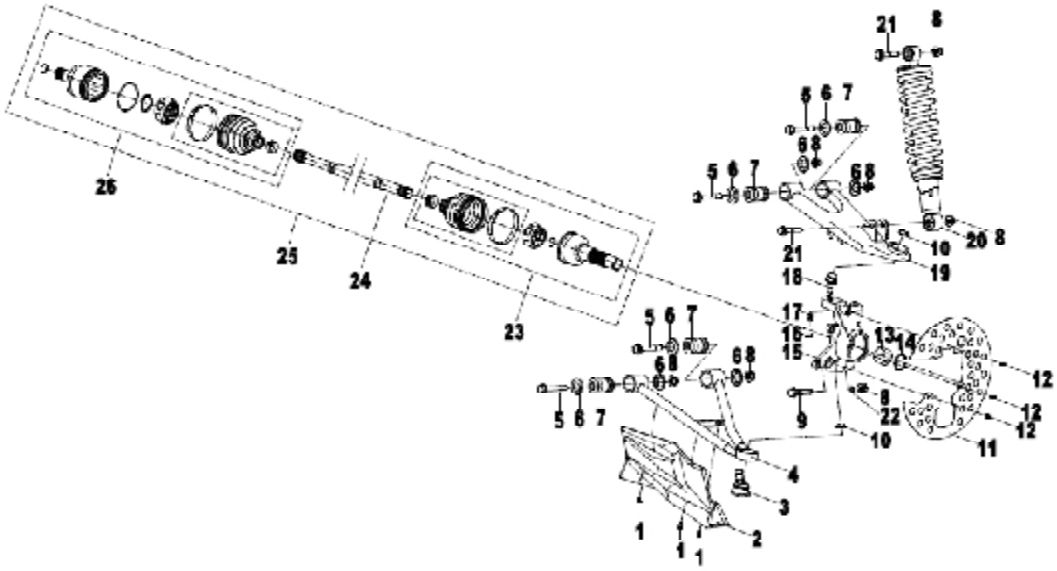
Remove the bolt on upper A-arm (LH) and the nut no.4;

Remove the cotter on upper A-am(LH) and nut no.6 ;

Remove upper A-arm(LH) no.5;

Remove the cotter & locknut no.9 on the steering rod;





1、bolt 2、suspension fender LH 3、lower ball pin assy 4、upper A-arm assy, LH 5、bolt 6、cushion collar protecting hood 7、cushion collar assy 8、nut 9、bolt 10、circlip for shaft 11、front brake flap 12、bolt 13 、rim bearing 14、circlip for hole 15、left steering knuckle 16、cotter 17、slotted nut 18、upper ball pin 19、upper A-arm assy, LH 20、front absorber 21、bolt 22、Φ 10 washer 23、bearing kit, fixing end 24、FRONT SHAFT 25、FRONT CV DRIVE SHAFT 26、RH BEARING KIT, MOTION END

Remove the bolt,nut no.7;
Remove the down A-arm blot no.10;
Remove the down A-arm(LH) no.8;
Pull out the steering knuckle from drive shaft. This vehicle has variety suspension system, to suit deffirent customer needs. Above instruction is for the basic suspension, pls refer to this for other suspension system.

Installation

Reverse the removal procedure for installation. As for removal, installation and check procedure of front shock absorber (RH),refer to front shock absorber (LH)

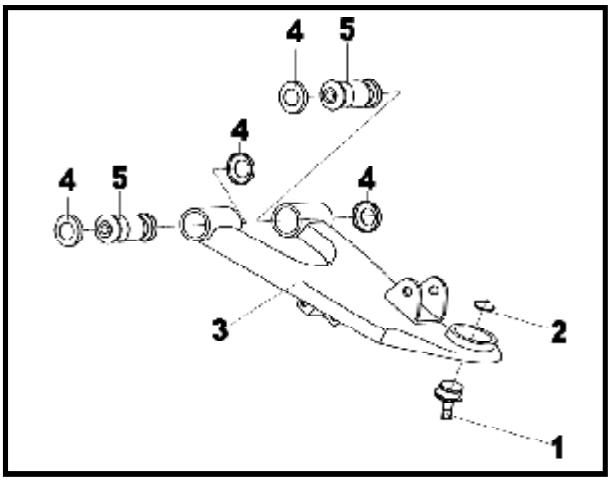
Note:

This vehicle have totally 8 suspension A-arms, and the way of removal, disassemble, inspection,installation are all the same, so this manual will only introduce removal, disassemble, inspection,installation of upper A-arm (LH) & lower A-arm. As for other arms, please refer to upper A-arm (LH) & lower A-arm.

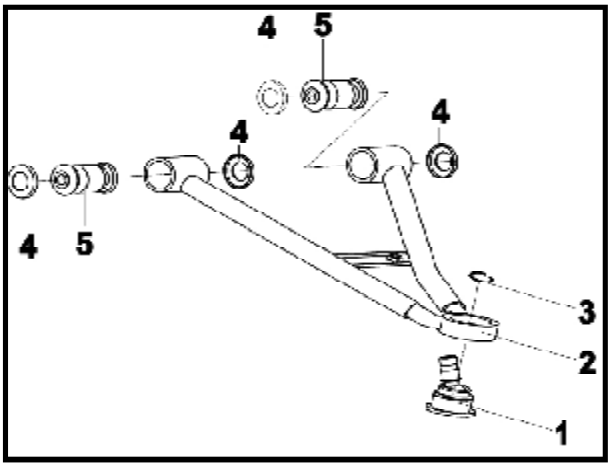
Removal LH Suspension
Remove LH absorber no.1;
Remove the bolt no.18 & the nut no.2 ;
Remove the rim,brake caliper & rim stand before remove the absorber;
Remove the steering rod before remove the bolts;
Pull out the steering knuckle from drive shaft before remove the LH A-arm.

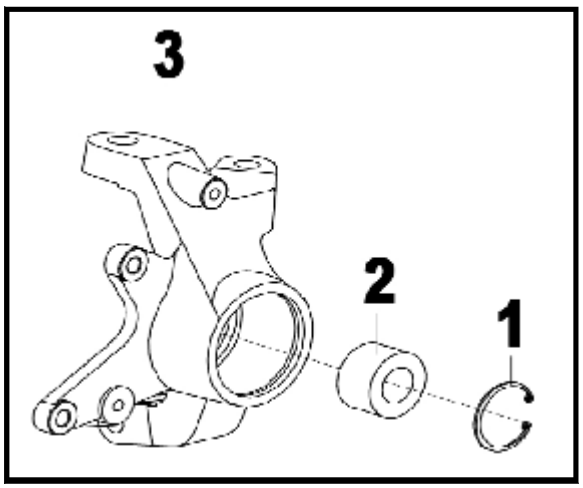
Removal LH A-arm

Check upper & lower A-arm; Remove front Lower A-arm (LH) no.3; Remove circlip no.2(model no:GB894.1 34) Remove top ball pin no.1; Make sure the greese in ball pin is good(greese type：no.2, lithium greese GB7324-87)，make sure the dust boot of ball pin is not damaged or aging,otherwise, replace it.



Remove the cushion hood no.5 and check it if any damage or aging, replace it if necessary; Remove the LH lower A-arm ; Remove the circle for shaft no.3（type：GB894.1 34); Remove the lower ball pin no.1; Check lower ball pin no.1 if it can move freely and also check its clearance. If it cannot move freelly or too big clearance, replace it. Check the greese in the ball pin to make sure it’s good （greese type：no.2 lithium greese G B 7324- 87)，Check dust boot of ball pin if damaged or aging。Replace it if have any above problem. Remove the cushion hood no.5 and check it if any damage or aging, otherwise, replace it. Installation Use special tool to press ball pin into A-arm; Reverse the removal procedure for installation.





Note：Upper and Lower A-arms should not vibrate after installation, otherwise replace cushion hood no 5

Check the left knuckle; Remove the left knuckle no.3; Remove circle no.1（type:GB893. 1 55 ） Use special tool to remove hub bearing no.2（type:DAC3055W） Check hub bearing if any damaged and move freely,or big clearance.Replace it if necessary.

6.5 Steering system

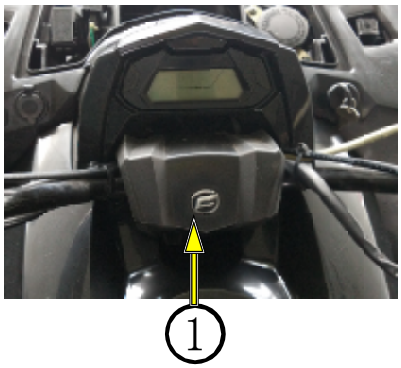
Handlebar, front handbrake pump, handguard

Removal

Remove handguard no.1

Installation

Reverse the removal procedure for installation



Winch control switch

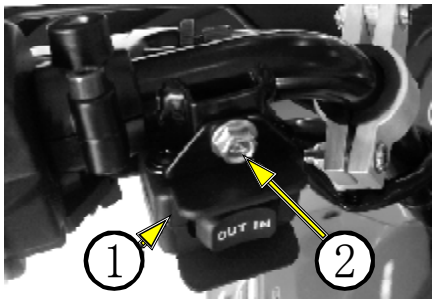
Removal

Remove bolt no.2;

Remove control switch no.1;

Installation

Reverse the removal procedure for installation

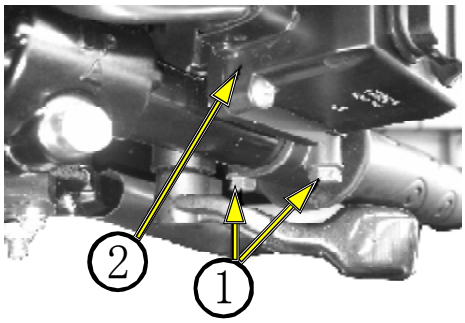


Right handlebar switch assy

Removal

Remove bolt no.1;

Remove right handlebar switch assy no.2.



Left handlebar switch assy

Removal

Remove bolts no.3;

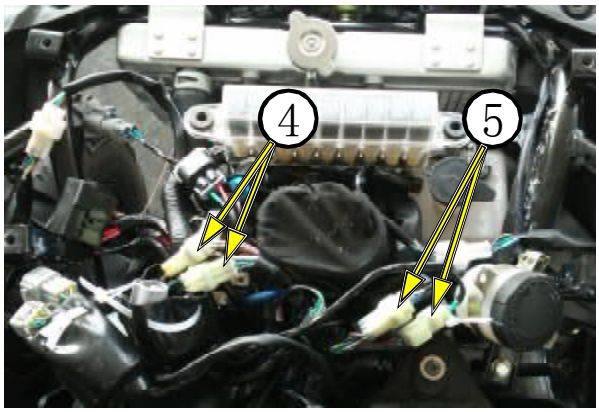
Disconnect the connectors;

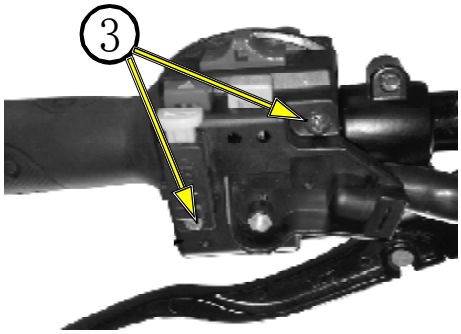
Remove left handlebar switch connector no. 4;

Disconnect right handlebar switch connector no.5

Installation L&R handlebar switch assy

Reverse the removal procedure for installation





Rearview mirror

remove

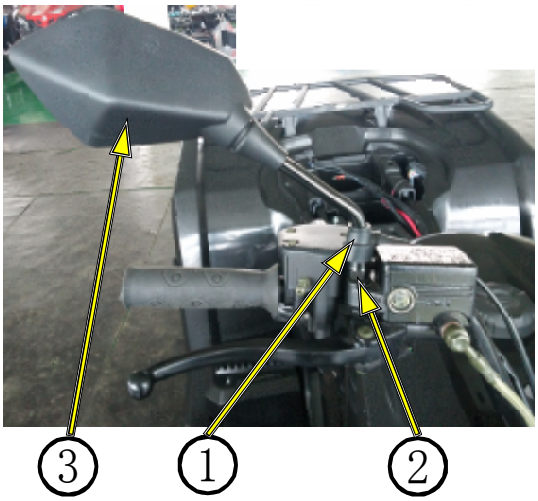
Slide sleeve no 1; Loosen the nut no.2 with counterclockwise ;

Remove rear view mirror no.3 in anti-clockwise Direction.

NOTE: As for rear view mirror (LH), it is right hand threads, so remove it by turning it counter-clockwise.

Unscrew nut in clockwise direction and unscrew rear view mirror (RH) to remove.

NOTE: As for rear view mirror (RH), the threads are left hand, so remove it by turning it counter-clockwise



installation

Reverse the removal procedure for installation

Handlebar

Removal

Remove handguard; Remove left & right handlebar switch;

Remove winch switch;

Remove parking lever;

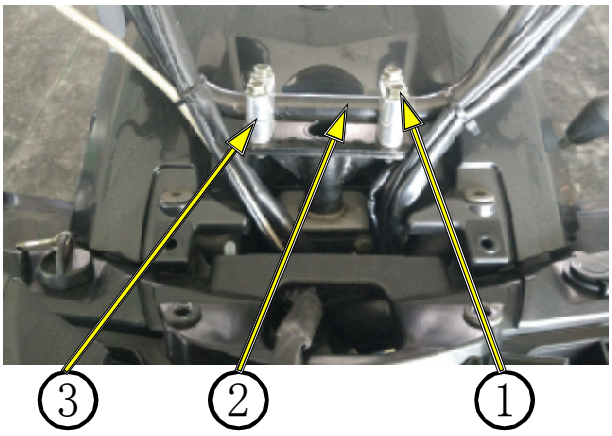
Disconnect the hand brake master cylinder from handle bar;

Remove left & right handguard;

Remove bolt no.1;

Remove alu.cap no.3;

Remove handle bar no.2.



Installation

Reverse the removal procedure for installation Handlebar alu.cap installation bolt：M8X 55

touque:

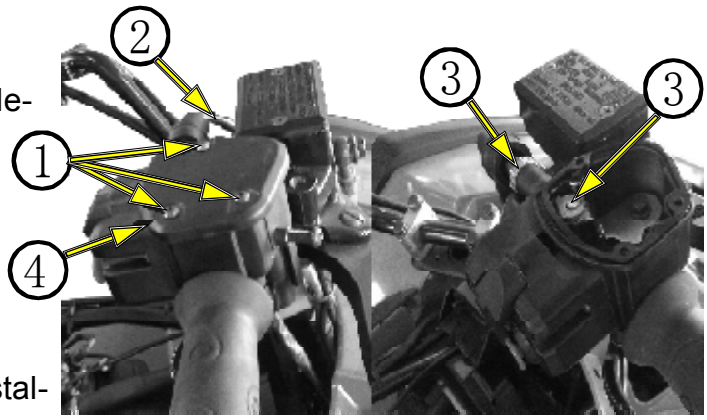
30N·m～40N·m (3.0kgf·m～4.0kgf·m)

Note: Main cable, Throttle Cable,brake tube,other cable installation pls follow the drawing.

Throttle Cable

removal

Remove bolt no.1; Remove right handle-bar cover no.4; 1 Remove throttle cable connector no.5; Remove the throttle joint no.3; 4 Remove the throttle cable no.2lation

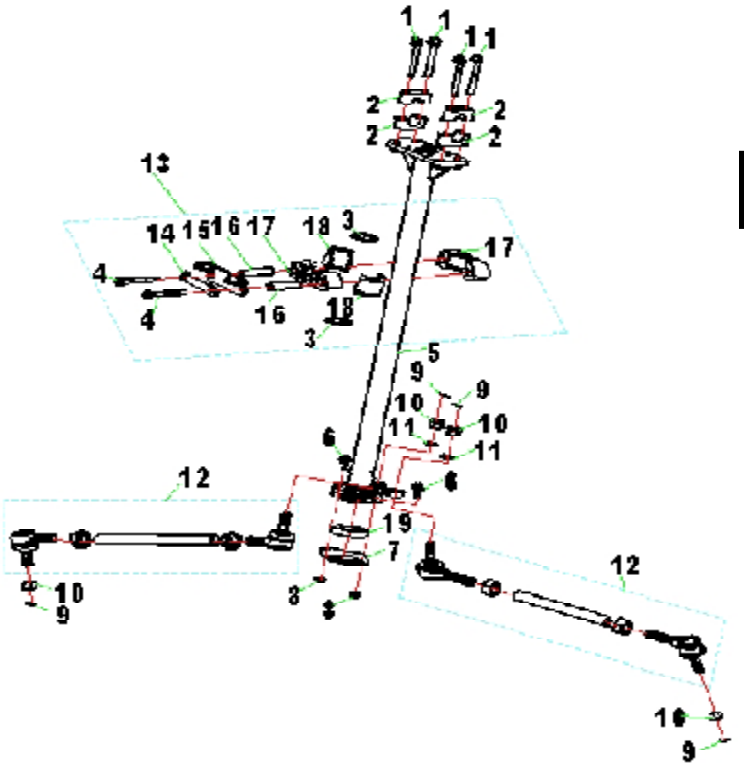


Installation

Reverse the removal procedure for instal-lation

Steering system

1、bolt M8 × 55 2、alum cov O-Ring 4、bolt 5、steering stem 6、bolt 6 7、bearing seat,steeri nut 9、cotter 10、nut M10 × 1.2 washer12、steering rod 13、bushi steering stem 14、lock washer 15 linking plate assy 16、bush 17、 bush,steering shaft 18、inner bu steering shaft 19、bearing



Steering shaft

Removal

Remove handlebar cover;

Remove plastic parts;

Remove front wheel;

Remove handlebar;

Remove rear brake lever;

Remove hand brake master cylinder;

Remove connector of handlebar switches;

Remove steering rod;

Hammer out the lock washer no.1 by screw driver and hammer;

Remove bolt no.2;

Remove bolt no.6;

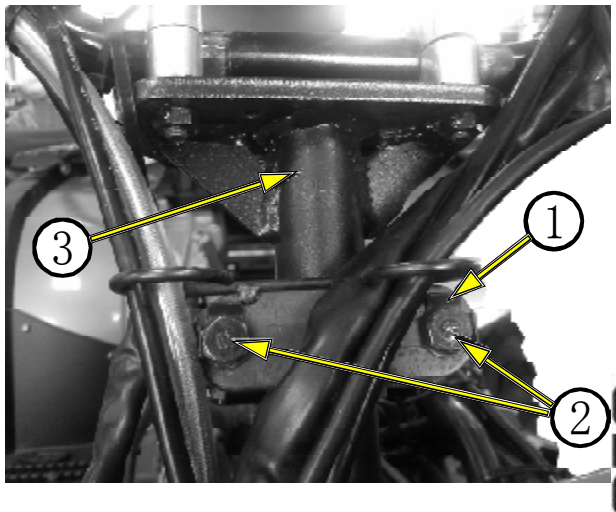
Remove nut no.8;

Remove cotter no.9;

Remove nut no.10;

Remove steering rod no.12;Lift the steer-ing shaft no.3;

Remove the steering shaft.

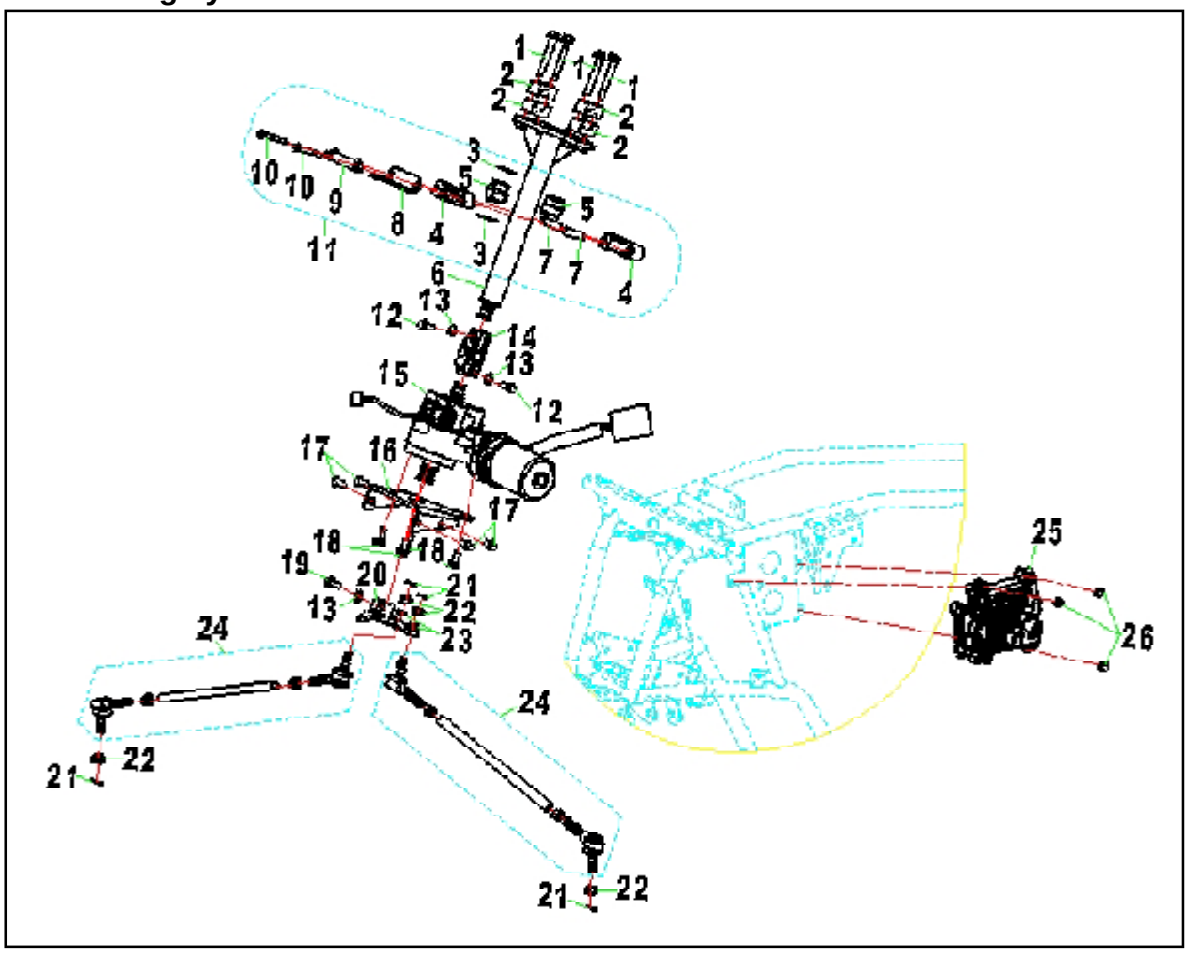


installation

Reverse the removal procedure for installation

note：after installation, be sure to check steering agility;cable installation according to chapter 1、be sure steering arm in the middle,be patient when install steering shaft, then lock other parts.

EPS steering system



1、bolt M8 × 55 2、handlebar alum cover 3、O-ring 4、outer bush,steering shaft 5、inner bush,steering shaft 6、EPS steering shaft assy 7、bush 8、linking plate assy 9、lock washer 10、bolt M8 × 75 11、bushing,steering stem 12、bolt 13、washer14、bearing kit,steering shaft 15、EPS driver 16、EPS mounting plate 17.bolt 18、bolt 19、bolt 20、EPS steering arm 21、cotter 22、nut 23、washer 24 、steering tie-rod 25 、EPS controller 26、bolt Removal Remove handlebar cover; Remove plastic parts; Remove front wheel; Remove handlebar; Remove rear brake lever; Remove hand brake master cylinder; Remove all switches on handlebar; Loosen lock nut on steering tie-rod; Remove steering tie-rod; Remove 4 bolts no.17; Hammer out the lock washer no.1 by screw driver and hammer; Remove bolt no.2; Remove bolt no.19; Remove steering arm no.20;Remove bolt no.12; Remove the bearing kit, steering shaft no.14; Lift the EPS steering shaft no.6; Remove the steering shaft Installation Reverse the removal procedure for installation.

Note:after installation, be sure to check steering agility;cable installation according to chapter 1,be sure steering arm in the middle,be patient when install steering shaft, then lock other parts.

EPS Driver

Removal

Remove plastic parts;

Remove front wheel;

Remove handlebar;

Remove EPS steering shaft;

Loosen connector no.1;

Remove 4 bolt no.17;

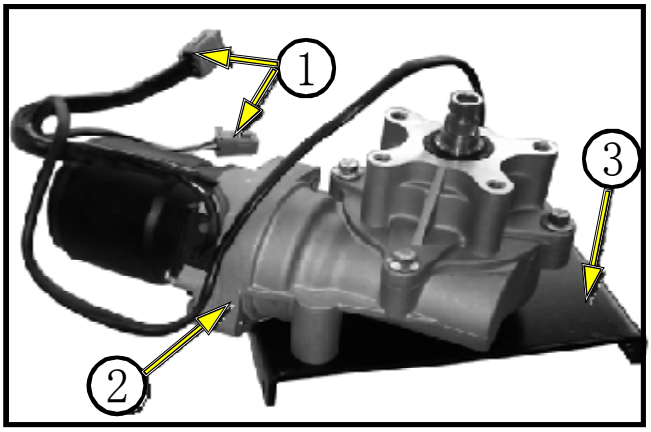
Remove steering stem plate no.3;

Remove bolt no.19;

Remove steering arm no.20;

Remove bolt no.18;

Remove EPS driver no.2.



installation

Reverse the removal procedure for installation

Note：Cable installation according to chapter 1,be sure steering arm in the middle, then install EPS driver, be patient when install steering shaft, first to fix one side of the steering shaft on EPS driver, then install EPS steering shaft. Make sure the same steering angle both on the left & right, then lock other parts.

EPS Controller

Removal

Remove plastic parts;

Loosen the connectors;

Remove bolts no.26;

Remove EPS controller no.25;

Installation

Reverse the removal procedure for installation.

EPS steering system

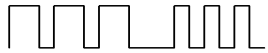
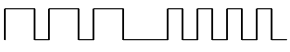
The EPS indicator light works when the vehicle is equipped with EPS system ①. Under normal conditions, EPS indicator light is on ② after turning power switch on. EPS doesn't work; EPS indicator light is off after engine is started. EPS begins to work.)

NOTE: Spare parts in the EPS system cannot be taken apart by user. If there is something wrong with the EPS system expect track junction problem, please contact dealer.

Appendix 1: EPS system fault code table

(EPS indicator light on the instrument flashes when fault occurs. At that time, do not cut the power off but observe the frequency of flashing and record the orderliness in a period. Then please check with this table to find troubleshooting.)

(EPS indicator light represents fault code. Every fault code consists of two digits. Each digit means long-flashing times (the first number) and short-flashing times.(the second number). Long-flashing lasts two seconds while short-flashing lasts a second, interval lasts a second. Repeat the process after three second with indicator light is off.)

Code	waveform	diagnosis	solution
21		Main sensor is disconnected	Check sensor harness
22		Output exception of the main sensor (Voltage is too high or low)	Check sensor harness
23		Deputy sensor is disconnected	Check sensor harness
24		Output exception of the deputy sensor (Voltage is too high or low)	Check sensor harness
25		Discrepancy of the main and deputy torque is too large	Check sensor harness
26		Deviation of phase compensation of main torque sensor is over the limit	Replace EPS controller
32		Main sensor is disconnected	Check sensor harness
33		Output exception of the main sensor (Voltage is too high or low)	Check sensor harness
34		Deputy sensor is disconnected	Check sensor harness
35		Output exception of the deputy sensor (Voltage is too high or low)	Check sensor harness
36		Discrepancy of the main and deputy torque is too large	Check sensor harness

Appendix 2：EPS malfunction analysis and solution

No.	Failure Phenomenon	Probable Reason	Troubleshooting
1	Steering without assistance	1、connectors of wire is bad contact 2、The fuse blew out 3、Relay damage 4、Thecontroller、motor or sensor is damaged	1、Check whether wire connectors are fully inserted 2、Replace the fuse（30A） 3、Replace the relay 4、Contact with suppliers and replace it
2	Power don't weighs the same for left and right	1、The median output voltage have deviation 2、controller、motor or sensor is damaged	1、Disconnect motor connectors,loosen the sensor adjustment screw,adjust the sensor position to keep the voltage in 1.65V±0.05V 2、Contact with suppliers and replace it
3	when system is on, the steering wheel swings on both sides	1、Motor is mounted backwards 2、controller or sensor is damaged	1、Exchange the position of (thick line) red line and black line at the motor terminal 2、Contact with suppliers and replace it
4	Steering becomes heavy	1.Battery have power loss 2.Motor damage (power reduction) 3. air pressure of the tires (front) is insufficient.	1、Charge 2、Contact with suppliers and replace it 3、Inflate tires
5	System has noise	1、Motor damage 2、Gap of lower steering shaft assembly or mechanical steering assembly is too large 3、Installation of lower steering shaft assembly or mechanical steering assembly is unfirm	1、Replace 2、Replace 3、Check whether the installation screw is tight, reinforcement

6.6 Front & Rear Axle

6.6.1 Front & Rear axle maintain info.

Maintain standards

lubricating period				
Item	Type	capacity	interval	
			initial	next
Front axle	SAE15W/40SF or SAE80W/90GL-4	Initial 0.20L/ Replace 0.20L	350km	5000km
Rear axle		Initial 0.30L/ Replace 0.25L		

Tightening torque table				
Item	QTY	Specification	Torque (N.m)	Remark
Front axle case bolt	5	M8 × 25	25	
Front axle motor bolt	4	M6×16	8	
Front axle pin bolt	1	M8×10	13	With fastening glue
Front axle bolt	1	M10×1.25×20	50	
Diff. gear bolt	8	M8×1×22	45	
Oil bolt. Front axle	1	M14×1.25 ×12	25	
Drain bolt front axle	1	M10×1.25	25	
Bearing seat bolt,front	4	M8×25	25	
Rear axle case bolt	2	M10×1.25×25	40	
Rear axle case bolt	4	M8×25	25	
Bearing seat nut,rear axle	1	M12×1.25	70	
Bearing seat bolt,rear axle	4	M8×30	25	
Retainer, rear axle	1	M65×1.5×10	70	
Oil bolt rear axle	1	M20×1.5×12	25	
Drain bolt,rear axle	1	M14×1.25 ×12	25	

Inspection & maintain

If any one of below problem happens, pls check and repare the front & rear axle.

Problem descriptions	causes
① runstable moving during accelerating. decerating or constant speed. ② abnormal sound in front or rear axle. ③engine power transmission failure to front or rear wheels.	A.bearing broken B.gear clearance over/under size C.gear severely worn D.gear blocked E.drive shaft broken F.lack of lubricant G.foreiggn matter in front or rear gear

note:A 、B 、C problem is difficult to judgement, need detail fault phenomenon to analyse.

Disassemble the axle if necessary.

Obsernvation and judgement

1.never ignore abnormal sound

a.abnormal sounds during accelerating,decelerating ,if it Æs not engine problem.so possibly the gear worn;

b.constant abnormal sounds during accelerating or decelerating might because by gear clearance wrongly adjusted during assembling;

note:wrong assembly or adjustment of the front or rear axle will aggravate gear worn and block.

c.slight sounds will be noticed during low-speed driving and should not be hear during high-speed driving. This is caused by gear block.

2.Check lubrication

Regularly check the consumption of lubrication is normal or not, and check if the metal particle content in lubrication oil is normal.

3.check lubrication leakage

a.check if any oil stains on front or rear axle；

b.check if any oil stains arround parking lot；

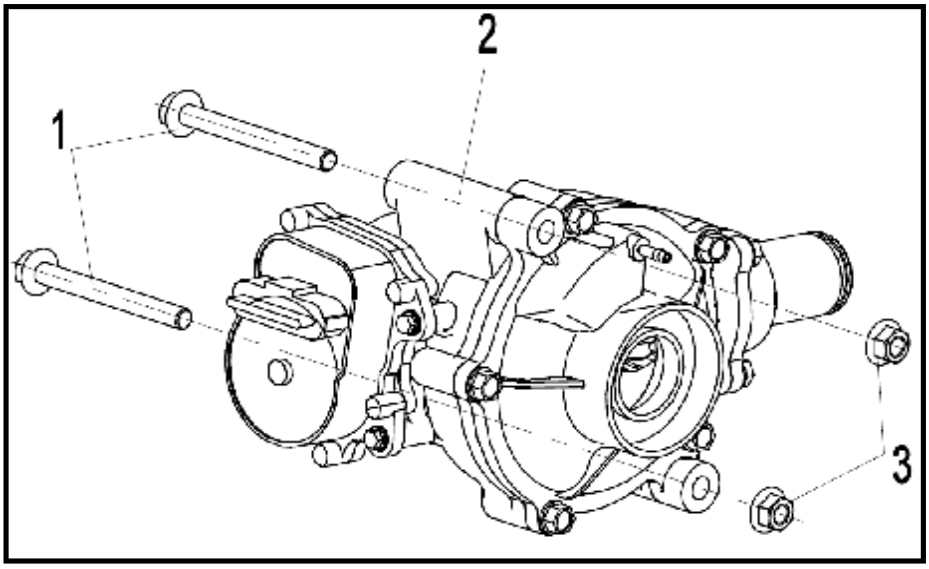
c.check if any oil splash. Judge the pb is gear box or oil seal leakage, then replace the broken part.

6.6.2 Front&rear axle

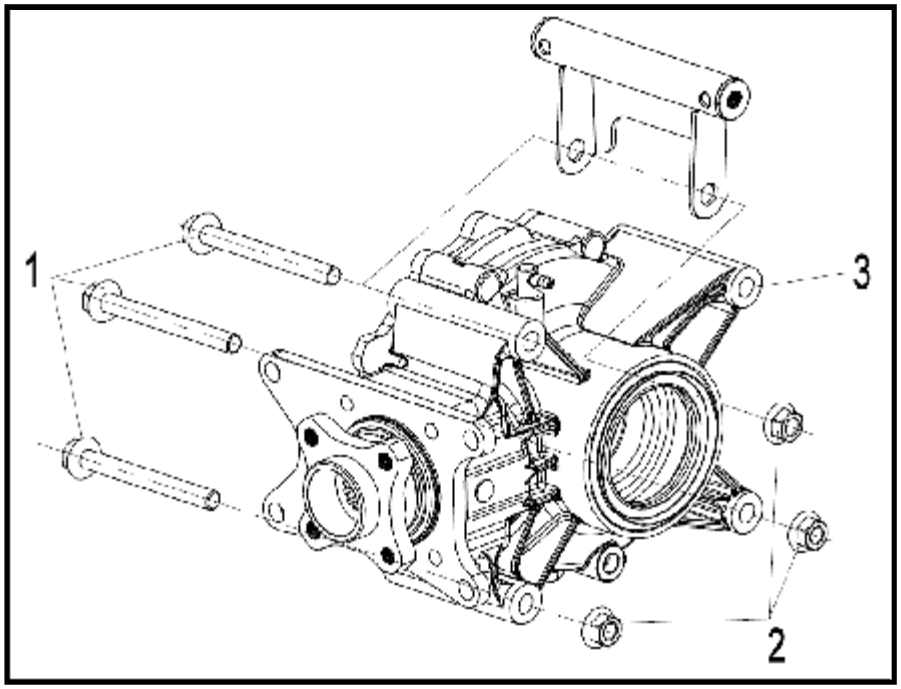
Removal: Hanging the vehicle firmly

Remove the front and rear wheel,A-arm,drive shaft(see chapter 6.2 6.4 and 6.7)

Remove the bolt,nut(item 1 、item 3) ， see below pic.



Remove the bolt,nut (item 1、item 2) ， see below pic.



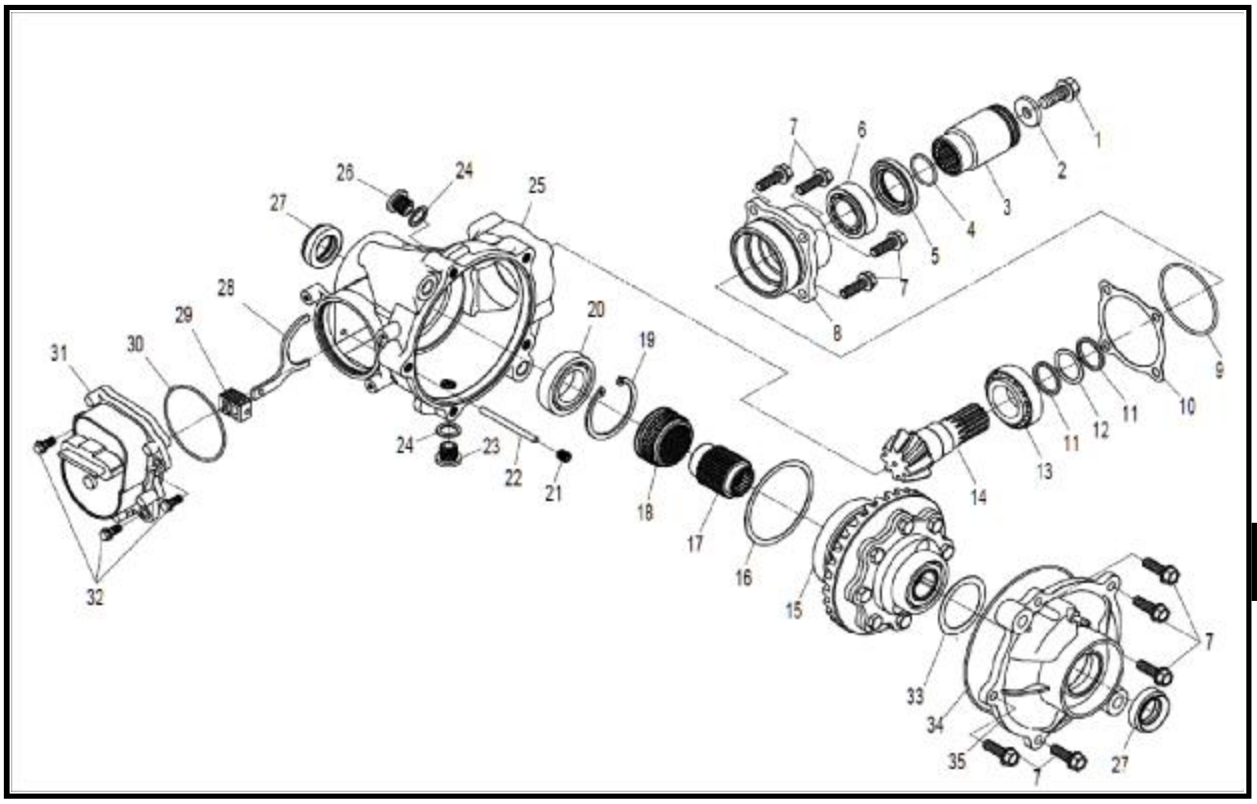
Installation: Reverse the removal procedure for installation.

Front axle bolt(GB5789 M10 × 1.25 × 25) torque:40N • m～50N • m

Front axle bolt(GB5789 M10 × 1.25 × 90) torque:40N • m～50N • m

Rear axle bolt(GB5789 M10 × 1.25 × 110) torque:40N • m～50N • m

6.6.3 Front axle exploded view



item	Part name	Qty	item	Part name	Qty
1	Bolt M10×1.25×20	1	19	Retainer55	1
2	Washer 10×27×4	1	20	Bearing 6006	1
3	Drive gear	1	21	Screw M8×10	1
4	O-ring 25×2	1	22	Pin	1
5	Oil seal 35×50×7	1	23	Drain bolt	1
6	Bearing 330005	1	24	Washer 14	2
7	Bolt M8×25	1	25	Front gear box	1
8	Bearing seat	1	26	Bolt M14×1.25×12	1
9	O-ring 55x2.5	1	27	Oil seal 24×38×8	2
10	washer	1~3	28	Shift fork	1
11	washer 32×24.5	2	29	Rack	1
12	washer	0~1	30	O-ring 67.5×2	1
13	bearing 320006	1	31	Gear motor	1
14	Bevel gear comp, front	1	32	Bolt M6×16	3
15	Differential gear	1	33	Washer 54.5×43	1~2
16	Washer 79.5×68	1~2	34	O–ring 130×2	1
17	Drive clutch cover	1	35	Front gear box cover	1
18	Drive cluth	1			

6.6.4 inspection after front axle disassembly

● check if there is damage or crack on the front differential gear casecover and bearing assembling hole is OK, replace casecover if necessary;

● check if front axle bearing clearance OK or turing stable and roll way,steel ball, needle and plate are OK, replace bearing if necessary；(using special tools)

● check if oil seal lips and O-ring shape are OK, replace if necessary;

● check cylindrical surface of front axle and oil seal lips,replace broken parts if necessary;

● check drive pinion gear and diffenential gear, inspect worn surface,replace broken if necessary;

● check driven gears surface gear (center)differential, bracket differential wearing situation on the differential gear assembly, replace parts if necessary;

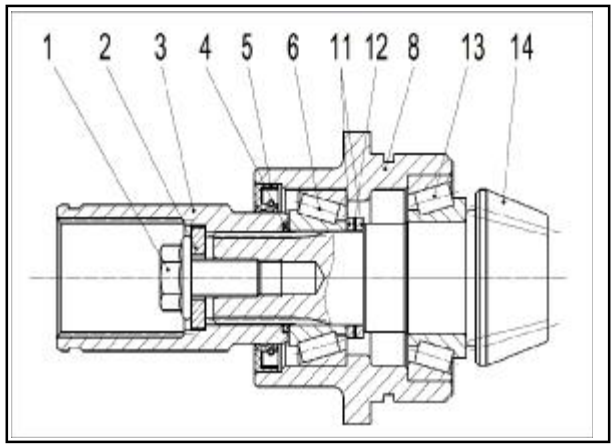
● check inside and outside spline washer wearing status in front axle, replace parts if necessary;

● check gear motor working status,replace with new parts if necessary；
gear motor inspection must be carried out with special quipment or acted on the vehicle;

● check other parts, replace broken parts if necessary;

6. 6. 5 Front axle assembly and adjustment

●Front axle drive bevel gear shaft assembly a: During assembly, use adjusting shims “11”and “12”to ensure “14”rotate smoothly and the axial clearance to be less than or equal to 0.05



Item”1”tightening torque 50 N • m

note: Apply engine oil on oil seal, bearing and drive clutch, during assembly. Apply thread locker on Item”1”

Shim”11”thickness				
2.10	2.20	2.30	2.40	2.42
2.44	2.46	2.48	2.50	2.60
2.70	2.80	2.90	3.00	

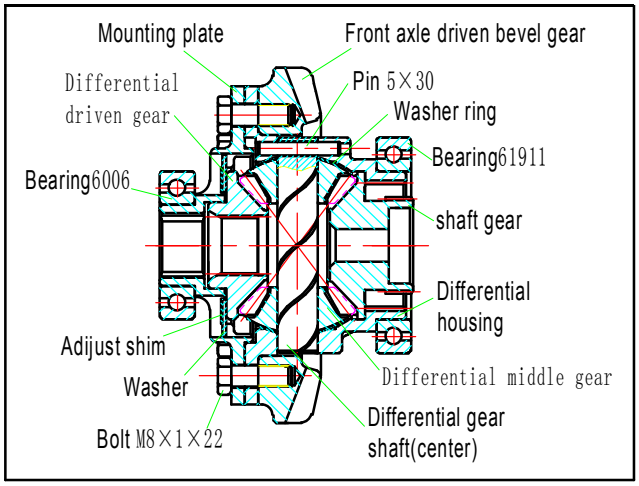
Shim”12”thickness 0.3

● Differential gear assembly

Bolt M8”1”22 tightening torque 45N • m

Note:

During assembly, apply engine oil on bearing and differential gear Use proper shim to ensure gears rotate smoothly Differential driven gear axial play 0.1~0.4 Shaft gear axial play 0.1~0.4 Apply thread locker on bolt M8 × 1 × 22

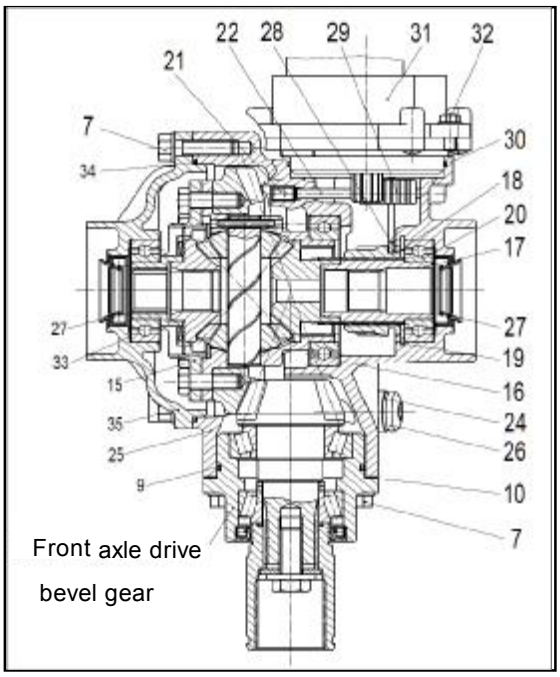


Shim thick-ness	0.1 0.2 0.3 0.4 0.5 1.0

● Front axle assembly and adjustment

As illustration shown：

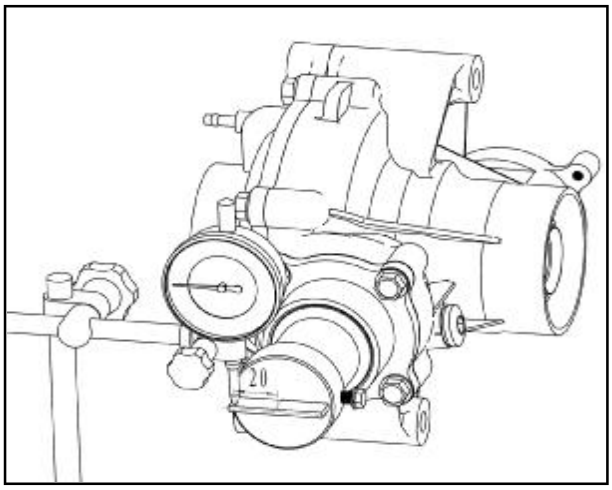
Tightening torque	
item “7”	25N • m
item “21”	13N • m
item “32”	8N • m
Injecting oil bolt	25N • m
Draining oil bolt	25N • m



a:During assembly, use proper locating distance adjusting shims”10”and adjusting shims”16”and”33”thickness to adjust the locating distance and gear clearance between front axle drive bevel gear and driven bevel gear, and ensure gear contact properly. Gear clearance 0.10 ~ 0.25

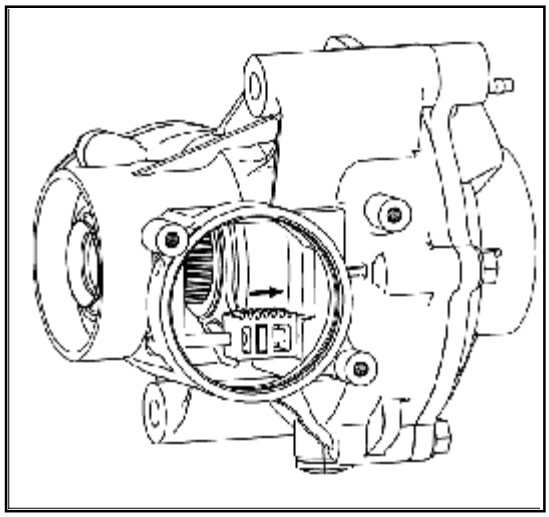
Shims thickness	0.1 0.2 0.3 0.4 0.5 1.0

Locating distance shims thickness	0.1 0.2 0.3 0.4 0.5 1.0



The clearance measurement of bevel gear as right illustration: install assistant measurement tool, tighten fixing bolt, set up dial indicator, and ensure 20mm distance between measuring point and the center of assistant measurement tools. And rotate assistant measurement tool forward and reverse and read the data

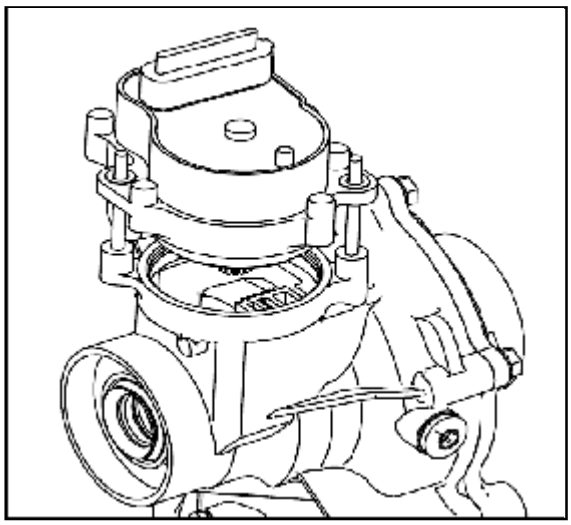
Standard: 0.10～0.25



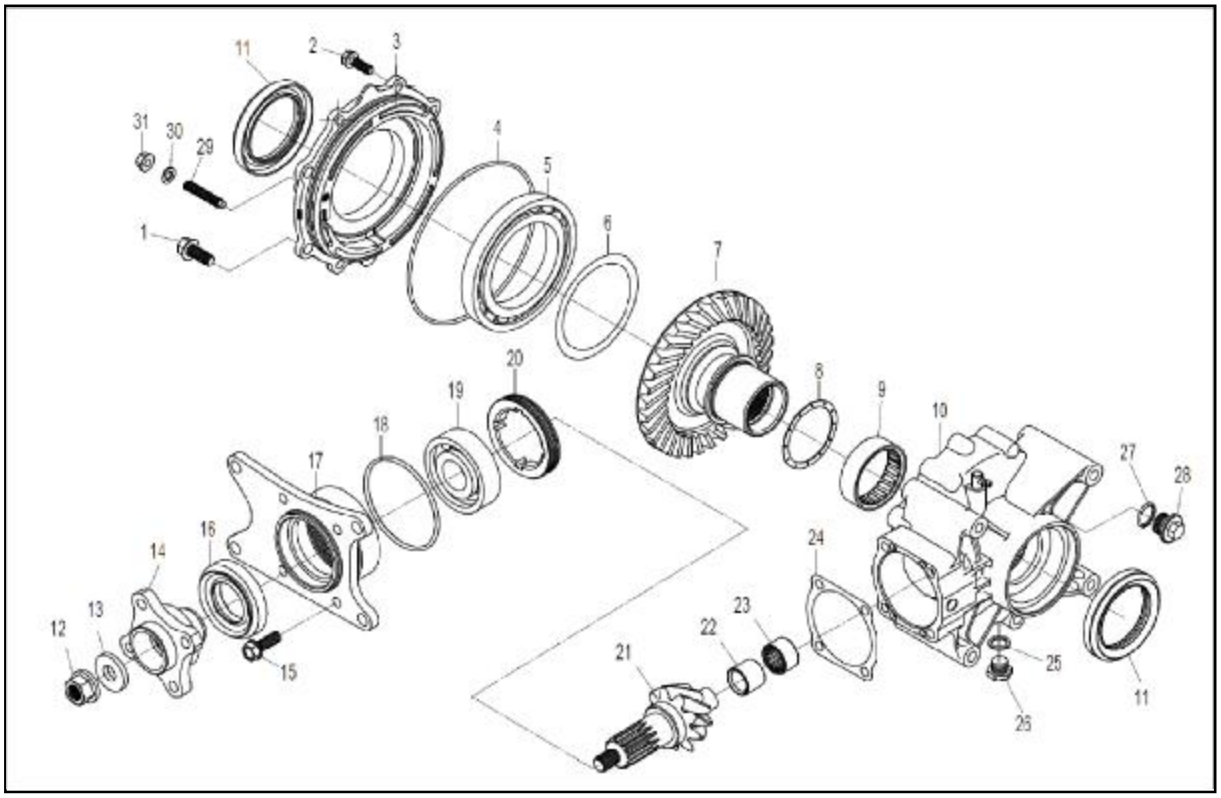
b:When assembly of front axle motor, spline, shift fork and drive clutch should be against tightly to the arrow shape as illustration

c : Use special equipment or vehicle control circuit to rotate into 4WD position before gear motor assembly

d :make sure b and c is assembled properly, and use illustrated positioning screw ϕ 5 to assemble gear motor and front axle.



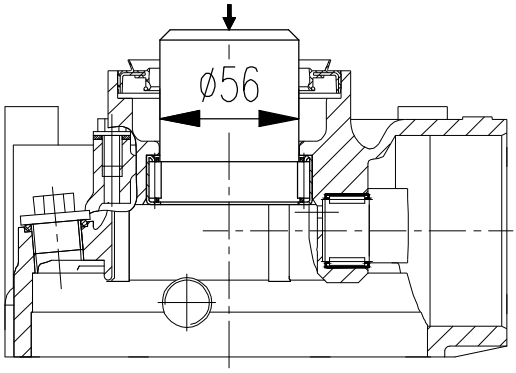
6.6.6 Rear axle exploded view



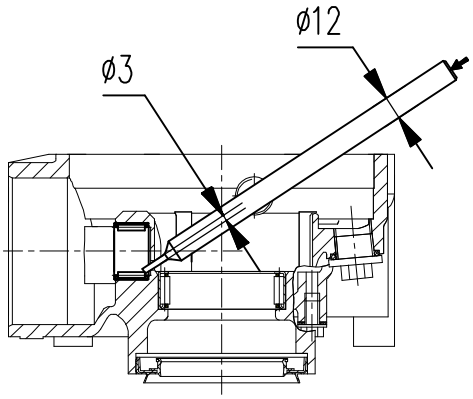
item	Part name	Qty	item	Part name	Qty
1	BOLT M10 × 1.25 × 25	2	18	O -ring 64.5 × 3	1
2	BOLT M8 × 25	6	19	Bearing 6305	1
3	Rear Gear Bearing housing	1	20	Bearing reteiner	1
4	O-Ring 151 × 3	1	21	Drive gear rear axle	1
5	Bearing 16017/C2	1	22	Bearing inner race NA5903	1
6	Adjust Shim（2）	1~2	23	Bearing inner race NA5903	1
7	Bevel gear comp, Rear axle	1	24	Adjust gasket	1～3
8	Adjust Shim（1）	1	25	Washer 14.5 × 21 × 1.5	1
9	BEARING 55BTM6720A	1	26	bolt M14 × 1.25 × 12	1
10	CASE, REAR AXLE	1	27	O -ring 19 × 2.5	1
11	OIL SEAL SD4 65×90×9 NS	2	28	bolt M20 × 1.5 × 12	1
12	NUT M12 × 1.25	1	29	Screw M8 × 45	1
13	WASHER 12.5 × 27 × 4	1	30	washer 8.2 × 15 × 1.5	1
14	Coupler rear axle	1	31	Nut M8	1
15	Bolt M8 × 35	5			
16	Oil seal35 ×61 ×9.5(14)	1			
17	BEARING SEAT, REAR AXLE	1			

Disassembly of bearing

a :disassemble needle bearing 55BTM6720 as left illustration



b: when make needle bearing NA5903 replacement, rear bearing housing should be heated to 150 ę, then disassemble it as left illustration.



6. 6. 7 Rear axle inspection after disassembly

● Check if there is crack or damage in rear gear case or right cover, and check if mounting hole is ok. If necessary, replace it.

●Check if bearing clearance is ok or rotating smoothly, or rollway, steel ball, needle bearing or bracket is ok. If necessary, replace bearing. (Special tools are required)

●Check worn status of drive bevel gear and driven bevel gear of rear axle. If necessary, replace it.

● Check if oil seal lips shape or O-ring seal is ok. If necessary, replace it.

●Check if cylinder surface of rear axle and oil seal lips is ok. If necessary, replace it.

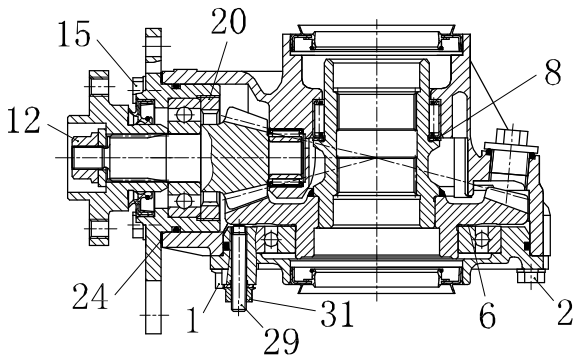
● Check if inner and outer spline of rear axle is ok. If necessary, replace it.

● Check if other parts of rear axle is ok. If necessary, replace it.

6.6.8 Rear axle assembly and adjustment

● Assemble rear axle as left illustration

Tightening Torque	
Item “1”	40N·m
Item “2”	25N·m
Item “12”	70N·m
Item “15”	25N·m
Item “20”	70N·m
Item “31”	16N·m
Injection oil bolt	25N·m
Draining oil bolt	25N·m



Apply thread locker on Item “29” for assembly

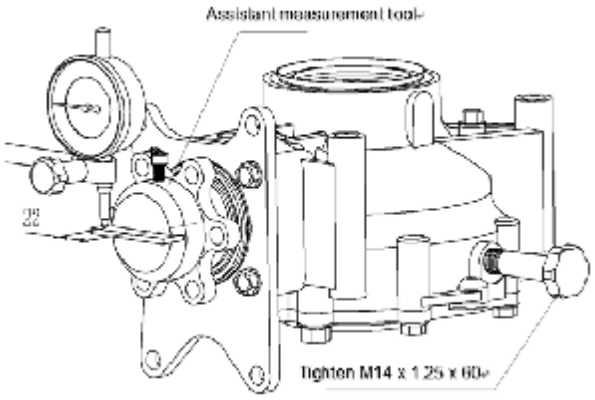
● Adjust locating distance and gear clearance of rear axle bevel gear

a: By choosing shim “24” thickness to adjust locating distance

b: By choosing shim “6” thickness to adjust gear clearance c: By coating color to check contact surface of bevel gear and check locating distance d: The clearance measurement of bevel gear as illustration: install assistant measurement tool, tighten fixing bolt (M14×1.25×60), set up dial indicator, and ensure 22mm distance between measuring point and the center of assistant measurement tools. And rotate assistant measurement tool forward and reverse and read the data

standards：0.1～0.2

e: By choosing shim”8”thickness to ensure installing point bearing clearance 0.1 ~ 0.2.

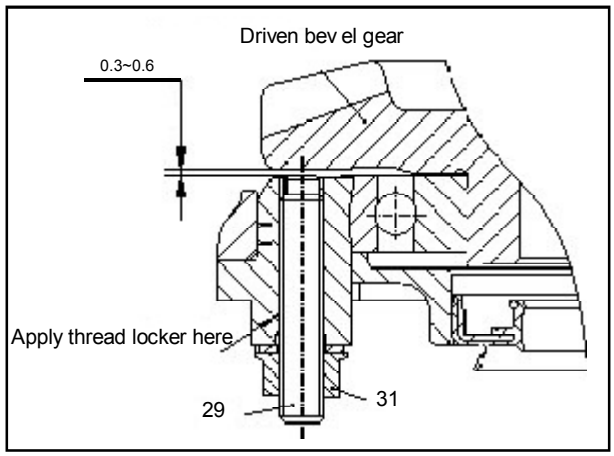


Shim “6” thickness	0.2 0.3 0.4

Shim “8” thickness	1.0 1.2 1.4 1.6 1.8

Shim “24” thickness	0.4 0.5 0.6

f: Adjust Item “29” as illustration, and make sure 0.3 ~ 0.6 clearance between its end and back, tighten item “31”



6.7 Drive Shaft

6.7.1 Inspection Information of CV shaft and front & rear drive shaft Inspection and maintenance

Inspection and maintenance is required if any of bellowing problems happened on front and rear drive shaft and CV shaft.

Problem description	Failure cause
①a pronounced hesitation or jerky movement during acceleration deceleration or sutained speed ②abnormal noise in front and rear drive shaft or CV shaft ③shed oil from CV shaft joint ④no power transmitted from engine to front or rear wheel	A. CV shaft drop off from axle B. front shaft of CV shaft brake or universal joint damage C. seal enclosure of CV shaft brake D. cross type universal joint of front drive shaft brake E. rear drive shaft brake or spline damage F. Fixed bolt loose

note: Inspect failures according to problem description. If problem is not caused by engine or front and rear axle, remove and inspect shafts.

Obsernvation and Judgement

1. Investigate any unusual noise

a. Unstable noise or constant noise during acceleration or deceleration, and the noise does not relate to engine or front or rear axle Possible relates to the damage of universal joint Possible relates to the damage of wheel bearing

2. Check CV shaft and drive shaft seal enclosure. If damage, replace it.

3. Improper CV shaft assembly damage splines, and lead to no power be transited.

WARNING:

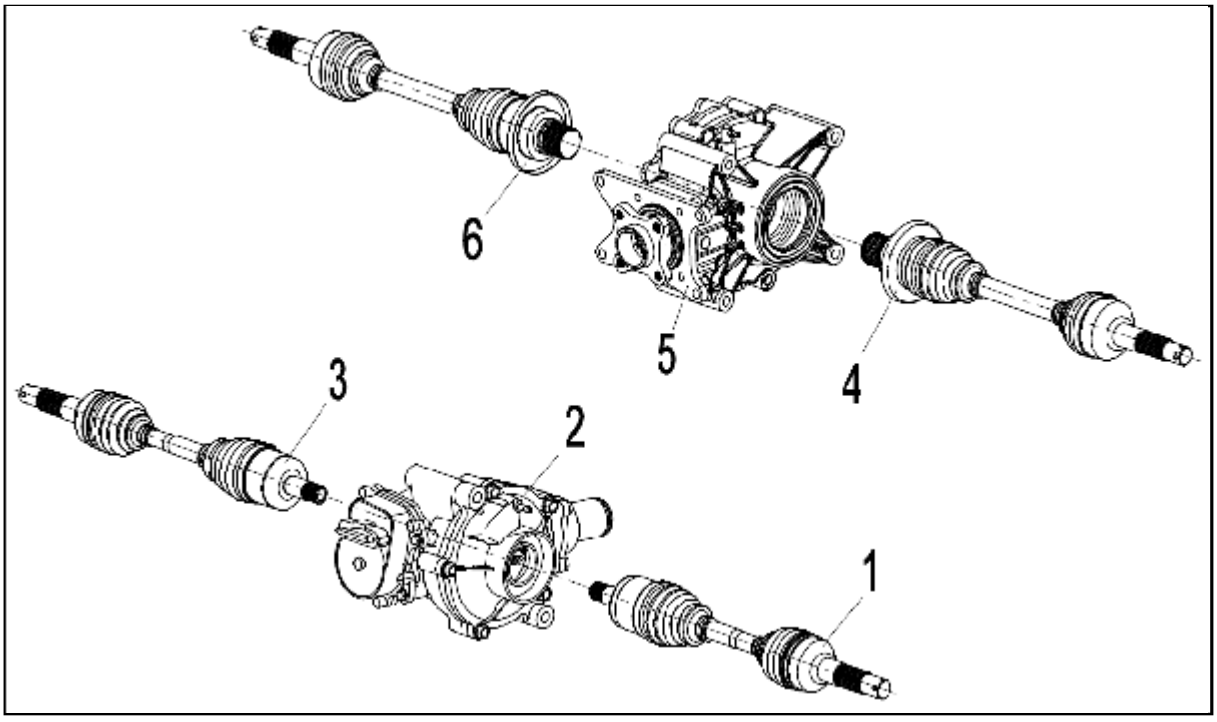
In case of above mentioned itmes, stop riding immediately for inspection and fix the problem before successive use.otherwise it will cause loss of control of the machine and possible injury to the rider.

6.7.2 CV shaft and front & rear drive shaft disassembly and assembly

Disassembly of front and rear CV shaft

Suspend vehicle and make sure it does not fall

Remove front and rear wheels and A-arms (refer to Chapter 6.2 and 6.4) Pull item 1, 3, 4, and 6 from front and rear axle at horizontal, never exert an excess force in order to avoid damaging limit circlip, rotate CV shaft try again if failed several times.

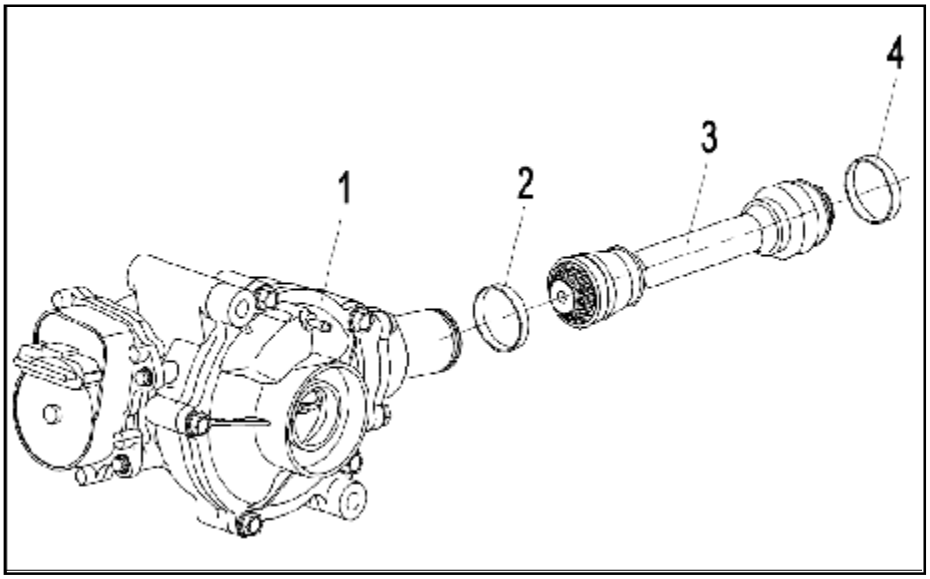


Disassembly of front drive shaft:

Suspend vehicle stable and make sure it does not fall

Remove front and rear wheels and A-arms (refer to Chapter 6.2 and 6.4) Use special tool or nipper pliers to remove 2 clamps (as illustration, item 2 and 4), and remove front axle (refer to Chapter 6.6.2), and then remove front drive shaft (as illustration, item 3)

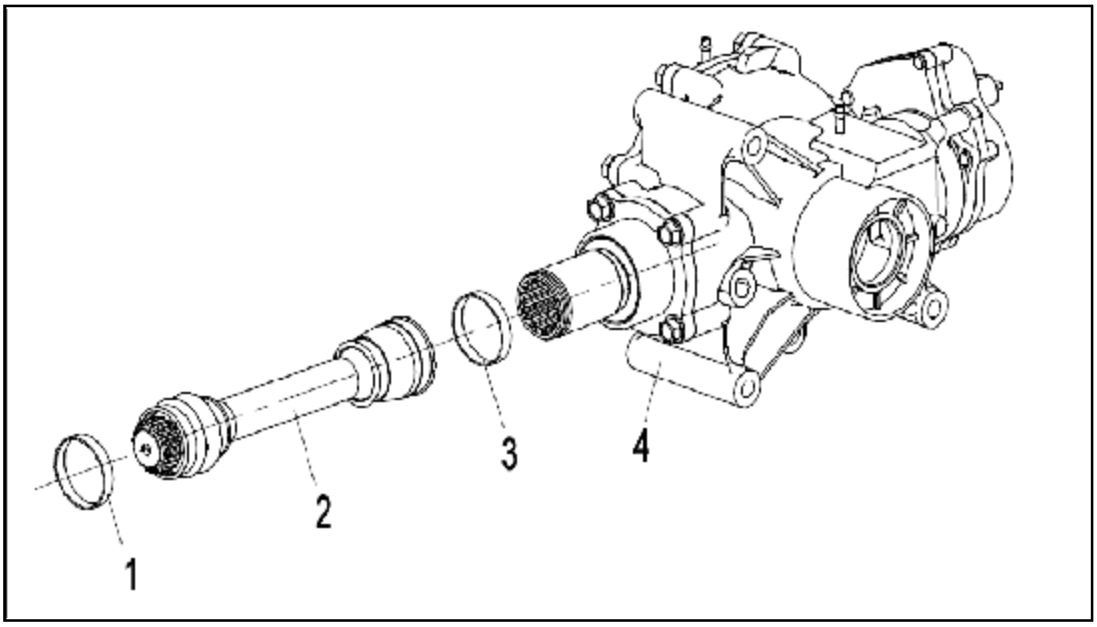
Note: apply 15g grease or other lubricate oil to the joints of spline ends



Disassembly of rear drive shaft (with differential):

Suspend vehicle stable and make sure it does not fall

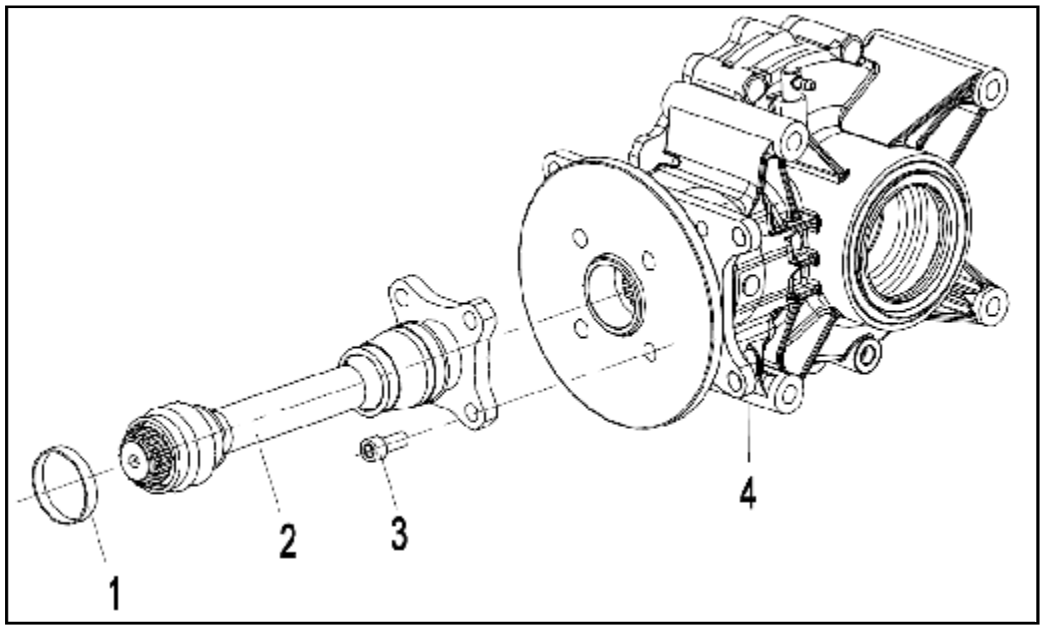
Remove front and rear wheels and A-arms (refer to Chapter 6.2 and 6.4) Use special tool or nipper pliers to remove 2 clamps (as illustration, item 1 and 3), and remove rear axle (refer to Chapter 6.6.2), and then remove rear drive shaft (as illustration, item 2) Note: apply 15g grease or other lubricate oil to the joints of spline ends



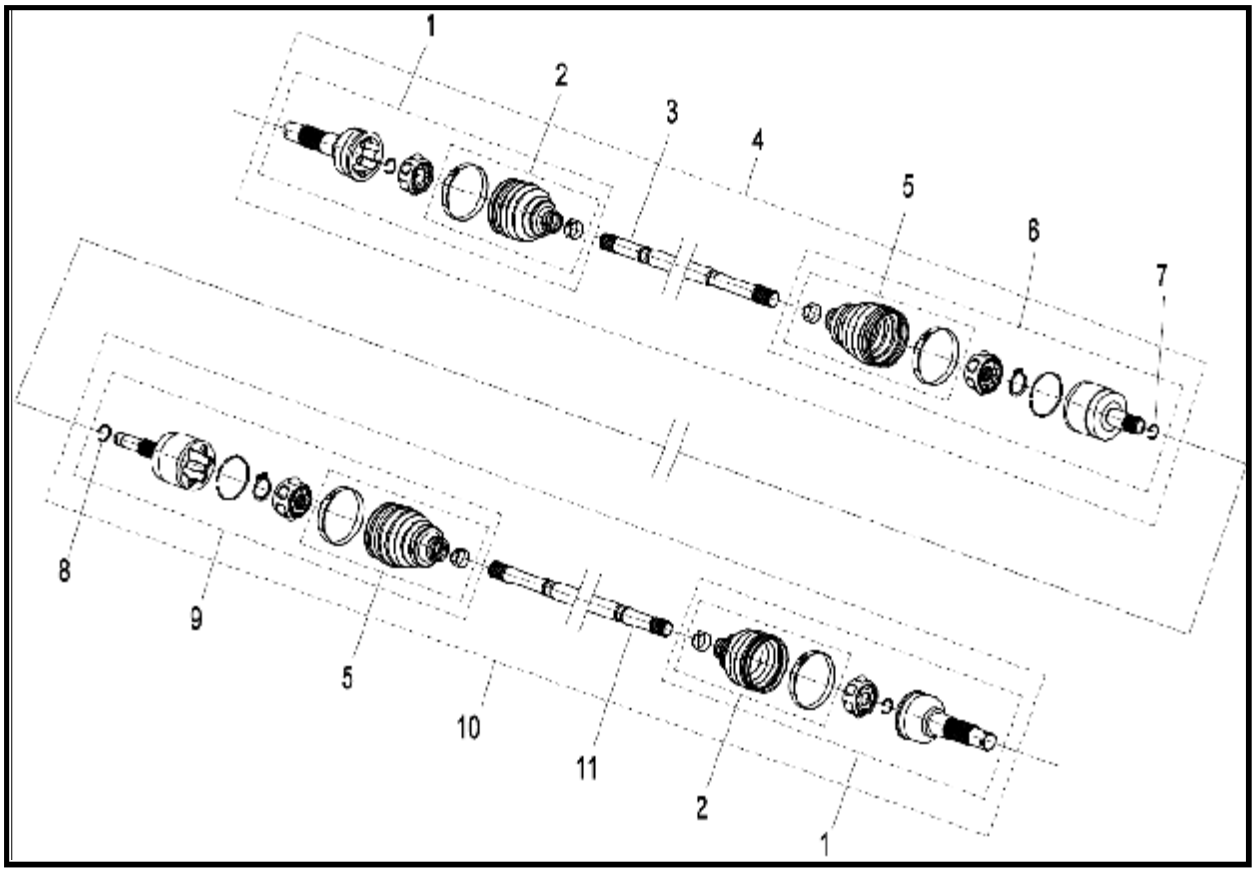
Disassembly of rear drive shaft (without differential):

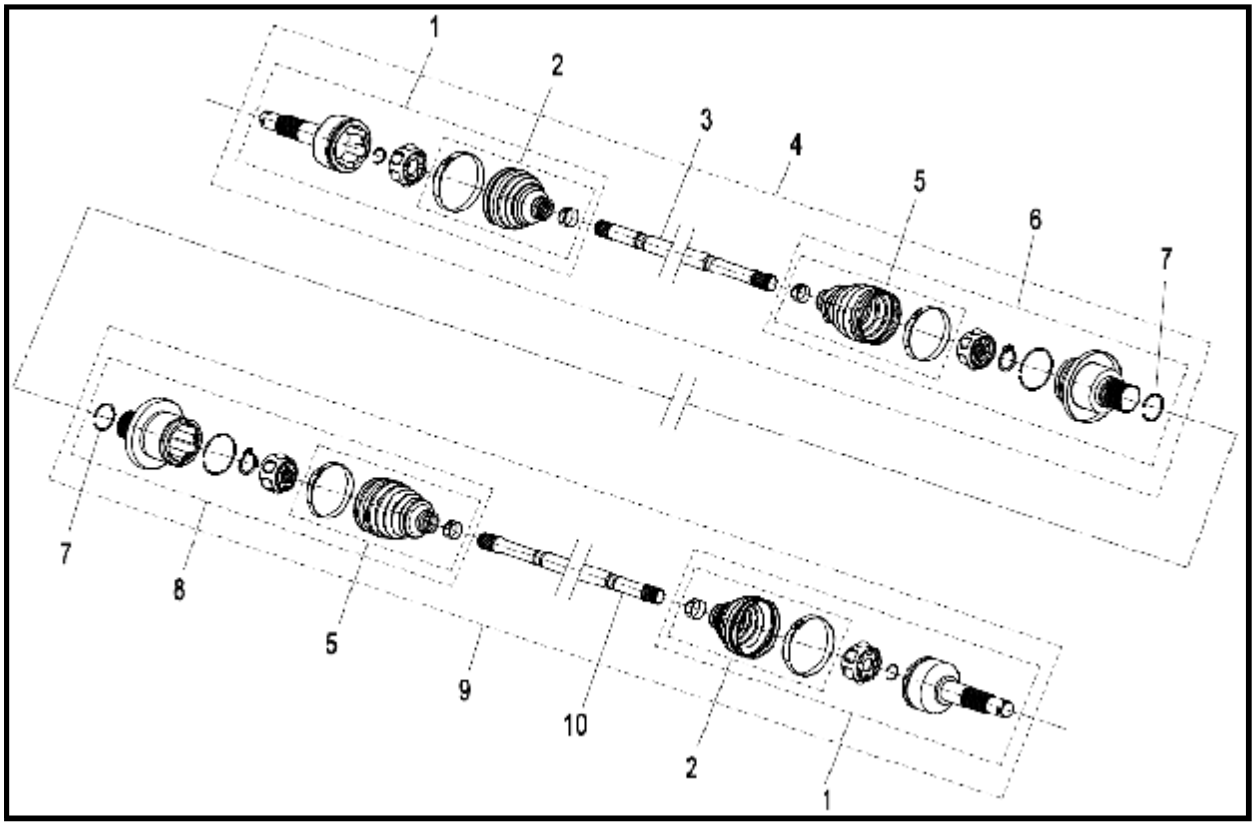
Use special tool or nipper pliers to remove 1 clamp (as illustration, item 1), and remove 4 bolts (as illustration, item 3), and then remove rear drive shaft (as illustration, item 2)

Note: apply 15g grease or other lubricate oil to the joints of spline ends



6.7.3 Front and Rear CV shafts exploded view





6.7.4 Inspection of front and rear CV shafts

● Universal joint of shafts should move smoothly. If not or with abnormal noise, replace it

● Check clearance of universal joint and middle shaft’s spline, if over 1° 30’，replace it

● Check seal enclosure of shaft ends, if broken or leakage, replace it.

● Check limit circlip and spline surface of shaft, if abnormal wore or damage, replace it.

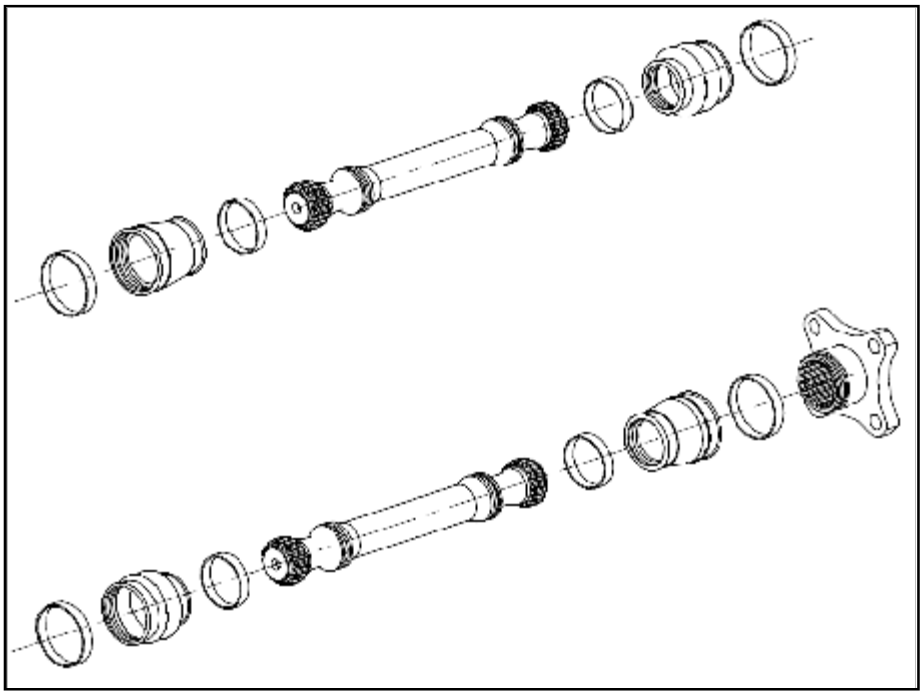
●Check shaft cage inner frame, star cage, steel ball, steel ball track and middle shaft spline, if broken, replace it

● Check other parts of shaft, if necessary, replace it.

note:

Shaft cage universal joint with MoS2 lithium grease, fill 28g ± 5g grease in fixed end cage universal joint, 32g ± 5g grease in fixed end seal enclosure, 70g ± 10g grease in axial movement cage universal joint.

6.7.5 front drive shaft inspection



● Check rear drive shaft ends sale enclosures, if broken, replace it.

● Check shaft ends surface splines, if abnormal more or damage, replace it.

Note: apply 15g grease or other lubricate oil to end spline joints.

7 Signal and lighting system

Overhaul Information

Operation instructions

warning:

• Headlight bulb will be very hot when it is turned on. Do not touch it after it is just turned off. Operation should be done when the bulb is cooled down.

• Inspection of water temperature alarm may use heat source and liquid of high temperature. Do not put flammable matters nearby and take care not to get burnt.

• The temperature of headlight is quite high when turned on. Replacing with bare hand or stained glove willcause oil stains on the glass face which may form hot spot and cause deformation of glass face and damage to bulb.

• Pay attention to the following when replacing the bulb.

Do not replace the bulb when it is turned on. Keep ignition switch in the OFF position, and replace after the bulb is cooled down.

-Replace the bulb with hands in clean gloves to avoid oil stains on the glass surface.

-Clean the glass with a clean rag dipped in alcohol or isoamyl acetate in case of any oil stains on the glass surface.

• If the Inspection has to be done with battery, check if the battery is normal.

• 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 (Chapter1) .

• Refer to Chapter 2 for removal and installation of taillight and rear turning lights.

Check standard

item		standard
fuse	main	2
	Sub-fuse	30A×1 15A×4 5A×1
Light,bulb	headlight（Hi / Lo）	12V-60/60W
	Brake light / taillight	14-LED×2 14-LED×2
	Turning light	12-LED×2 8-LED×2
	Da shboard indicator	12V-1.7W
	I ndicators	12V-3.4W

7.1 TROUBLESHOOTING

Headlight Cannot Turn On

- Broken fuse
- Open circuit of main cable
- Burnt Bulb
- Faulty Switch
- Damaged relay or poor contact

7.2 Replacing Bulb

Headlight Bulb

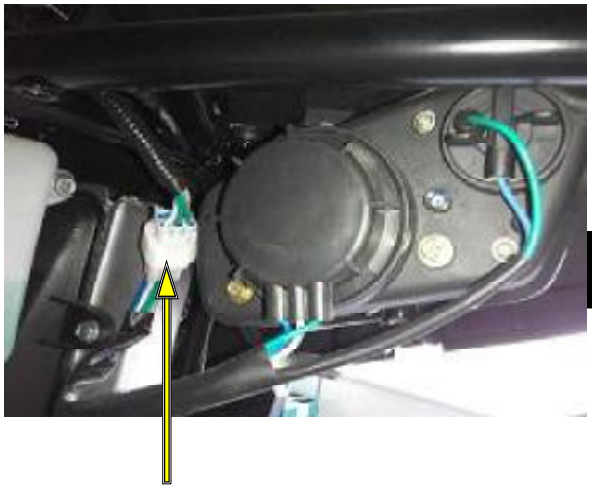
Cautions

Headlight bulb will be very hot when it is turned on.

Do not touch it after it is just turned off.

Operation should be done when the bulb is cooled down.

Remove headlight.



Connect comp, headlight

Disconnect headlight.

Remove dust-proof cap, headlight connector, circlip and replace with a new bulb.

Warning

Wear clean gloves when replacing bulb. Oil stains on the glass surface may cause break of bulb. Clean the stained surface with alcohol or isoamyl acetate.

Make sure that the three pins of the bulb should be in line with the three positioning holes in the socket when replacing the bulb.

Bulb specification：HS1 12V-35/35W

Reverse the removal procedure for installation

After replacing the bulb, adjust headlight beam.

7.3 Inspection of Headlight

Turn the ignition switch to ON position, turn light switch to the illuminating position and check if the headlight is on

— ON: Normal.

— off：

• Short circuit of main cable or broken main cable

• Broken fuse

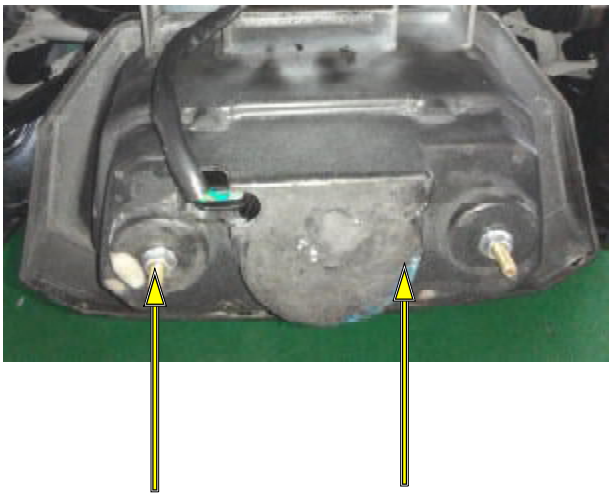
• Faulty Switch

Brake Light/Tail Light Bulb

Remove 2 tapping screws Remove tail light cover. Turn brake light/tail light bulb counter clockwise and remove it. Replace brake light/tail light bulb Bulb Specification: 12V-21/5W.

Tail light

Reverse the removal procedure for installation.



Tapping screws Tail light cover

Front Turning Indicator Bulbs

Remove headlight Remove cover of front turning light Replace front turning light bulbs Bulb Specification:12V-10W

Reverse the removal procedure for installation, Refer to the dismounting of Headlight.

Screw

Rear Turning Indicator Bulbs

Remove screw1

Remove rear turning indicator cover. Replace rear turning indicator bulbs. Bulb Specification:12V-10W.

Reverse the removal procedure for installation.

Rear turning light

Screw (3)

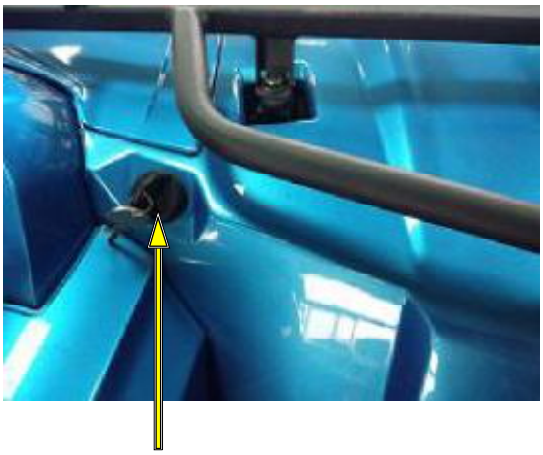
Rear turning light cover

7.4 Ignition Switch

Inspection

Remove front top cover

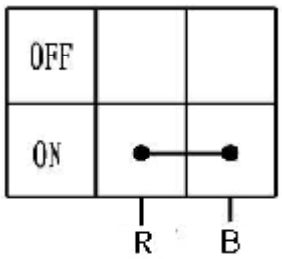
Disconnect 3P connector of ignition switch.



Ignition Switch Lock

Check according to the following table if the connector terminals are in continuity.

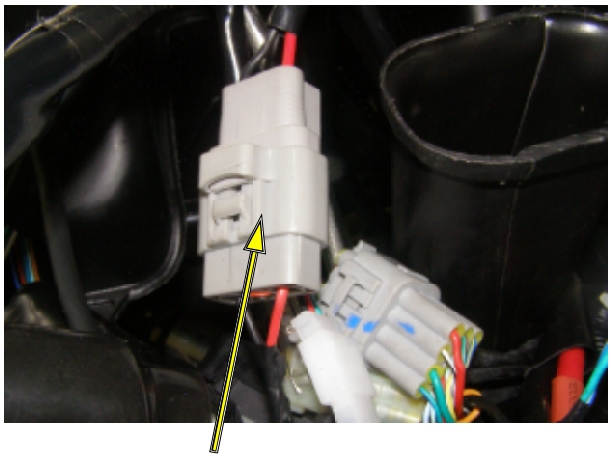
● - ● in continuity



Disassemble:

Remove front cover

Disconnect 3P connector of ignition switch Loosen bolt and remove ignition switch



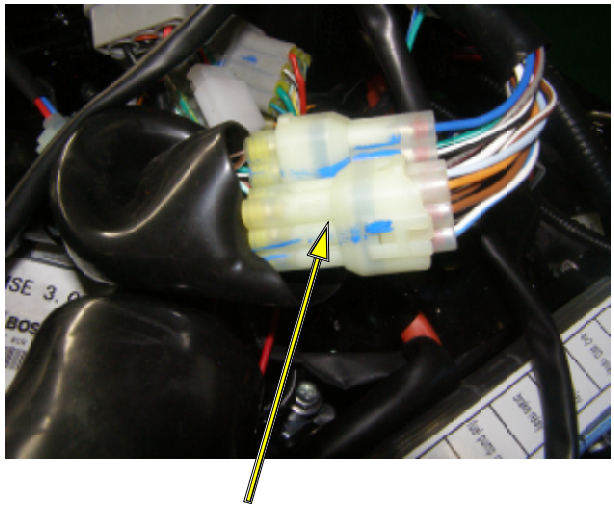
Ignition switch connector

Reverse the removal procedure for installation

7.5 Handlebar switch

Remove front cover, Disconnect left and right handlebar switch connector. Check according to the following table if the connector terminals are in continuity.

—● continuity

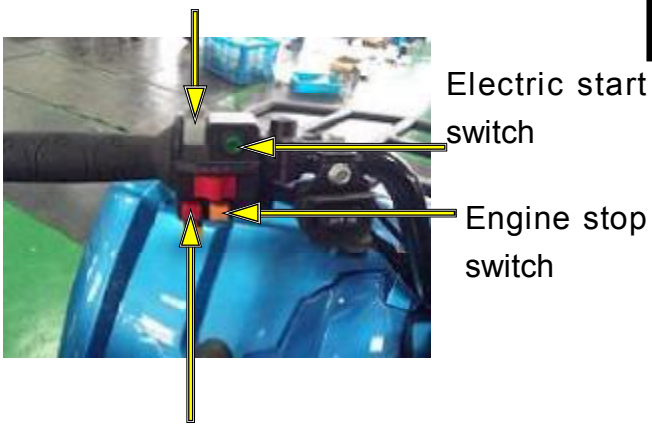


Ignition switch connector

Lighting Switch

	black /palm	palm	palm /white	blue	white /blue	white
≡D	●	●	●	●	●	
≡D	●	●	●		●	●
OFF						

Lighting Switch



Electric start switch

Engine stop switch

Engine stop switch

Electric start switch

	black /white	black /palm	yellow
	●	●	●

	yellow	gray /red
	●	●

Emergency switch

Emergency switch

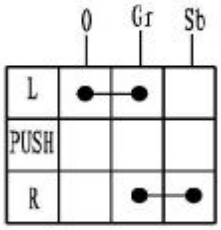
	orange	gray	Sky blue
△ press down	●	●	●
△ upspring			

Over-ride switch

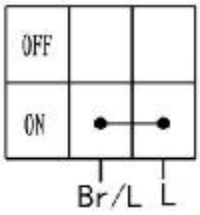
Over-ride Switch

	gray /black	black /palm
⚠	●	●

Turn switch



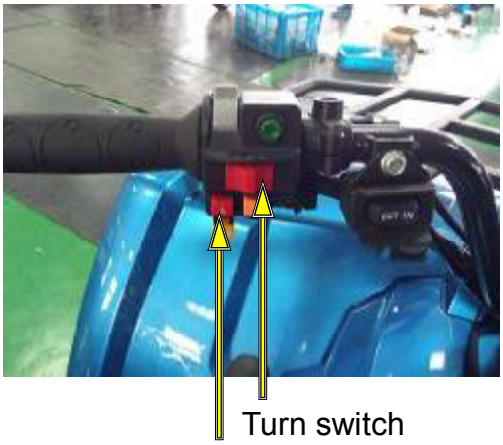
Horn switch wiring diagram



2 wd、4wd、4wd lock switch

	Br/R	L/G	L/B	Br/G	Gr/W	L/G	Br/R	Br/G	Lg/Br	G
2WD	●	●			●	●				
4WD			●	●	●	●				
LOCK			●	●			●	●	●	●

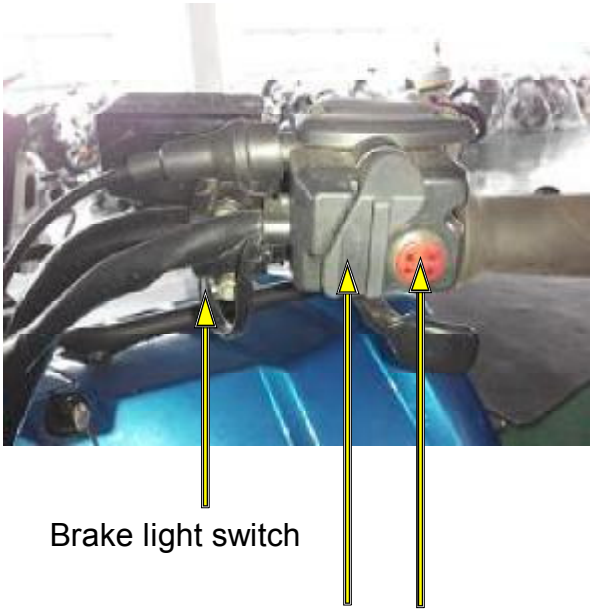
If something wrong, please replace handlebar switch.



7. 6 Brake Light Switch

Disconnect brake light switch connector and check terminators for continuity. Hold the brake lever —— Continuity Release the brake lever —— No continuity

No continuity: Replace brake light switch.



7. 7 Horn

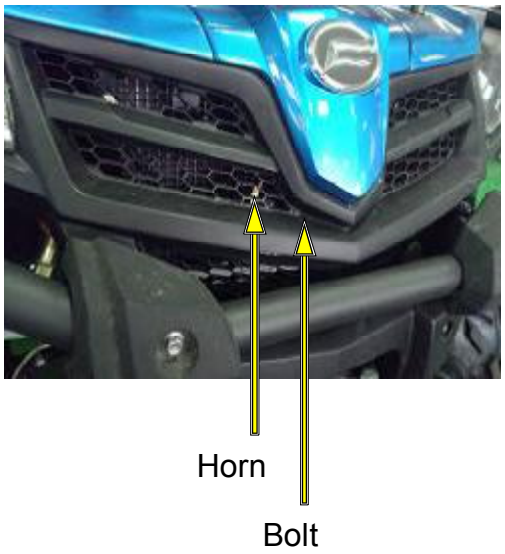
Inspection:

Remove front vent grille

Disconnect horn

Connect with a fully charged 12V battery and check if the horn sounds.

Faulty Horn: Replace



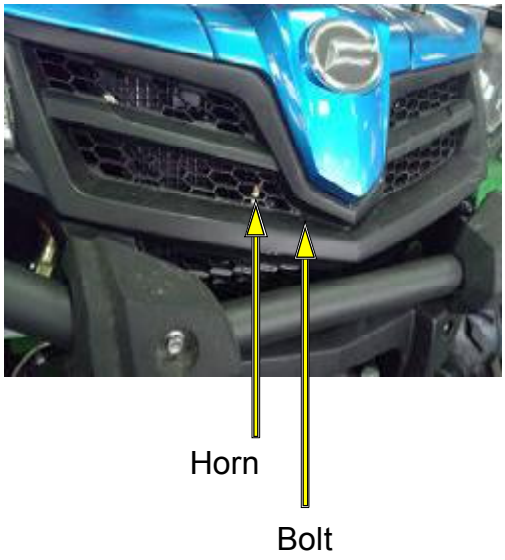
Disassemble

Disconnect horn connector

Remove bolt

Remove horn

Reverse the removal procedure for installation.



7.8 Dashboard

Run the vehicle at low speed and check if the speed indicator moves Faulty speedometer: Replace

Removal and Installation

Remove front top cover

Remove front cover of dashboard

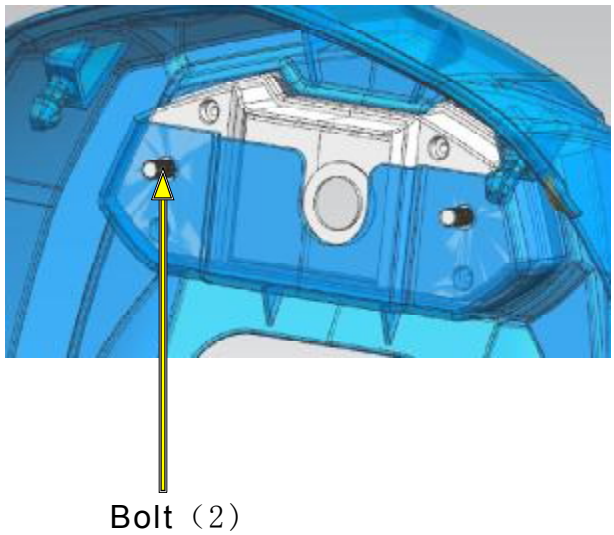
Disconnect dashboard wire connector

Remove fixing nut and remove dashboard in the direction as illustrated on the right.

Reverse the removal procedure for installation.

Note:

Main cables and wires shall be routed properly.



7.9 Fuel Sensor

Remove

Fuel tank top cover with key: 4 fixing bolts

Fuel sensor Disconnect 2P connector

Inspection

Remove fuel sensor.（refer to above steps）Connect 2P connector Turn ignition switch to ON.

Shake fuel sensor float with hand, locate the float position and check if it conforms to the fuel gauge reading.

Non-conformity:

-check main cable for damage or short circuit.

Check fuel sensor and fuel gauge

Remove fuel sensor 2P connector.

Connect multimeter between 3P connector terminals.

Shake float with hand and measure the resistance of float at different positions.

Connection Terminal：

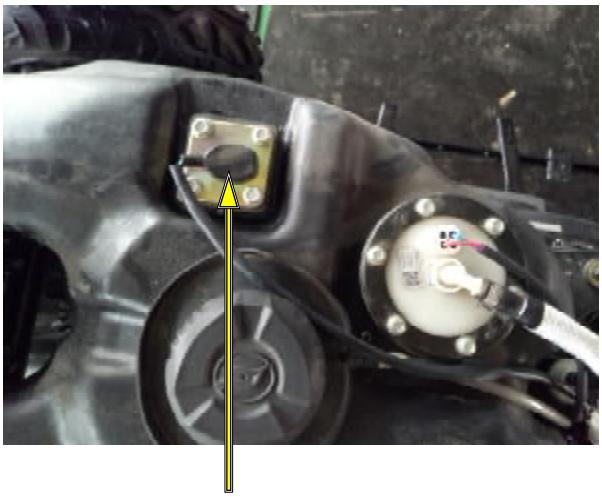
Upper: Blue/White-Green：

4 Ω～10 Ω（20 ℃）

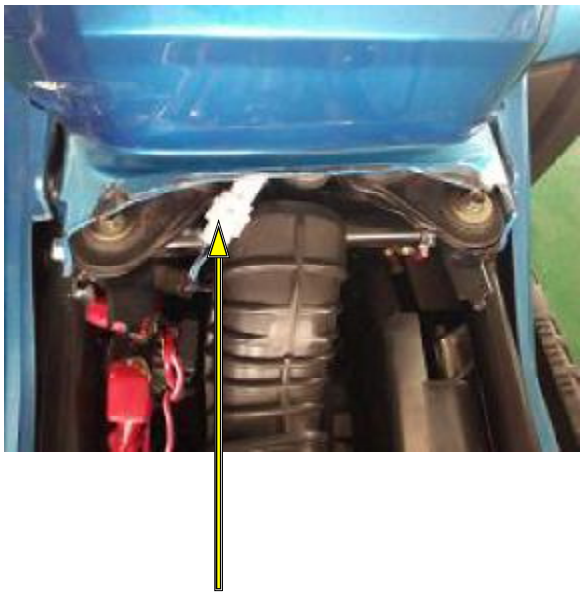
Lower: Blue /White-Green：

90 Ω～100 Ω（20 ℃）

Faulty fuel sensor:Replace.

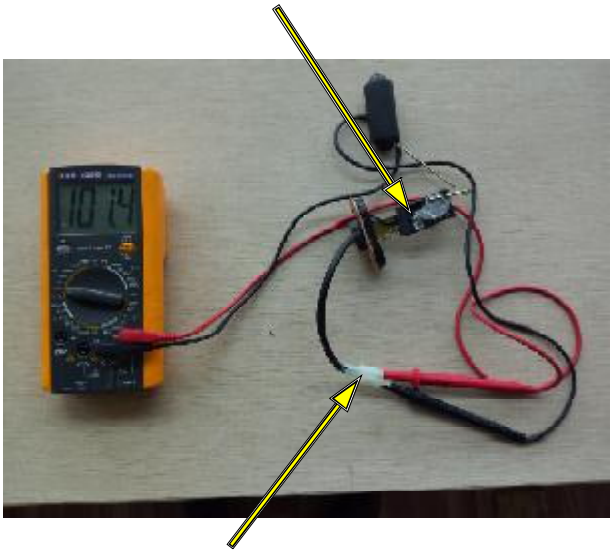


Fuel Sensor



Fuel Sensor connector

Fuel Sensor



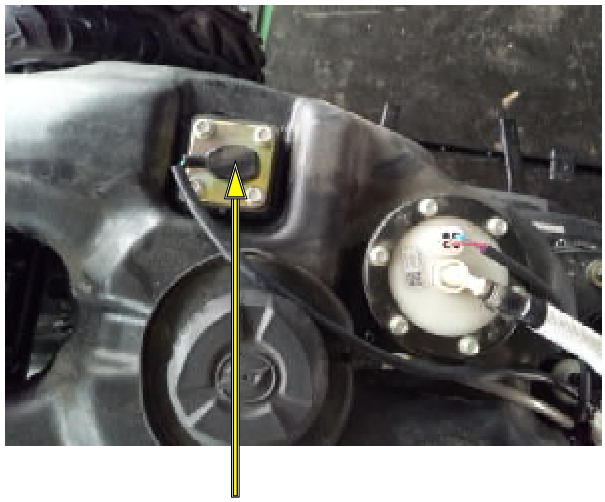
Fuel Sensor 2P connector

Installation

Put fuel sensor into installation hole of fuel tank,

Fuel sensor should be fitted properly,No fuel leakage is allowed.

Connect fuel sensor 2p connector.



Fuel Sensor connector

Inspection of Fuel Gauge

Switch on power supply and check if fuel level gauge functions normally.

If fuel gauge works normally,Reverse the removal procedure for installation of plastic parts and seat.

WIRING DIAGRAM

Electrical schematic diagram

code	R	W	B	G	Br	P	L	Y	Gr	Lr	O	Lg	Sb
color	red	wite	blak	green	brown	purple	blue	yellow	grey	light pink	orange	light green	light blue