



450CL-C

Service Manual

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450CL-C: CF400-10

This Service Manual is designed primarily for use by experienced technicians in a properly equipped shop and is intended primarily for reference. All references to left and right are from the operator's perspective when seated in a normal riding position.

Certain procedures outlined in this manual require a sound knowledge of mechanical or electrical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and understand the procedure before starting any repair. Certain procedures require the use of special tools. Use only the proper tools as specified. If you have any doubt as to your ability to perform any of the procedures outlined in this Service Manual, contact an authorized dealer for service.

The information printed within includes the latest product information at the time of print, and may contain product information that does not apply to your particular market. Due to constant improvements in the design and quality of production components, minor discrepancies may result between the actual vehicle and the information presented in this publication. No liability can be accepted for omissions or inaccuracies. Any reprinting or reuse of the depictions and/or procedures contained within, whether whole or in part, is expressly prohibited.

INTRODUCTION

This manual introduces CF400-10 maintenance information, including disassembly procedure checking & adjustment methods, troubleshooting and technical specifications. There are some illustrations, drawing to guide your operation.

The first three chapters mainly introduce general operation information, special tool, vehicle structure, basic specification, inspection & maintenance methods etc.,

The rest chapters introduce vehicle part removal, installation, adjustment, service, fault diagnosis and etc.,

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This manual has been improved by using many ways to make it accuracy. But we are no response for any difference and missing. CFMOTO reserves right to make improvements and modifications to the products without prior notice. Overhaul and maintenance should be done according to actual condition of vehicle. And CFMOTO is not responsible for production improvements and modifications. This manual is only for reference. If any objections, please ask the nearest dealer to get the latest information.

The information in this manual are the latest depends on latest productions on coming out. The images in this manual may not stand for real model assembly and parts.

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Conversion Table

A	Ampere	lb	Pound
ABDC	After bottom dead center	m	Meter
AC	Alternating current	min	Minute
ATDC	After top dead center	N	Newton
BBDC	Before bottom dead center	Pa	Pascal
BDC	Bottom dead center	PS	Metric horse power
BTDC	Before top dead center	Psi	Pound/Square Inch
°C	Centigrade	r	Revolutions
DC	Direct current	rpm	Revolutions per minute
F	Farad	TDC	Top dead center
°F	Fahrenheit	TIR	Total indicator reading
ft	Feet	V	Volt
g	Gram	W	Watt
h	Hour	Ω	Ohm
L	Litre	in	Inch
US gal	Gallon(US)	US qt	Quart(US)
oz	Ounce	HP	British horsepower
cm Hg	Centimeter of mercury	pint	Pint
cu in	Cubic inch	mL	Milliliter

Forward

This service manual is not only specially designed for professional machinist, but also it is used to instruct the vehicle's user how to do maintenance work. It is necessary to know mechanical knowledge, tools proper usage and have a well understanding of service procedure conversion before you perfectly solve all service problems. If no, you should get the service support by professional machinist. Please read this service manual and understand it before operation for high efficiency work. Work in clean area for vehicle mechanical performance and safety works. No tools replaced or use temporary tools since that we have been appointed the special service tools and equipments. All service and scheduled maintenance should be executed base on the instructions of service manual. Any consequences are responsible by the vehicle's owner resulted from any rule-breaking operations.

How to get Long Service Life:

- Follow scheduled maintenance and service operations based on service manual.
- Non-periodical maintenance in special situations.
- Use tools properly and use CFMOTO genuine parts.
- Special tools, dashboard and tester have been listed into this service manual for necessary genuine parts.
- Strictly operate based on the correct service procedures.
- Keep fully service records and specify the date of new parts replacement.

How to use this manual:

In this manual, the production will be separated as several systems. All the systems are shows up in the contents. That will help you to lock the chapter. And each chapter has its own contents. For example, if you want to find ignition coil information, lock the electrical system chapter by using the contents, and then find the ignition coil in electrical system chapter.

Whenever you see the warning or warning symbol, you must keep attention and comply with the safety operation and maintenance method.

 **DANGER:** This symbol means it will cause serious injuries even death if you don't follow the procedure.

 **WARNING:** This symbol means the special steps. It may cause the vehicle damage if you don't follow the procedure.

 **CAUTION:** This symbol means the special steps to prevent from parts damage.

NOTE: It makes operation process easier or offers clearer information. It has no symbol.

NOTE:

The vehicle removal procedures are not included electrical parts, police implements and engine. Electrical parts and engine are shown in the separate chapters.

All connectors are unplugged by default during removal.

The guide line without serial number in the picture indicates the direction of removal.

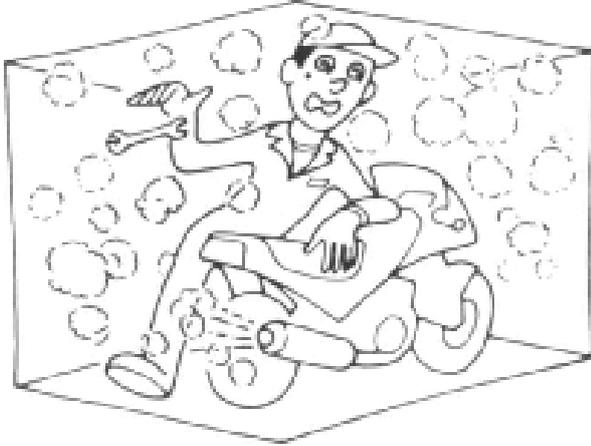
1 General Information

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1.1 Operation Cautions

⚠ DANGER: Exhaust contains toxic ingredients. Do not run the engine in an enclosed or poor ventilated place for a long time.



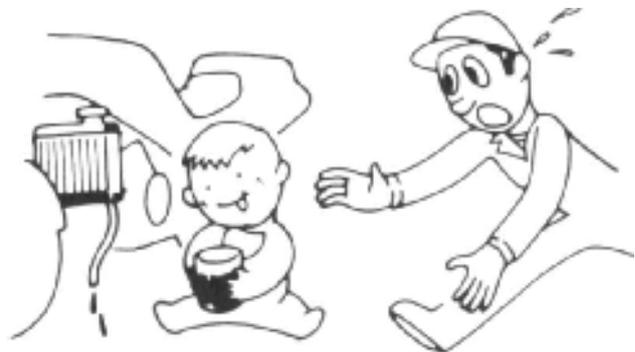
⚠ WARNING: Don't touch the engine or muffler with bare hands when the engine has just stopped to avoid hurt. Wear long-sleeve work clothes.



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



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



1 General Information

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



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



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



⚠️ WARNING: The operators shall remind each other from time to time for safety purpose during operation.

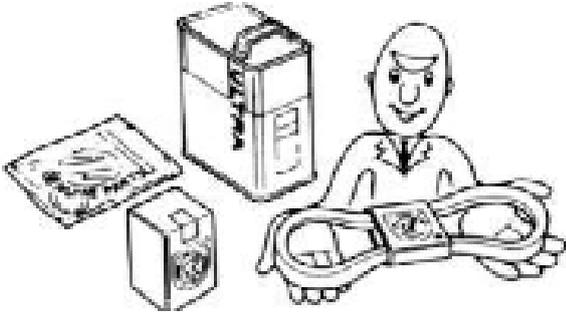


⚠️ Be careful to get clamped by the turning parts like wheels and clutch.



1.2 Disassembly and Assembly Cautions

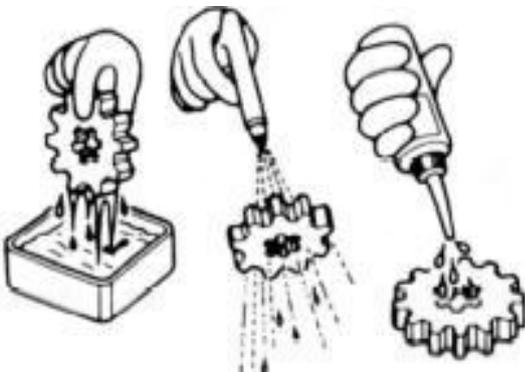
■ Use CFMOTO genuine or recommended parts, lubricants and grease.



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



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



■ Clean the mud, dust before overhauling.



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

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

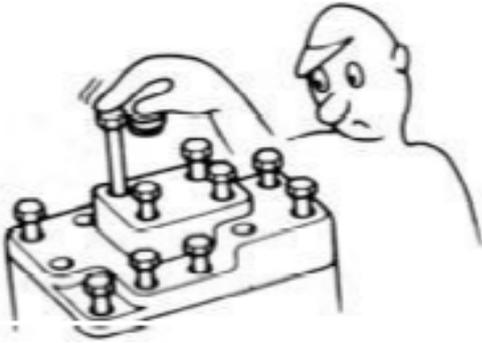


■ Measure the data during disassembly for correct assembly.

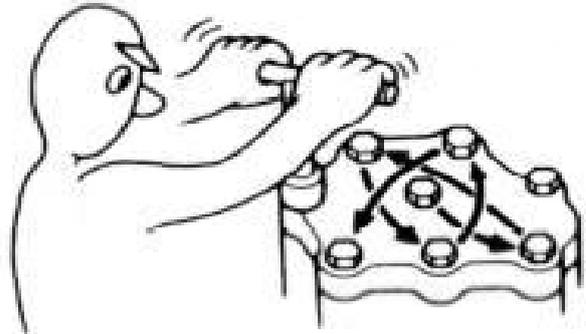


1 General Information

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



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



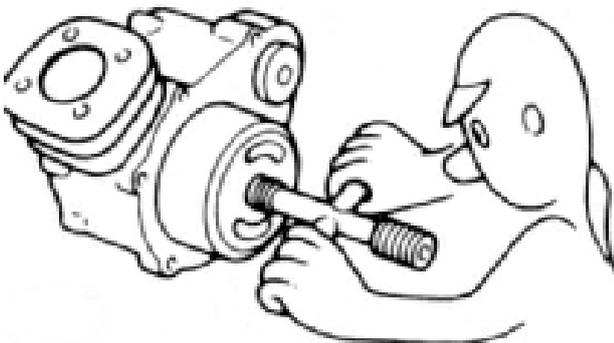
■ Check if the disassembled rubber parts are aged and replace it if necessary. Keep the rubber parts away from grease.



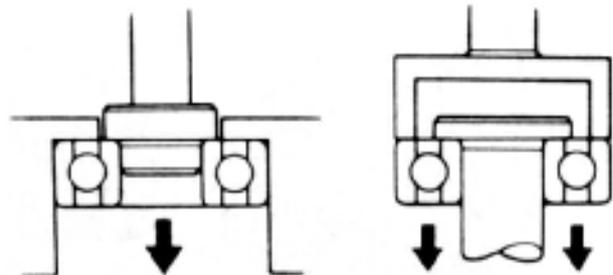
■ Apply or inject recommended lubricant to the specified parts.



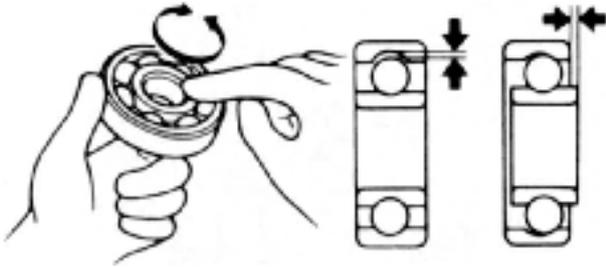
■ Use special tools wherever necessary.



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



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



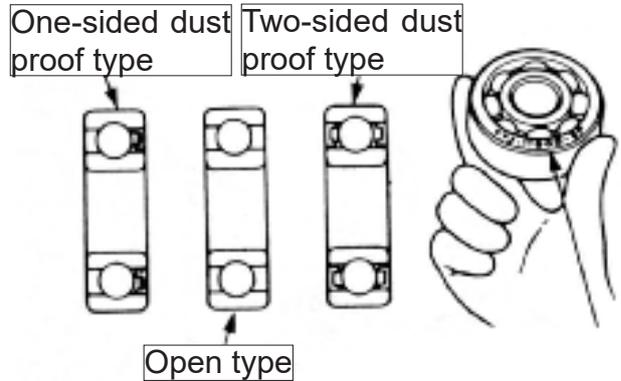
■ Keep the bearing block still when blowing dry the bearing after washing clean. Apply oil or lubricant before assembling.



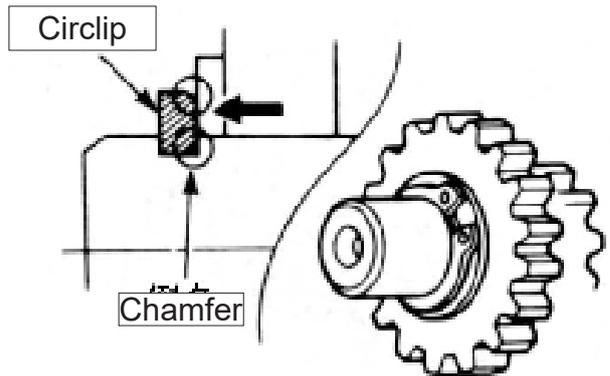
■ After assembling, check if all the tightened parts are properly tightened and can move smoothly.



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



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

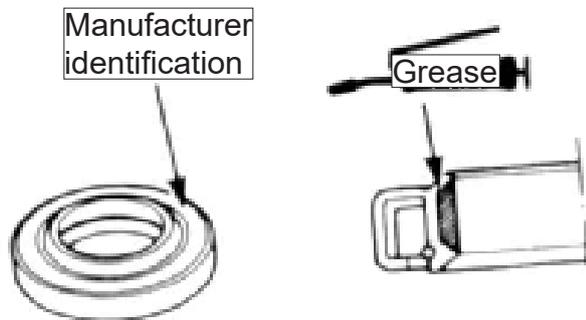


■ Brake fluid and coolant may damage coating, plastic and rubber parts. Flush these parts with water if splashed.

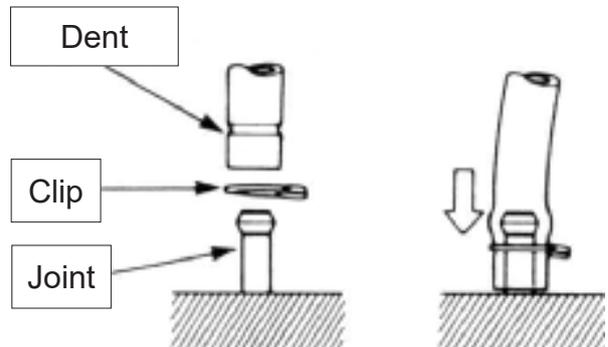


1 General Information

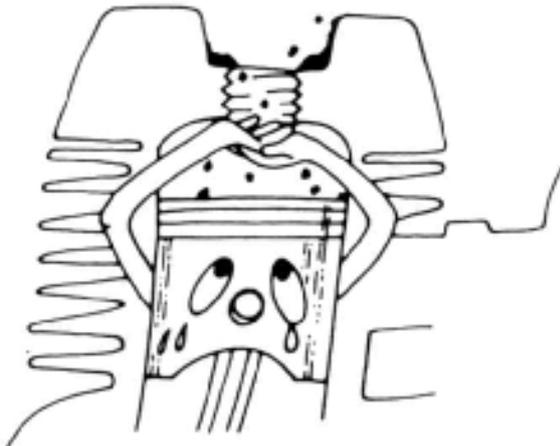
■ Install oil seal with the side of manufacturer's mark outward. Do not fold or scratch the oil seal lip. Apply grease to the oil seal lip before assembling.



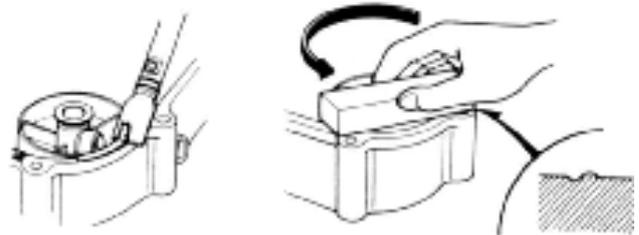
■ When installing pipes, insert the pipe till the end. Fit the pipe clip, if any, into the rove. Replace the pipes or hoses that cannot be tightened.



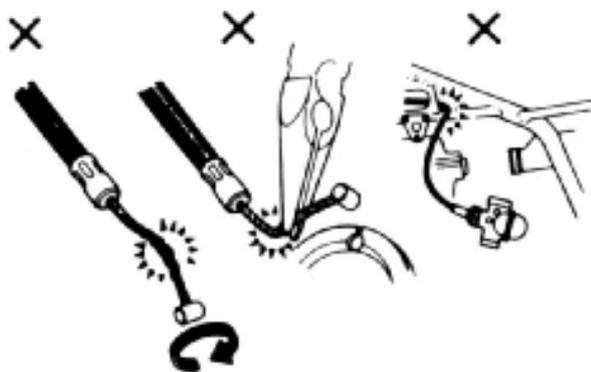
■ Do not mix mud or dust into engine or the hydraulic brake system.



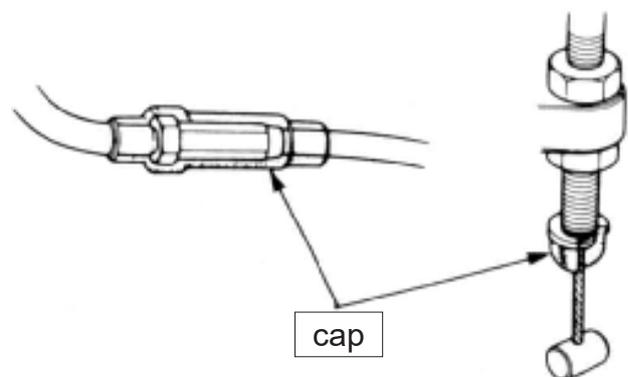
■ Clean the gaskets and washers of the engine cases before assembling. Remove the scratches on the contact surfaces by polishing evenly with an oil stone.



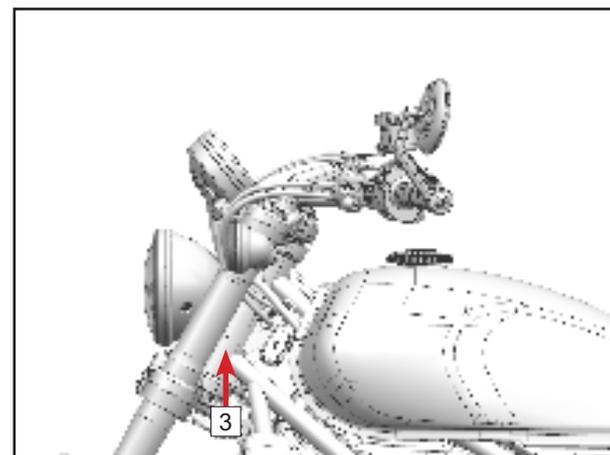
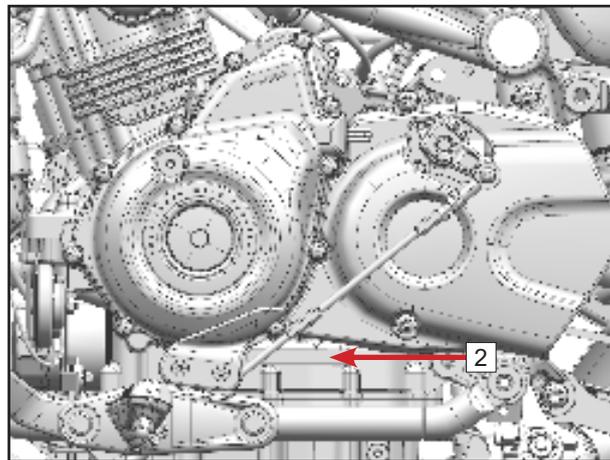
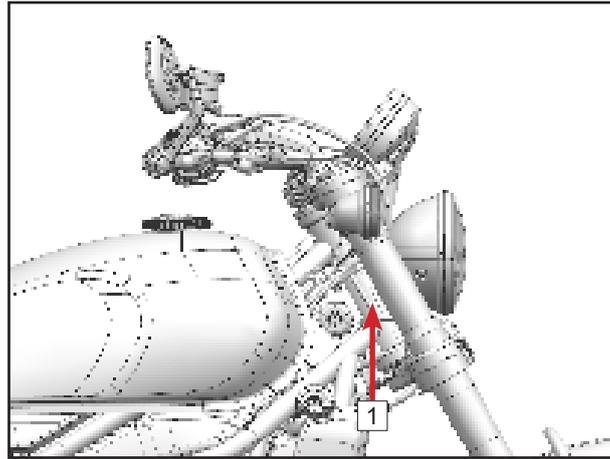
■ Do not twist or bend the cables too distorted or damaged cables may cause poor operation.



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



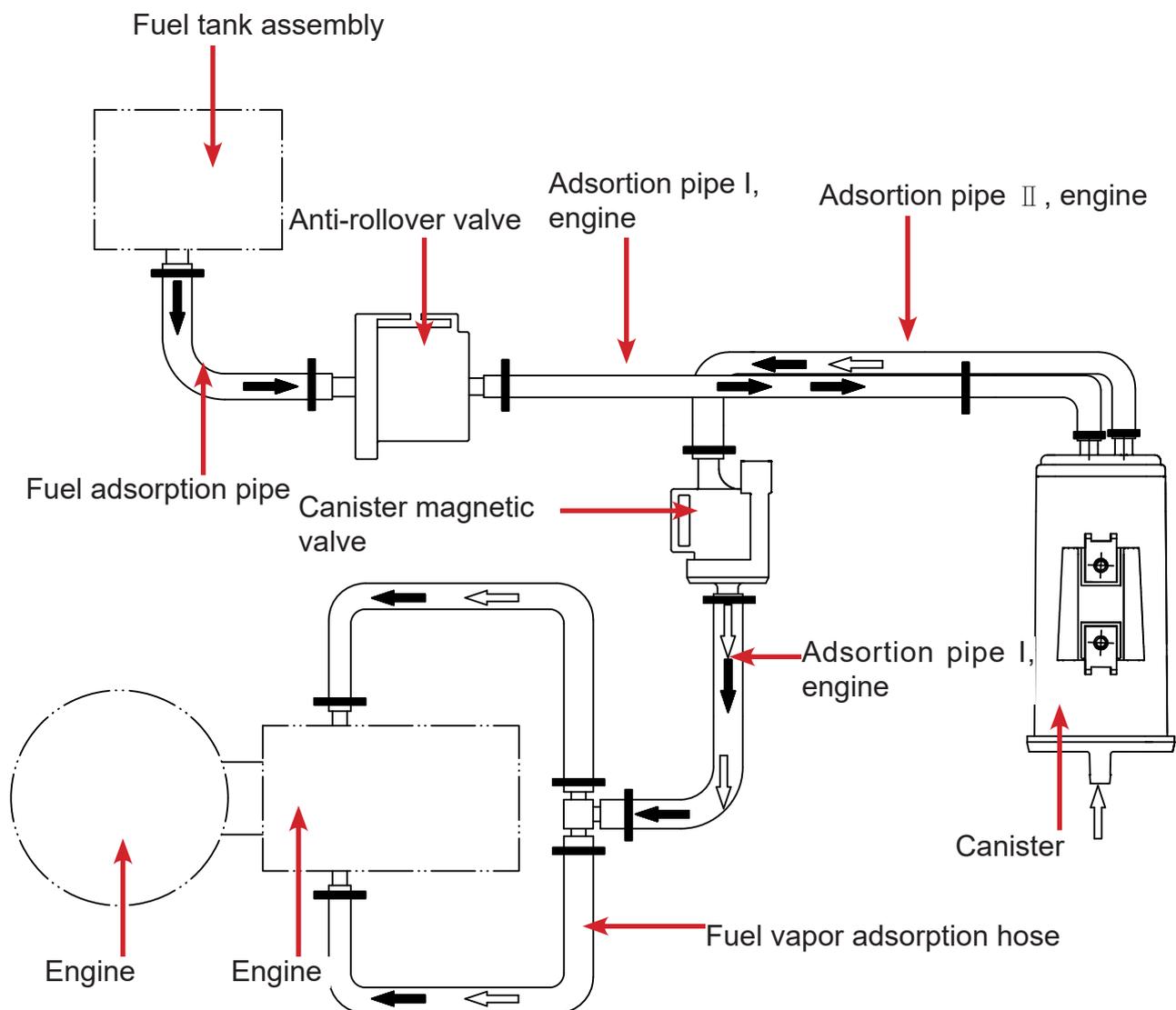
1.3 VIN and EIN Location



1	VIN	2	Engine Serial Number	3	Vehicle Plate
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1.4 Fuel Evaporation System Diagram

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



2 Maintenance Information

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⚠ Cautions:

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

2.1 Maintenance before Operation

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

2 Maintenance Information

2.2 Break-in Maintenance Schedule

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

2.3 Periodic Maintenance Schedule

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

2 Maintenance Information

Item	Periodic Maintenance Interval (Service whichever interval comes first)				
	Hour	Calendar	km	Remarks	
Suspension system					
■	Suspension system	-	-	5000	Inspect
■	Rear shock absorber and front forks	-	12M	10000	Inspect for leaking (maintain parts according to the requirement)
		-	24M	20000	
■	Swing arms	-	-	10000	Inspect
		-	-	30000	
Cooling system					
	Coolant level	-	12M	10000	Inspect
		-	24M	20000	
■	Coolant	-	12M	10000	
		-	24M	20000	
■	Radiator fan function	-	12M	10000	Inspect
		-	24M	20000	
■	Coolant hoses	-	12M	10000	
		-	48M	30000	
Frame system					
	Frame	-	-	30000	Inspect
Steering system					
■	Steering bearings	-	12M	10000	Inspect
		-	24M	20000	
Other parts					
■	Diagnosis connector	-	12M	10000	Read with DSCAN
		-	24M	20000	
▶ ■	Inspect drive belt, driven pulley, and engine output pulley for weariness	-	6M	5000	Inspect and replace if necessary.
		-	-	20000	Replace
■	Mobile parts	-	12M	10000	Lubricate; inspect for flexibility
		-	48M	30000	
■	Bolts and nuts	-	12M	10000	Inspect for fastness
		-	48M	30000	
■	Cables and wires	-	12M	5000	Inspect for damage, bending and routing
		-	24M	15000	
■	Pipes, ducts, hoses and sleeves	-	12M	10000	Inspect for cracks, sealing and routing
		-	48M	30000	

3 Technical Information

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3.1 General Specifications

Item		Specifications	
Model		450CL-C	
		CF400-10A	CF400-10
Length		2205 mm	2205 mm
Width		815 mm	805 mm
Height		1130 mm	1110 mm
Wheel base		1485 mm	
Engine type		272MQ-D	
Displacement		449 mL	
Fuel grade		RQ-95 or above	
Gross weight		177 kg	181 kg
Passengers		1 person (including the driver)	2 people (including the driver)
Load		90 kg	150 kg
Tire	Front	130/90 R16	
	Rear	150/80 R16	
Min. ground clearance		160 mm	
Turning circle diameter		5600 mm	
Steering	Steering angle	Right: 32.5°	
		Left: 32.5°	
Brake system		Front: Hydraulic Disc	
		Rear: Hydraulic Disc	
Shock absorber	Suspension	Front wheel: Telescopic	
		Rear wheel: Cantilever type	
Frame		Steel tube	

Item		Standard
Fuel supplier	Fuel capacity	12 L
	Injector	Type: F01R00MH06
	Fuel pump	Voltage: DC13.5V±0.3V
		Pressure: 0.40MPa ± 0.01MPa
		Flow: ≥22 L/h
	Current: ≤2.2 A	

3 Technical Information

3.2 Engine Specification

Item		Type/Specification		
Type		Line Engine/signal cylinder/four strokes/water-cooled/top camshaft		
Bore × Stroke		72mm × 55.2 mm		
Displacement		449mL		
Compression ratio		11.5:1		
Low idling speed (Idling)		1400 ± 140r/min		
Starting		Electric		
Max power and related speed		30kw / 8000r/min		
Max torque and related speed		42N•m / 6250r/min		
Electrical system	Ignition type/time	ECU ignition / BTDC6°(1300 r/min)		
	Spark plug/Electrode gap	TORCH BN8RTI / 0.8mm ~ 1.0 mm		
	Magneto type	Triangular		
Combustion system	Air filter type	Sponge filter		
	Gasoline	RQ-95 and above		
Valves system	Valves type	DOHC / chain drive		
Lubrication system	Lubrication type	Pressure and splash		
	Oil pump type	Rotor drive		
	Oil filter type	Paper type, replaceable		
	Engine oil type	First: SAE 10W-40 SJ JASO MA2 Secondary: SAE 10W-30 SJ / SAE 10W-50 SJ / SAE 20W-40 SJ / SAE 20W-50 SJ JASO MA2		
Cooling system	Cooling type	Closed coolant circulation		
	Coolant type	-35°C anti-rust and anti-freeze fluid		
Drive train system	Clutch		Wet and multi-plate clutch	
	Transmission type		6-gear, constant mesh, step transmission	
	Reducer gear		6 gears	
	Gearshift methods/orders		Mechanical reciprocating / 1-0-2-3-4-5-6-5-4-3-2-0-1	
	Speed ratio	Primary ratio		2.088
		econdary ratio	1st	2.929
			2nd	2.056
			3rd	1.579
			4th	1.333
			5th	1.154
6th	1.037			
Overall size (L×W×H)		433mm×380.5mm×502mm		
Dry weight		47.3kg		
Output type		Belt		
Rotation of engine output		When moving forward, counter clockwise(left view).		

3.3 Maintenance Specifications

3.3.1 Front Wheel

Item		Standard	Service limit
Front wheel	Front wheel shaft bending	-	0.2 mm
	Rim run-out	Longitudinal	0.8 mm
		Horizontal	0.8 mm
	Tire	Remaining groove	-
Tire pressure		200 kPa ± 15 kPa (2.04 kgf/cm ² ± 0.15 kgf/cm ²)	-

3.3.2 Rear Wheel

Item		Standard	Service limit	
Rear wheel	Rim run-out	Longitudinal	0.8 mm	
		Horizontal	0.8 mm	
	Tire	Remaining groove	-	1.6 mm
		Tire pressure	200 kPa ± 15 kPa (2.04 kgf/cm ² ± 0.15 kgf/cm ²)	-

3.3.3 Brake System

Item		Standard	Service limit
Front brake	Front (hand) brake free travel	3mm~6mm	-
	Brake disc abrasion	4.5 mm	4 mm
Rear brake	Rear (foot) brake free travel	10mm~15mm	-
	Brake disc abrasion	5 mm	4 mm

3.3.4 Light, Dashboard and Switch

Item	Standard	
Fuse	Primary	30 A
	Subsidiary	1×25A 3×10A 3×15A 2×5A
Light, bulb	Headlight (Hi / Lo)	LED
	Position light	LED
	Tail light	LED
	Turn light	LED
	License light	LED

3.3.5 Suspension

Item	Standard
Front shock absorber travel	130mm
Front shock absorber rebound damping adjustment	Unadjustable
Front shock absorber compression damping adjustment	Unadjustable
Rear shock absorber travel	42mm
Rear shock absorber rebound damping adjustment	Unadjustable
Rear shock absorber compression damping adjustment	Unadjustable
Rear shock absorber spring preload	Adjustable range: 86mm~102mm Factory setting: 90 mm

3 Technical Information

3.4 Service Specification

3.4.1 Valve Train&Cylinder Head

Item	Standard		Service limit	Remark
Valve clearance (cold engine)	IN	0.10mm~0.15mm	-	
	EX	0.25mm~0.31mm	-	
Clearance, valve guide bushing and valve stem	IN	0.01mm~0.037mm	0.075mm	
	EX	0.03mm~0.057mm	0.095mm	
I.D of valve guide bushing	IN & EX	4.500mm~4.512mm	4.540mm	
O.D of valve stem	IN	4.475mm~4.490mm	4.465mm	
	EX	4.455mm~4.470mm	4.445mm	
Free Length, Valve Spring	36.8mm		35mm	
Valve spring force	Compress to 33mm, force is 106N~124N		-	
	Compress to 25mm, force is 423N~467N		-	
Height of valve camshaft	IN	32.298mm~32.408mm	32.200mm	
	EX	33.008mm~33.118mm	32.910mm	
Camshaft to hole clearance	IN & EX	0.028mm~0.071mm	0.13mm	
O.D of camshaft	IN & EX	23.950mm~23.972mm	23.920mm	
I.D of camshaft mating hole	IN & EX	24.000mm~24.021mm	24.050mm	
Camshaft run-out	≤0.02mm		0.1mm	

3.4.2 Lubrication System

Item	Standard		Service limit	Remark
Outer rotor to inner rotor clearance	0.08mm~0.15mm		0.25mm	
Outer rotor to pump body clearance	0.15mm~0.193mm		0.25mm	
Oil pressure	1500r/min, 1.4bar 6000r/min, 2.4bar		-	
Oil type	SAE 10W-40 SJ, JASO MA2		-	
Oil capacity	Change oil and filter	2500 mL	-	
	At overhaul	2700 mL	-	

3.4.3 Cylinder, Piston, Piston Ring and Connecting Rod

Item	Standard		Service limit	Remark
Cylinder pressure	1.43MPa~1.55MPa		-	
Clearance between piston and cylinder	0.033mm~0.052mm		0.10mm	
Dia. of piston skirt	71.960mm~71.975mm		71.910mm	Measure 10mm along the piston
I.D of cylinder	72mm~72.019mm		72.065mm	
Piston ring open gap	1 Ring	0.15mm~0.30mm	0.55mm	
	2 Ring	0.10mm~0.30mm	0.55mm	
	Oil ring	0.20mm~0.70mm	0.85mm	
Clearance between piston ring and groove	1 Ring	0.02mm~0.06mm	0.15mm	
	2 Ring	0.02mm~0.06mm	0.15mm	
	Oil ring	0.01mm~0.15mm	-	
Thickness of piston ring	1 Ring	0.97mm~0.99mm	0.93mm	
	2 Ring	0.97mm~0.99mm	0.93mm	
	Oil ring	1.38mm~1.50mm	-	
Width of piston ring groove	1 Ring	1.01mm~1.03mm	1.10mm	
	2 Ring	1.01mm~1.03mm	1.10mm	
	Oil ring	1.51mm~1.53mm	-	
I.D. of piston pin hole	17.002mm~17.008mm		17.035mm	
O.D of piston pin	16.992mm~16.997mm		16.980mm	
I.D of connecting rod small end	17.015mm~17.025mm		17.035mm	
Connecting rod big end side clearance	0.15mm~0.30mm		0.50mm	
I.D. of crankshaft journal	33.985mm~34.000mm		33.965mm	
Clearance of crankshaft journal	0.028mm~0.060mm		0.070mm	
I.D. of crankshaft connecting rod	34.985mm~35.000mm		34.955mm	
Connecting rod big end thickness	0.04mm~0.06mm		0.07mm	
Crankshaft run-out	≤0.02mm		0.05mm	

3 Technical Information

3.4.4 Clutch and Transmission

Item	Standard	Service limit	Remark
Clutch friction assembly I	-	-	
Quantity	3		
Clutch friction assembly II	-	-	
Quantity	3		
Thickness of clutch friction assembly	2.9 mm ~3.1mm	2.8 mm	
Driven pad I	-	-	
Quantity	1		
Driven pad II	-	-	
Quantity	4		
Flatness of clutch friction and driven pad	$\leq 0.15\text{mm}$	0.30mm	
Free length of clutch spring	42.5mm~43.5mm	41.5mm	
Shift fork groove width	4.93mm~5.00mm	4.83mm	
Shift fork thickness	5.10mm~5.17mm	5.27mm	

3.4.5 Cooling System

Item	Standard/Specification			Service limit	Remark
Start temp. of thermostat	80°C~84°C			-	
Lift range of thermostat valve	95°C, ≥ 8 mm			-	
Open pressure of radiator cap	135kPa~160kPa (Standard 140kPa)			-	
The relationship between the resistance of water temp. sensor and temperature	Temp. (°C)	B resistance to housing (Ω)	A、C resistance ($k\Omega$)	-	
	-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	0.1383~0.1451	-	
Coolant type	-35°C anti-rust and anti-freeze fluid with high boiling point			-	

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3.4.6 Air Inlet System

Item	Specification	Remark
Port size (mm)	Φ34 mm	
Idle speed (r/min)	1350 r/min ± 135 r/min	

3.4.7 Electrical System

Item	Specification	Remark	
Spark plug	Model	TORCH BN8RTI	
	Gap	0.8mm~1.0mm	
Spark	> 8 mm (100kPa)		
Ignition coil resistance	Primary	0.8Ω~1.4 Ω	
	Secondary	2.6 MΩ	
Magneto coil resistance	Trigger	400Ω	
Max power	350W(7000r/min)		
Stabilized voltage	13.5V~15.0V		
Secondary voltage, ignition coil	≥27kV		
Peak voltage, trigger coil	≥20V(1300r/min)		

3 Technical Information

3.5 Tighten Torque

Please use standard torque if without torque value mentioned below table.

Item	Torque N•m(kgf•m)	Item	Torque N•m(kgf•m)
M5 bolt, nut	5±1(0.5±0.1)	M5 screw	4±1(0.4±0.1)
M6 bolt, nut	10±1(1.0±0.1)	M6 screw	9±1(0.9±0.1)
M8 bolt, nut	20~30(2.0~3.0)	M6 flange bolt and nut	12±1(1.2±0.1)
M10 bolt, nut	45(4.5)	M8 flange bolt and nut	20~30(2.0~3.0)
M12 bolt, nut	60(6.0)	M10 flange bolt and nut	30~40(3.0~4.0)

3.5.1 Tighten Torque Table for Vehicle

Please use standard torque if without torque value mentioned below table.

**NOTE: 1. Lubrication oil should be applied on screw thread and contact surface.
2. Replace with new ones if self-locking bolts are removed.**

Item	Thread locker	Qty.	Torque N•m	Thread locker
Front LH screw, engine	M10×1.5×70	1	45~50	YES
Front RH screw, engine	M10×1.5×22	1	45~50	YES
Middle RH screw, engine	M10×1.5×22	1	45~50	YES
Middle LH screw, engine	M10×1.5×45	1	45~50	YES
Rear upper bolt, engine	M10×1.25×150	1	45~50	YES
Rear lower bolt, engine	M10×1.25×170	1	45~50	YES
Auxiliary frame bolt	M10×1.25×30	4	40~50	YES
Tighten bolt, upper/lower clamp triple and shock absorber	M8×25	6	20~25	YES
Screw, upper end of upper clamp triple	Nonstandard part	1	20~25N.m (before)	NO
Screw, front lower joint and front wheel shaft	M8×25	2	20~25	YES
Screw, upper clamp triple and steering column	M8×25	1	20~25	YES
Bolt, upper part of rear shock absorber, frame and tri-swing arm	M10×50	2	45	NO
Bolt, tri-swing arm and rear fork	M12×80	1	60	NO
Bolt, tri-swing arm and connecting rod	M12×110	1	60	NO
Bolt, rod assembly and frame	M10×130	1	45~50	YES
Nut, rear fork shaft	M16×1.5	1	110	NO
Front wheel shaft	M16×1.5	1	75~85	NO
Gear, brake pad and rim bolt	M8×28	5	25	YES
Speed sensor and front shock absorber bolt	M6×16	2	8	NO
Speed sensor and rear caliper bolt				
Bolt, front wheel speed sensor and wire clip	M6×12	2	8	NO
Front brake oil pipe and lower clamp triple bolt				

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Bolt, front brake oil pipe clip and frame	M6×12	2	8	NO
Bolt, front brake oil pipe clip and frame				
Brake pipe and front caliper bolt	Nonstandard part	1	38~42	NO
Front caliper and front shock absorber bolt	M10×60	2	40~50	YES
Brake pipe and hand pump bolt	Nonstandard part	1	38~42	NO
Brake pipe and ABS bolt	Nonstandard part	4	Pre-tighten (7~9)N·m Cover 120° -150°	NO
Bolt, brake pipe and rear caliper	Nonstandard part	1	38~42	NO
Brake pipe and foot pump	Nonstandard part	1	28	NO
Bolt, ABS and ABS bracket	M6×12	2	8	NO
Bolt, ABS bracket and frame	M6×22	2	10	NO
Bolt, rear brake main pump and right front footrest bracket	M8×25	2	10	YES
Bolt, rear caliper plate and caliper	Nonstandard part	2	25	YES
Bolt, rear oil cup and frame	M6×16	1	8	NO
Bolt, brake pedal rod assembly and right footrest bracket	M8×25	1	25	YES
Bolt, hand pump oil cup bracket	M8×1.25 (With hand pump assembly)	1	25	YES
Bolt, clutch grip assembly	Bolt	1	6	NO
Screw, grip	Hexagon socket cap screws M8×25	4	20~25	YES
Orientation screw, grip	Inner hex screw M6×20	2	8	YES
Screw, balancer	Inner hex screw M6×35	2	8	NO
Nut, rear wheel shaft	M16×1.5	1	105~110	NO
Bolt, fuel pump	Bolt M5×20	5	5	NO
Bolt, shift swing arm and engine shaft	Bolt M6×22	1	Tighten	YES
Bolt, bearing, shaft pedal and shift swing arm	M6×16	2	6	YES
Shift lever rod adjusting nut	M6/M6LH	2	6	NO
Shift lever pedal and front pedal bracket screw	M8×50 (the same with bolt, front footrest frame and bracket)	1	25	YES
Bolt, front footrest bracket and frame	M8×50	4	25	YES
Bolt, rear footrest bracket and frame	M8×20	4	25	YES
Screw, rear footrest seat	M6	4	6	YES

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Bolt, reservoir tank	Flange bolt M6×14	2	5	NO
Bolt, radiator lower mounting point and bracket	Step bolt M6×25	1	5	NO
Bolt, front seat supporter	Hexagon socket cap screws M8×16	2	20	YES
Rear seat screw and rear fender assembly	M6×12 Inner hex screw	1	6	NO
Driven belt and rear rim bolt	M8×25	6	28	YES

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3.5.2 Tighten Torque Table for Engine

Item	Qty.	Specification	Torque (N•m)	Remark
Bolt, crankcase	3	M6	10	
Bolt, crankcase	13	M8	8→20→27	With engine oil and MoS ₂ grease (ratio 10:1)
Bolt, crankcase	6	M9	8→20→35	With engine oil and MoS ₂ grease (ratio 10:1)
Bolt, LH bearing fender	2	M6	10	With thread locker
Bolt, RH bearing fender	2	M6	10	
Fork shaft head	1	M14×1.25	5	
Injector	2	M5	5.4	
Oil pressure switch	1	R3/8	20	With silicone sealants
Main oil passage plug	1	R ₂ 3/8	20	With thread locker
Bolt, oil filter	1	M20×1.5	25	
Shift spring pin	1	M8	20	With thread locker
Bolt, RH side cover	11	M6	10	
Hole cap, timing inspection	1	M12×1.5	4	
Oil filling plug	1	3/4"	Tighten by hand	
Filter cover	1	M35×1.5	10	
Bolt, LH side cover	11	M6	10	
Bolt, magneto rotor	3	M6	10	With thread locker
Trigger bolt	2	M5	5	With thread locker
Plate bolt	1	M6	10	
Bolt, cylinder head cover	4	M6	10	
Labyrinth bolt	3	M6	10	
Bolt, cylinder head	6	M10	New bolt 20→54 Old bolt 20→49	With engine oil and MoS ₂ grease (ratio 10:1)
Bolt, cylinder head	2	M6	10	
Shock absorber bolt, cylinder head	1	M6	10	
Water temp. sensor	1	M12×1.5	15	
Bolt, thermo head	3	M6	10	

3 Technical Information

Item	Qty.	Specification	Torque (N•m)	Remark
Spark plug	2	M10×1	15	
Plug, cylinder head	2	R ₂ 3/8	20	With silicone sealants
Bolt, camshaft seat	12	M6	5→8→12	
Bolt, tensioner assembly	2	M6	10	
Bolt, throttle body pipe	3	M6	10	
Bolt, timing sprocket	4	M6	10	
Thread pin shaft	1	M8	20	
Bolt, magnato rotor	1	M12×1.25	155	
Connecting rod bolt	4	M8×0.75	(20 N•m±2 N•m) +(100°±5°)	With engine oil and MoS ₂ grease (ratio 10:1)
Bolt, clutch plate	3	M6	10	
Nut, clutch	1	M14×1.25	125	
Output sprocket nut	1	M20×1.5	125	
Bolt, gearshift drum	1	M6	10	With thread locker
Swing arm screw	1	M6	10	
Bolt, gear sensor	2	M6	10	With thread locker
Screw, shift drum	1	M6	10	
Bolt, oil pump	4	M6	10	
Oil filter	1	M20×1.5	17	With oil
Bolt, water pump assembly	4	M6	10	
Drain bolt	1	M12×1.5	35	
Bolt, oil pan housing	13	M6	10	
Bolt, starter motor	2	M6	10	
Other bolts, nuts and screws		M5	4.5~6	
		M6	8~12	
		M8	18~25	

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3.6 Consumption Materials&Assembling Materials

Consumption materials include lubricant oil (engine oil), lubricant grease. Assembling materials include flange sealants, thread locker.

3.6.1 Vehicle Consumption Materials

Application areas	Notes	Type
Column bearing Front/rear footrest rotating part Side bracket rotating part Front rear wheel LH/RH sleeve Driven belt seat oil sealing Throttle cable Rear bracket bearing Rear brake padel sleeve Shift rod rotating part Tri-swing arm needle bearing Rear fork needle bearing Rod assembly bearing Throttle cable		Multi-purpose lithium base lubrication oil GB/T5671

3.6.2 Engine Consumption Materials&Assembling Materials

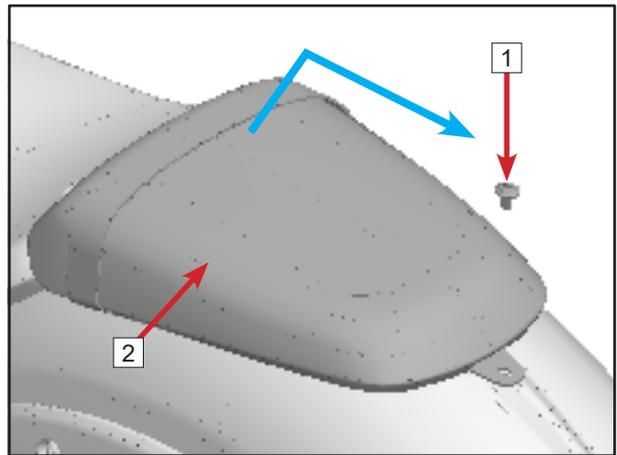
Item	Specification	Using parts	Remark
Lubricant oil	SAE10W/40 SJ, JASOMA2	Rotation and moving section in cylinder, crankcase and cylinder head. Details refer to lubricant chart.	Oil Capacity: 2500mL(oil and filter change) 2700mL(at overhaul)
Lubricant oil with molybdenum		Oil seal, o-ring and rubber seal face, bearing with sealant	
Lubricant grease	#3 MoS ₂ lithium grease	Oil seal, o-ring and rubber seal face, bearing with sealant	
Coolant	-35°C anti-rust and anti-freeze fluid with high boiling point	Cooling system, water seal installation	Capacity depends on radiator water pipes
Flange sealant		Crankcase faying face , crankcase and cylinder joint cylinder head and cylinder head cover joint	
Thread locker		Parts of thread	

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4.1 Rear Seat (double seats)

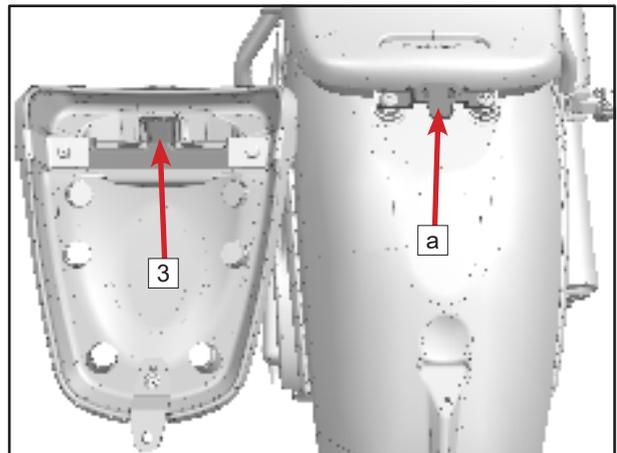
Removal

- Remove bolt [1].
- Lift the back of rear seat [2].
- Remove the rear seat [2] behind syncline.



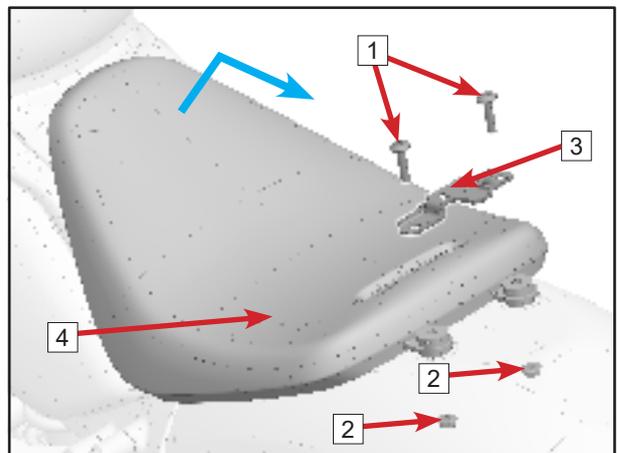
4.1.1 Rear Seat Installation

- Stick the clip [3] into [a].
- Reset the bolts [1].



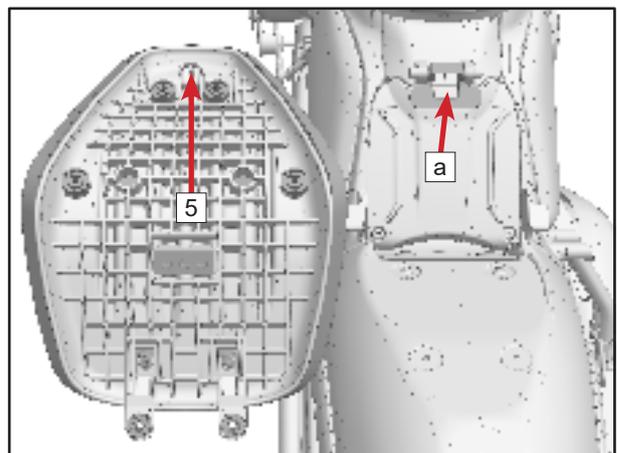
4.2 Front Seat(double seats)

- Remove bolts [1].
- Remove nuts [2].
- Remove the rear seat clip [3].
- Lift the back of rear seat [4].
- Remove the rear seat [4] rear backward.



4.2.1 Front Seat Installation

- Stick the clip [5] into [a].
- Reset the rear seat clip [3].
- Reset the bolts [1].
- Reset the nuts [2].



NOTE: The seat may become loose if not properly installed. Pull up the seat to check whether it is locked properly.

4.3 Seat Assembly (single seat)

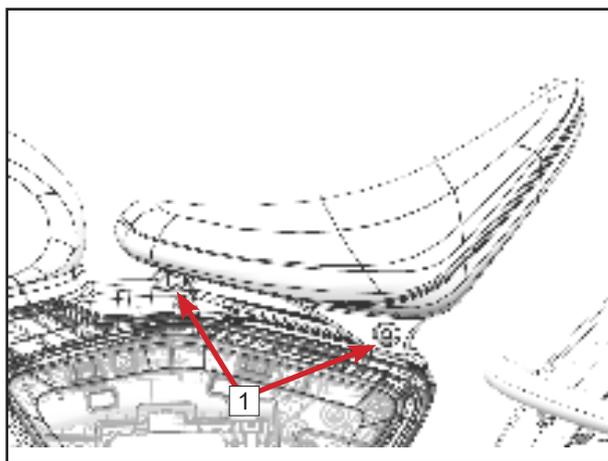
Removal

Remove the LH side bolts **1** of seat.
The removal methods of LH side bolts refer to the LH side.
Remove front seat assembly.

Installation

Reverse the removal procedures for installation.

NOTE: If not properly installed, the seat may become loose. Pull up the seat to check whether the seat is locked properly.



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5.1 Front Fender Assembly

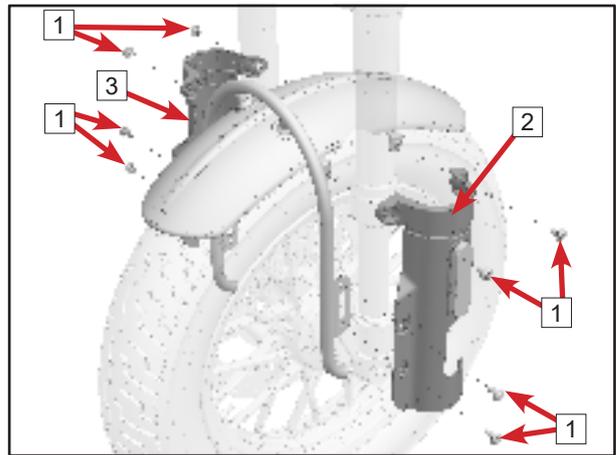
5.1.1 Front shock absorber LH&RH deco guard

Removal

Remove the bolts [1].

Remove front shock left deco guard [2].

Remove front shock right deco guard [3].



5.1.2 Disassemble the front fender assy

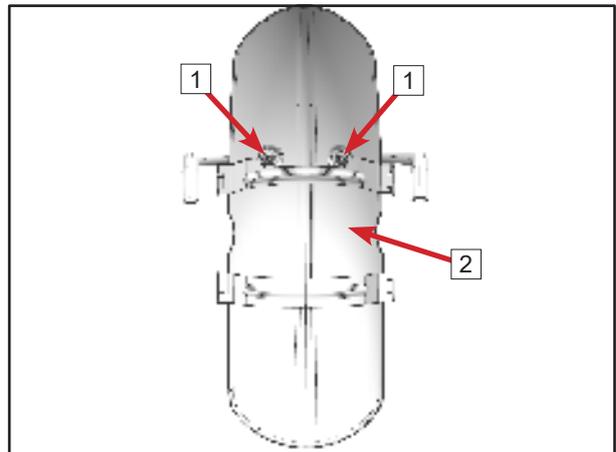
Removal

Remove bolts [1].

Remove front fender [2].

Installation

Reverse the removal procedures for installation.



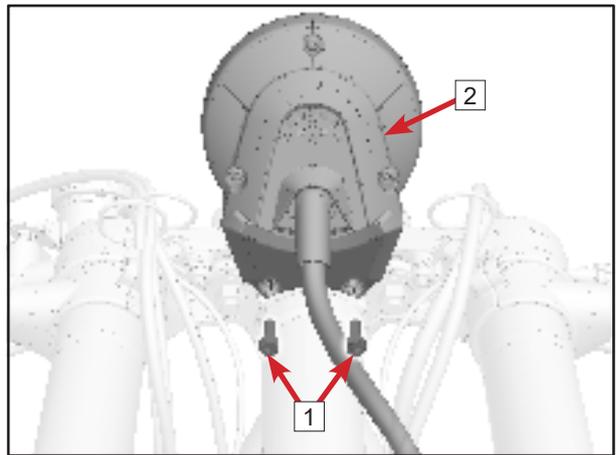
5.2 Instrument Assy

Removal

Turn off the power supply.
Plug out the instrument connecting wire.
Remove the bolts **1**.
Remove the instrument assy **2**.

Installation

Reverse the removal procedures for installation.



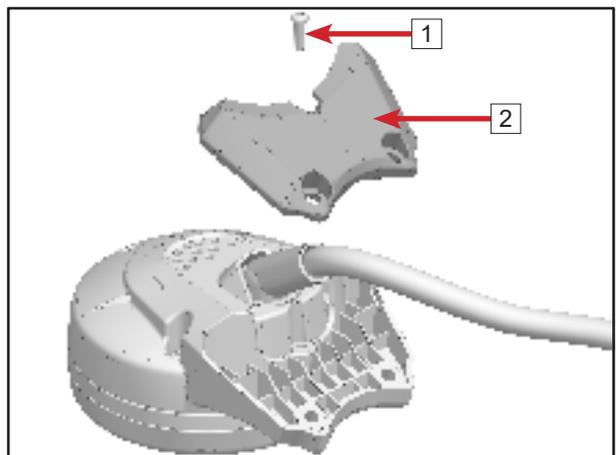
5.2.1 The rear cover of instrument

Removal

Remove the bolt **1**.
Remove the rear cover of instrument **2**.

Installation

Reverse the removal procedures for installation.



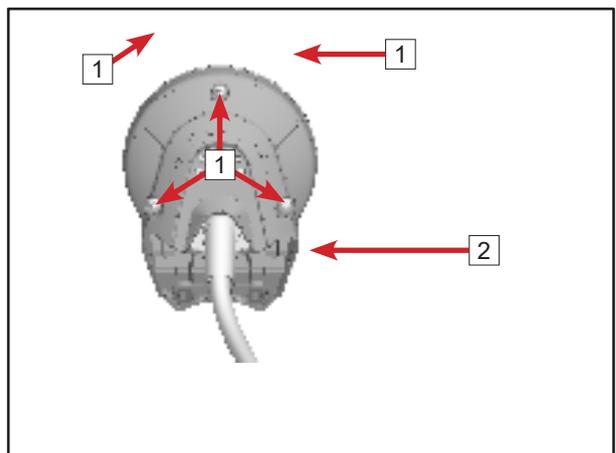
5.2.2 The seat cover of instrument

Removal

Remove the bolts **1**.
Remove the seat cover of instrument **2**.

Installation

Reverse the removal procedures for installation.



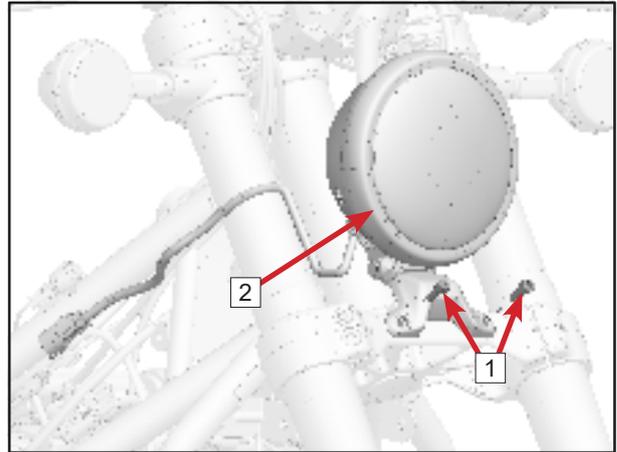
5.3 Headlight assy

Removal

Turn off the power supply
Plug out the instrument connecting wire.
Remove the bolts **1**;
Remove the headlight assy **2**.

Installation

Reverse the removal procedures for installation.

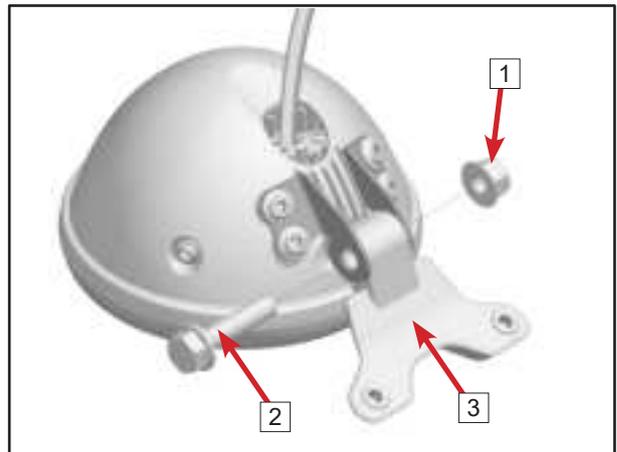


5.3.1 Headlight seat 1

Remove the nut **1**.
Remove the bolt **2**.
Remove the headlight seat 1 **3**.

Installation

Reverse the removal procedures for installation.



5.3.2 LH&RH headlight seat 2

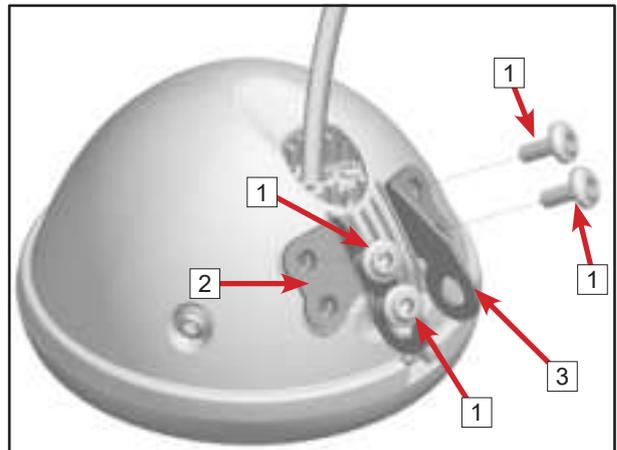
Removal

Remove the bolts **1**.
Remove the LH front headlight seat 2 **2**.
Remove the RH front headlight seat 2 **3**.

Installation

Reverse the removal procedures for installation.

NOTE: The headlight is LED light, if the headlight get damaged, it needs to be replaced with a new set of headlight.



5.4 Reservoir tank LH guard assy

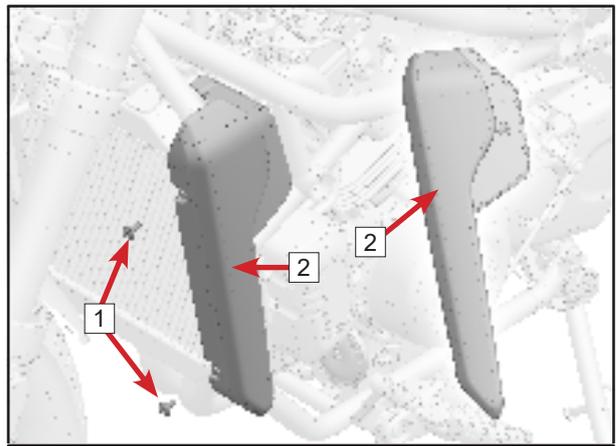
Removal

Remove the bolts [1].

Remove the reservoir LH guard assy [2].

Installation

Reverse the removal procedures for installation.



5.4.1 Reservoir LH guard deco panel

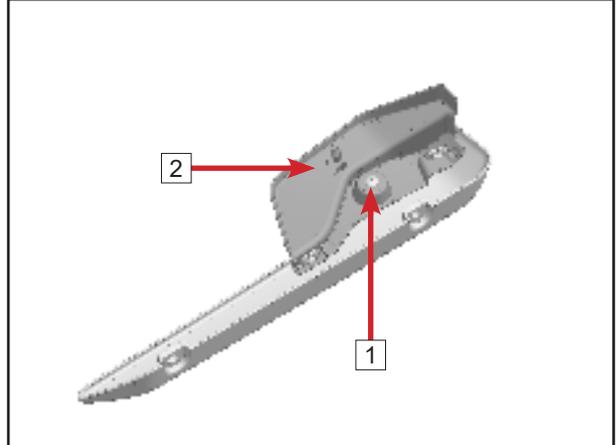
Removal

Remove the screw [1].

Remove the reservoir LH guard deco parts [2].

Installation

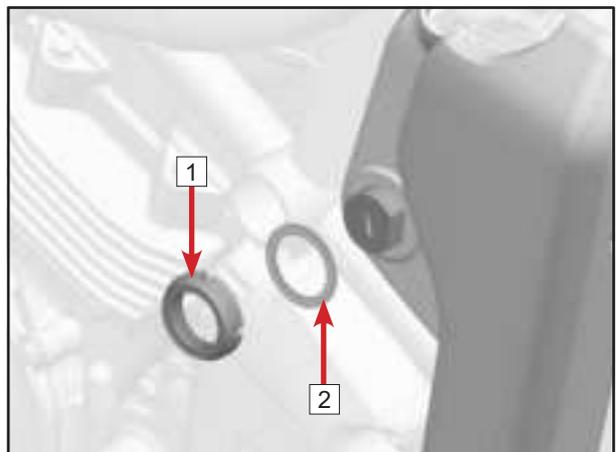
Reverse the removal procedures for installation.



5.5 Reservoir tank RH guard assy

Remove the electrical lock fixed nut [1].

Remove the protective gasket [2].



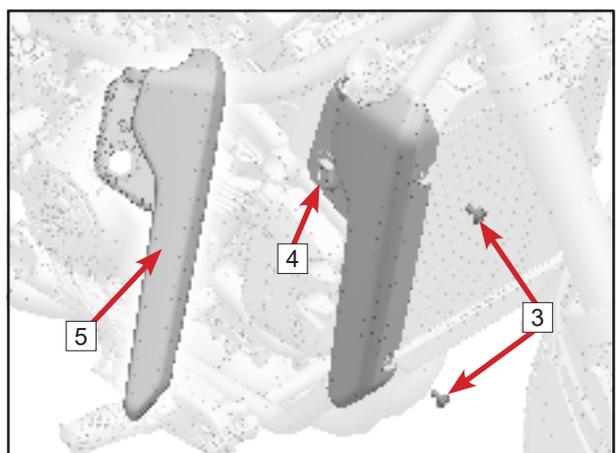
Remove the bolts [3].

Remove the electrical lock seat [4].

Remove the reservoir RH guard assy [5].

Installation

Reverse the removal procedures for installation.



5.5.1 Reservoir RH guard deco panel

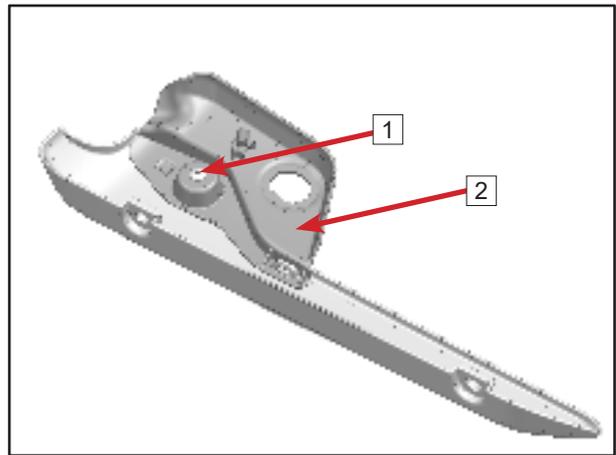
Removal

Remove the screw [1].

Remove the reservoir RH guard deco part [2].

Installation

Reverse the removal procedures for installation.



5.5.2 Battery box cover (Double Seats)

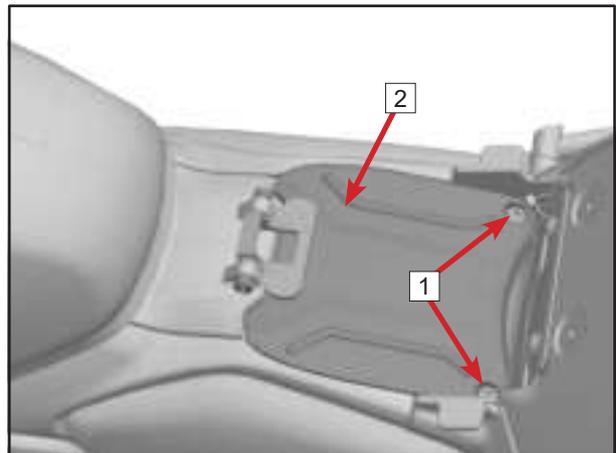
Removal

Remove the bolts [1].

Remove the battery box cover [2].

Installation

Reverse the removal procedures for installation.



5.5.3 Battery Box Cover (Single Seat)

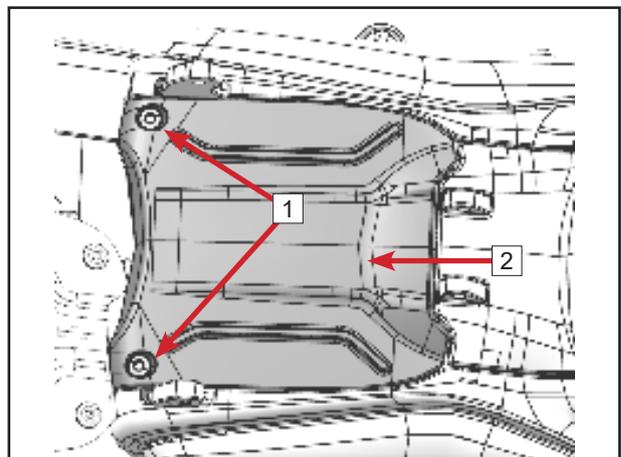
Removal

Remove bolts [1].

Remove battery box cover [2].

Installation

Reverse the removal procedures for installation.



5.6 RH & LH guard

5.6.1 LH guard

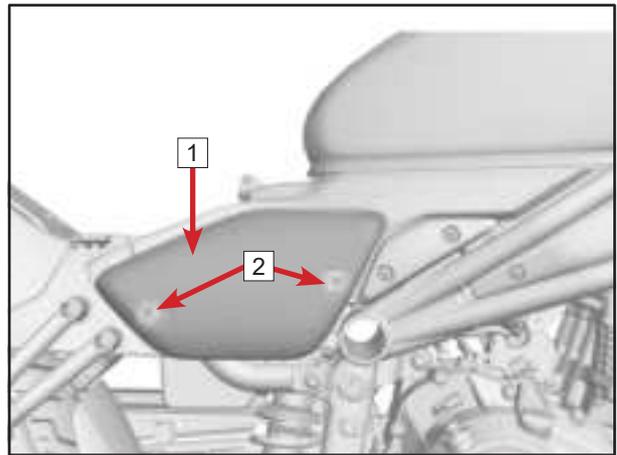
Removal

Remove the LH guard [1].

Installation

Reverse the removal procedures for installation.

NOTE: Prevent the plastic connecting part [2] from broken during the process of disassemble the LH & RH.



5.6.2 RH guard

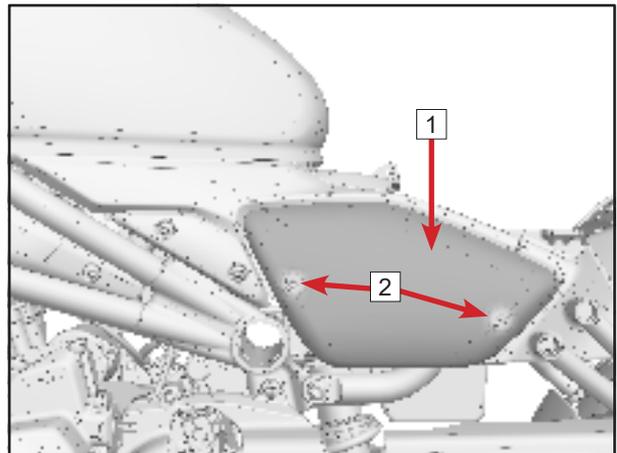
Removal

Remove the RH guard [1].

Installation

Reverse the removal procedures for installation.

NOTE: Prevent the plastic connecting part [2] from broken during the process of disassemble the LH & RH.



5.7 LH & RH guard deco cover

5.7.1 LH guard deco cover

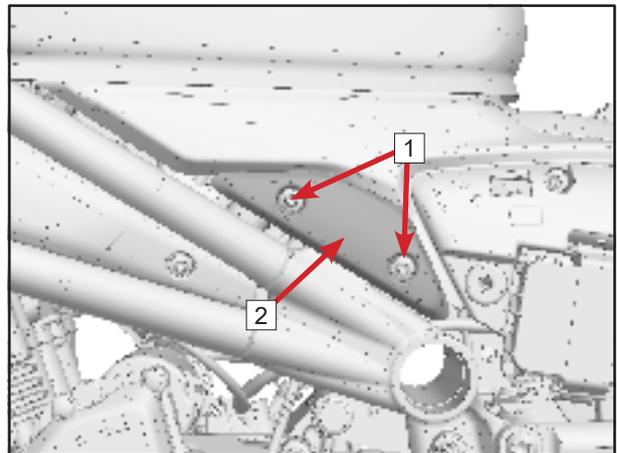
Removal

Remove the bolts [1].

Remove the LH guard deco cover [2].

Installation

Reverse the removal procedures for installation.



5.7.2 RH guard deco cover

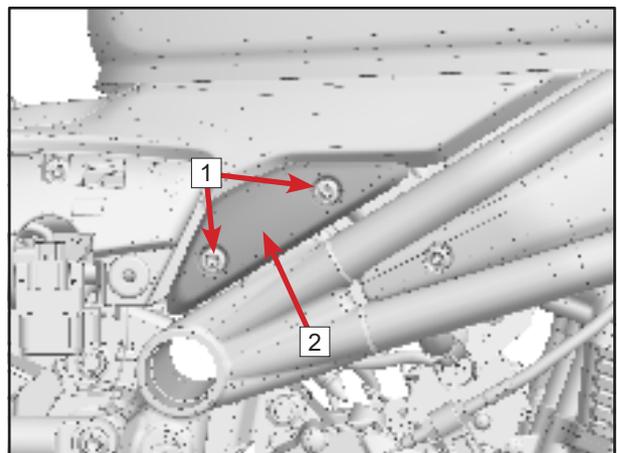
Removal

Remove the bolts [1].

Remove the RH guard deco cover [2].

Installation

Reverse the removal procedures for installation.



5.8 LH&RH guard base panel

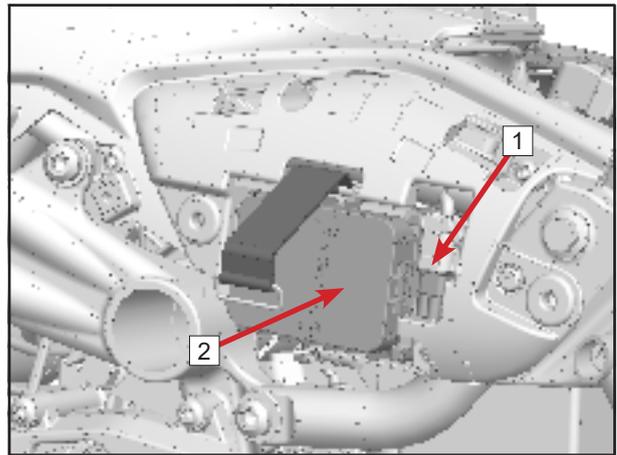
5.8.1 LH guard base panel (Double Seats)

5.8.2

Removal

Remove the connecting part [1].

Remove the TBOX [2].

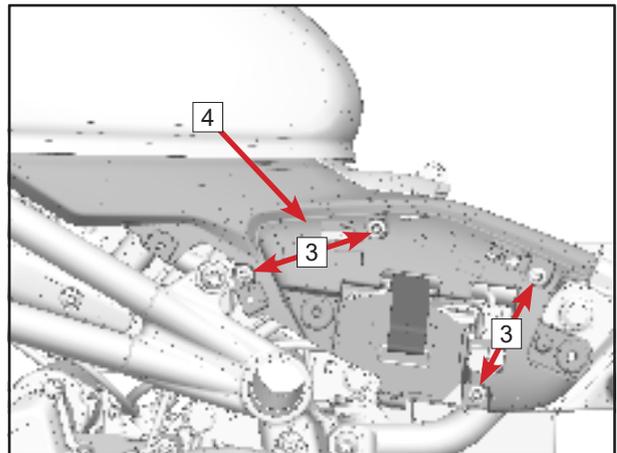


Remove the bolts [3].

Remove the RH guard base panel. [4].

Installation

Reverse the removal procedures for installation.

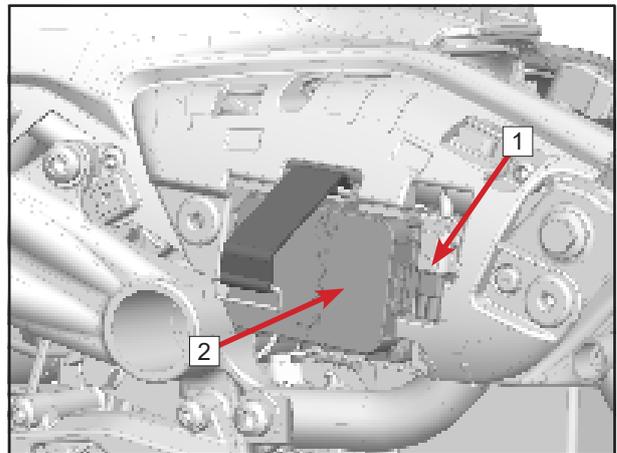


5.8.3 LH Panel Base Plate (Single Seat)

Removal

Remove connector.

Remove the TBOX.

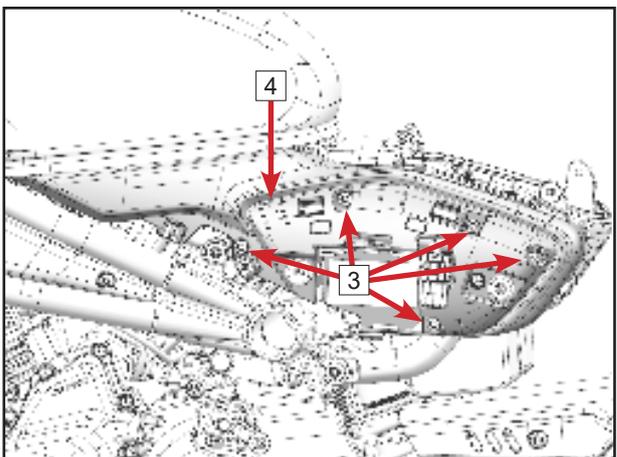


Remove bolt.

Remove LH panel base plate.

Installation

Reverse the removal procedures for installation.

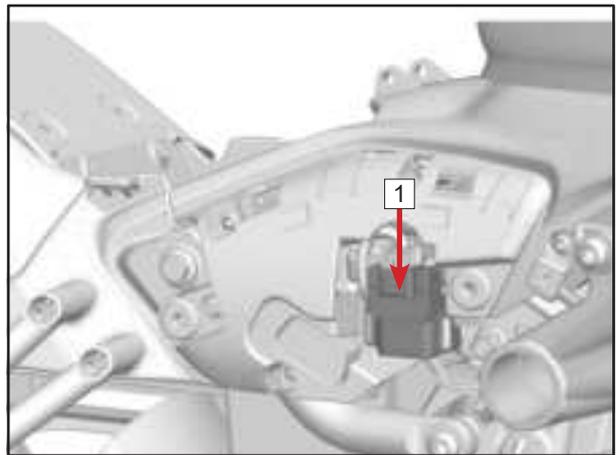


5.8.4 RH guard base panel (Double Seats)

5.8.5

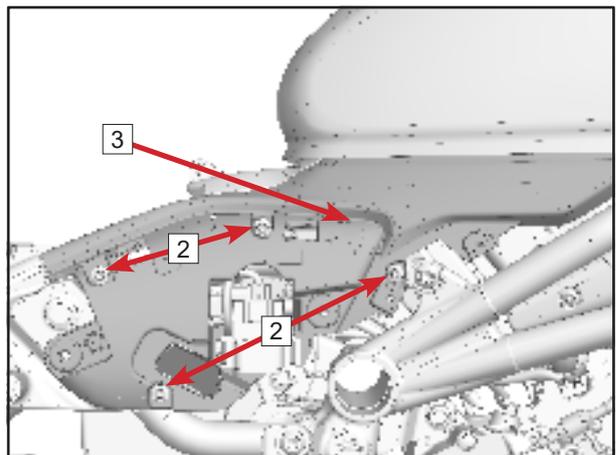
Removal

Remove the starting relay **1**.



Remove the bolts **2**;

Remove the RH guard base panel **3**.

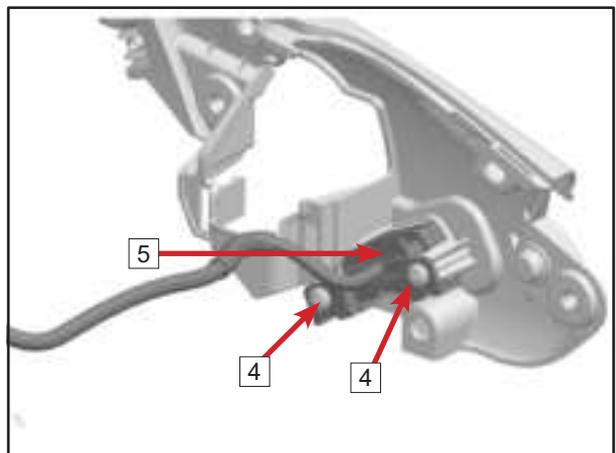


Remove the screws **4**.

Remove the OBD connector **5**.

Installation

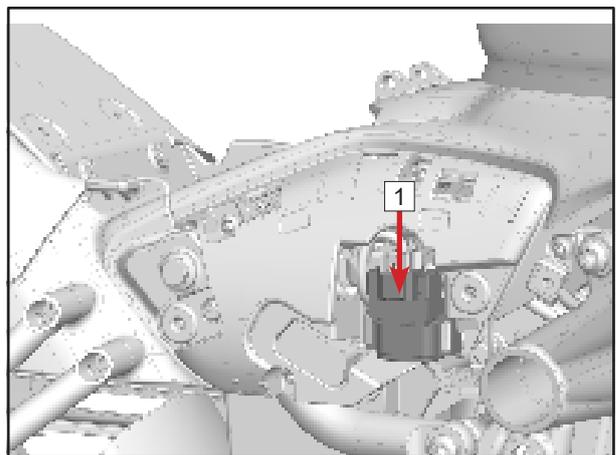
Reverse the removal procedures for installation.



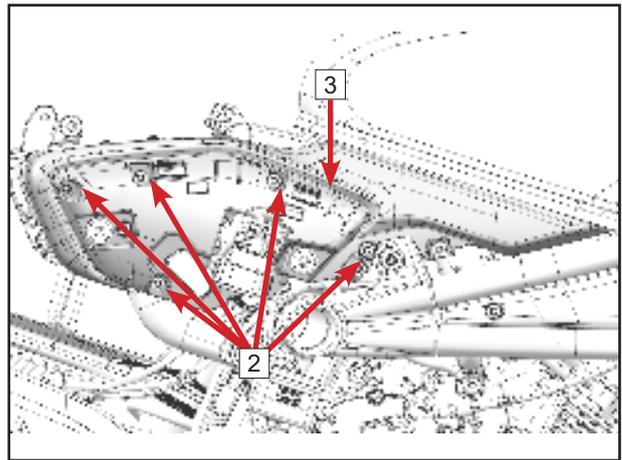
5.8.6 RH Panel Base Plate (Single Seat)

Removal

Remove starter relay.



Remove bolt.
Remove RH panel base plate.



Remove screw.
Remove OBD joint.

Installation

Reverse the removal procedures for installation.

5.9 Fuel tank LH&RH guard

5.9.1 Fuel tank LH guard

Removal

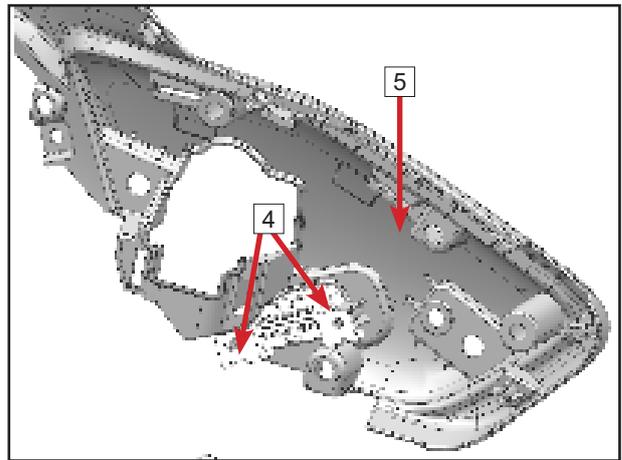
Remove (See the details in chapter 06)

Remove the bolts [1].

Remove the fuel tank LH guard [2].

Remove the connecting part lock seat [3].

NOTE: Prevent the plastic connecting part [4] from broken during the process of disassemble the LH & RH.



Installation

Reverse the removal procedures for installation.

5.9.2 Fuel tank RH guard

Removal

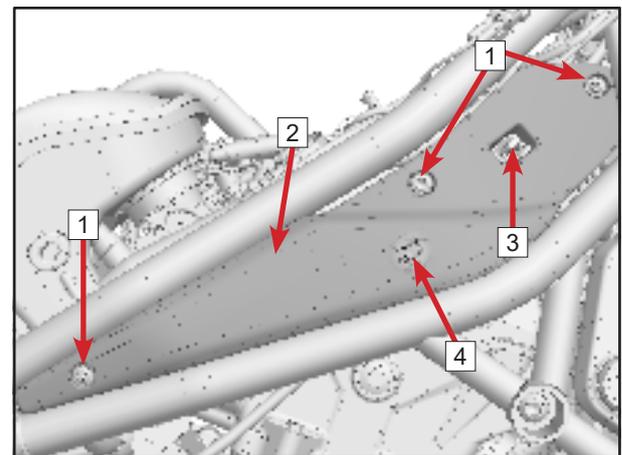
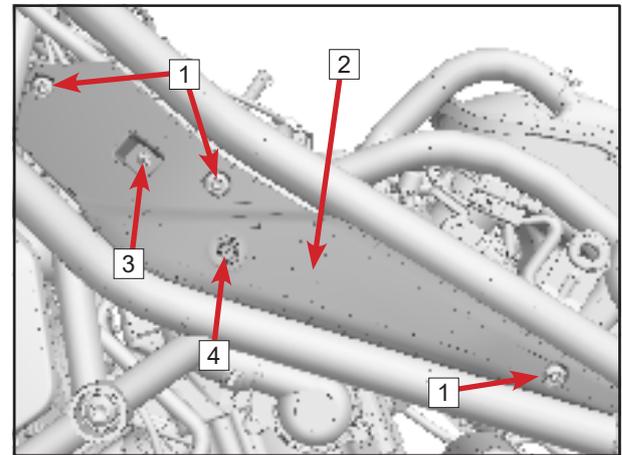
Remove the fuel tank (See the details in chapter 06)

Remove the bolt [1].

Remove the fuel tank RH guard [2].

Remove the connecting part fixed seat [3].

NOTE: Prevent the plastic connecting part [4] from broken during the process of disassemble the LH & RH.



Installation

Reverse the removal procedures for installation.

5.10 Rear rim fender assy (Double Seats)

5.10.1 Rear fender LH&RH deco cover

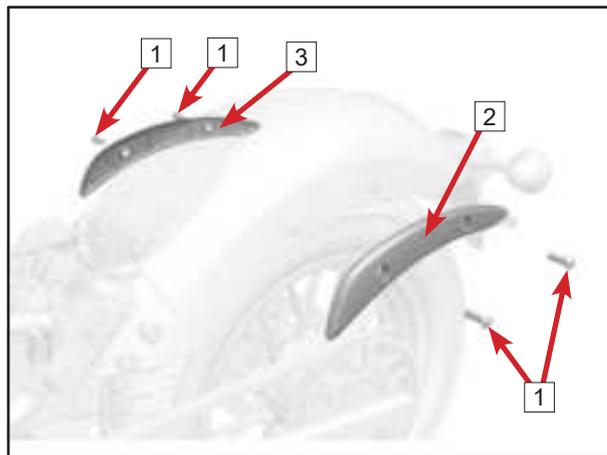
Remove the bolts [1].

Remove the LH deco cover [2].

Remove the RH deco cover [3].

Installation

Reverse the removal procedures for installation.



5.10.2 Rear fender deco cover

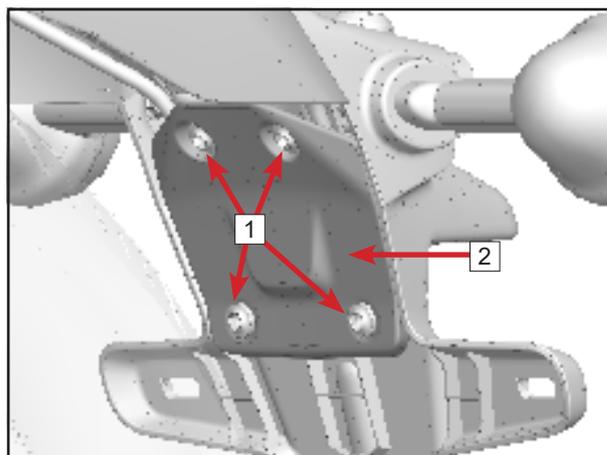
Removal

Remove the bolts [1].

Remove the rear fender deco cover [2].

Installation

Reverse the removal procedures for installation.

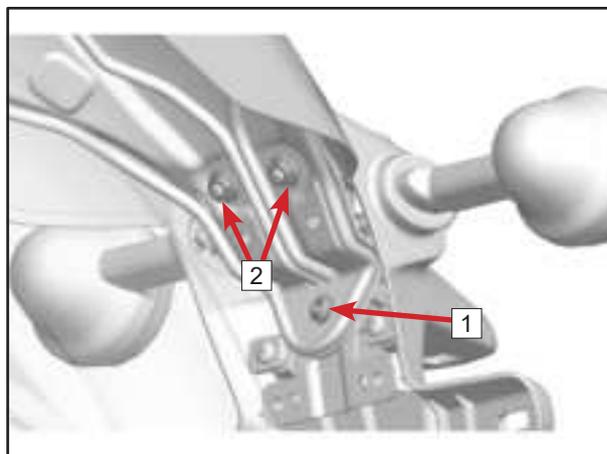


5.11 Rear fender assy

Removal

Remove the bolt [1].

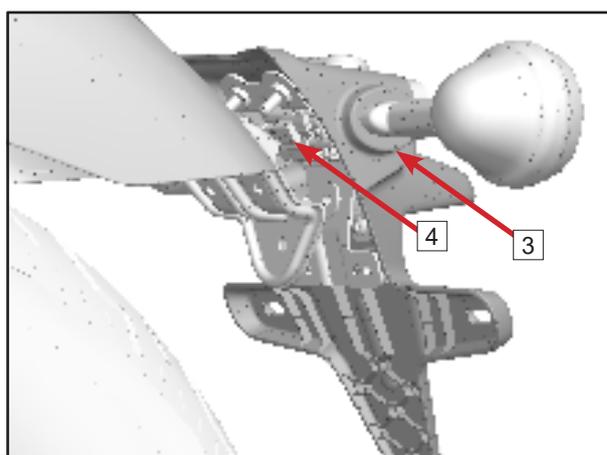
Remove the nuts [2].



Turn off the power supply.

Separate the rear fender [3].

Pull down the tail light, the turning light and license light connecting cable [4].



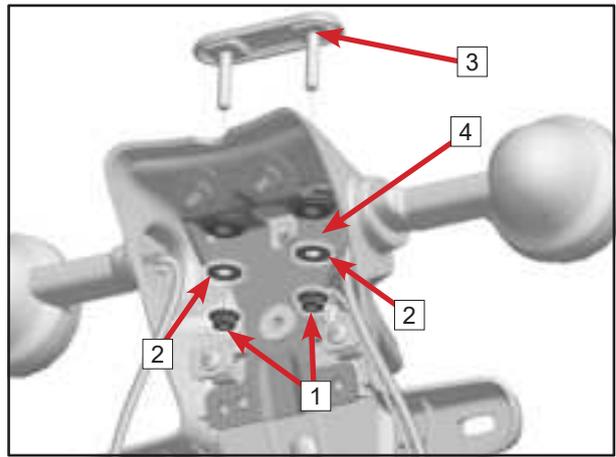
5.11.1 License bracket

Removal

- Remove the nuts **1**.
- Remove the gasket **2**.
- Remove the LOGO **3**.
- Remove the license bracket **4**.

Installation

Reverse the removal procedures for installation.



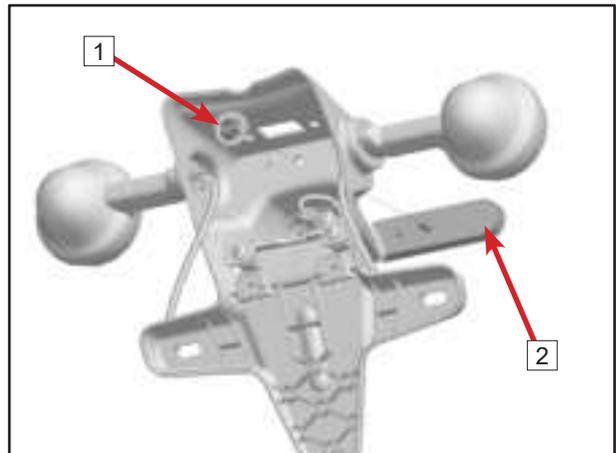
5.11.2 Rear reflecting plate

Removal

- Remove the nuts **1**.
- Remove the rear reflecting plate **2**.

Installation

Reverse the removal procedures for installation.



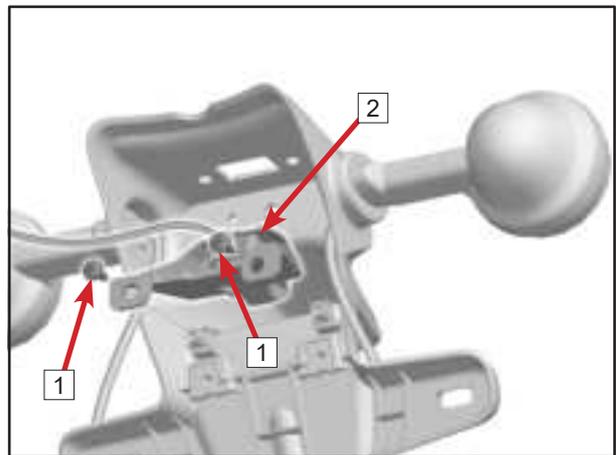
5.11.3 License light fixed plate

Removal

- Remove the screws **1**.
- Remove the license light fixed plate **2**.

Installation

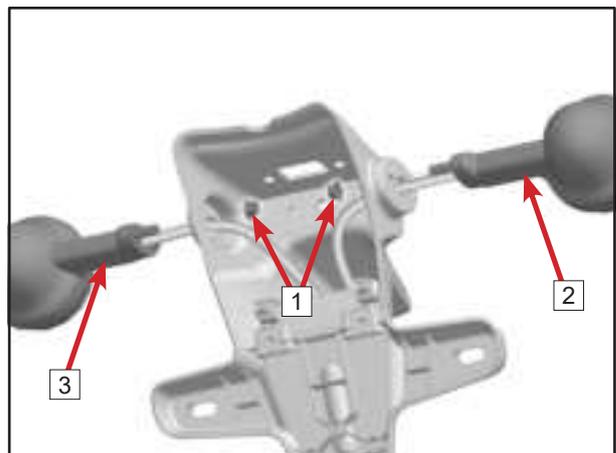
Reverse the removal procedures for installation.



5.11.4 LH&RH rear turning light

Removal

- Remove the nuts **1**.
- Remove the LH turning light **2**.
- Remove the RH turning light **3**.



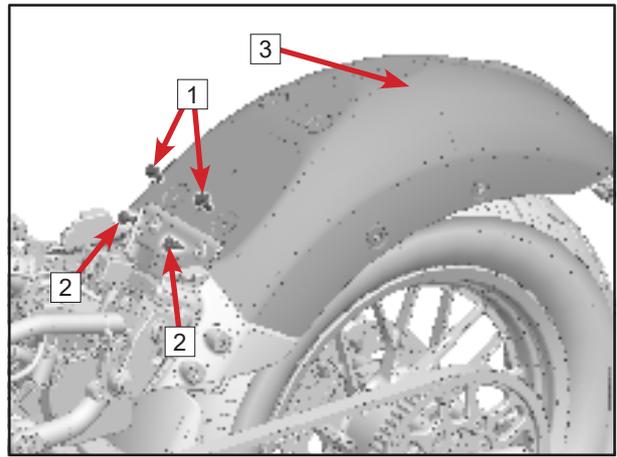
5.11.5 Rear rim fender (Double seats)

Removal

- Remove the bolts **1**.
- Remove the plastic buckle **2**.
- Remove the rear rim fender **3**.

Installation

Reverse the removal procedures for installation.



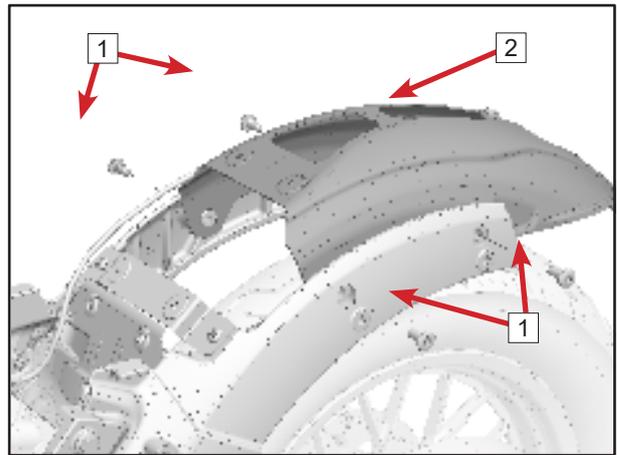
5.11.5.1 Rear rim inner fender

Removal

- Remove the bolts **1**.
- Remove the rear rim inner fender **2**.

Installation

Reverse the removal procedures for installation.



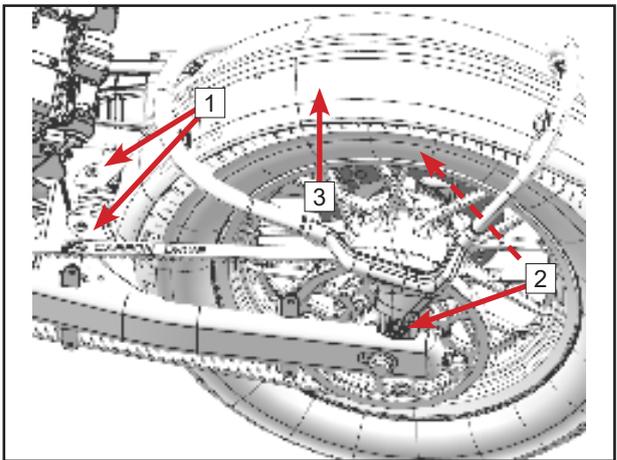
5.11.6 Rear fender outer plate assembly (Single Seat)

Removal

- Remove bolt.
- Remove bolt.
- Remove rear fender outer plate assembly.

Installation

Reverse the removal procedures for installation.



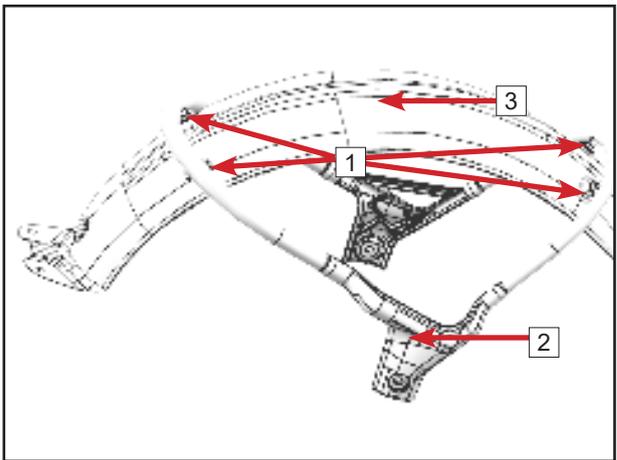
5.11.6.1 Welded Pipe Assembly

Removal

- Remove bolt.
- Separate welded pipe assembly from rear fender outer plate.

Installation

Reverse the removal procedures for installation.



5.12 Front LH turning light mounting cover and assy

Removal

Remove the bolts [1].

Remove the front LH turning light mount cover [2].

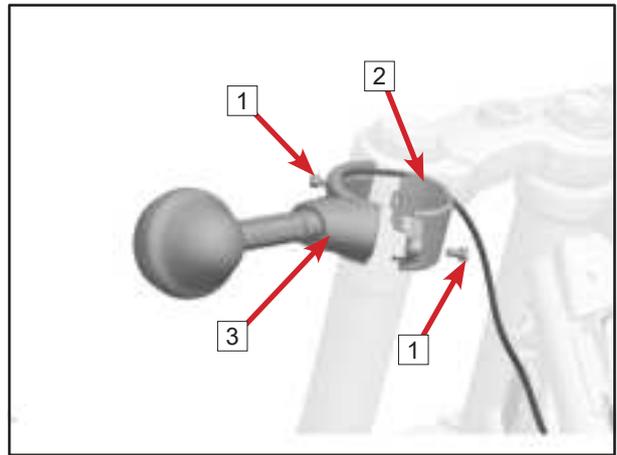
Remove the front LH turning light mount assy [3].

The disassembly of the front LH turning light mount cover as shown. Share the same method to disassemble the front RH turning light mount cover.

The disassembly of the front LH turning light mount seat assy as shown. Share the same method to disassemble the front RH turning light mount seat assy.

Installation

Reverse the removal procedures for installation.



5.12.1 Front LH turning light mount seat Removal

Remove the nut [1].

Remove the spring washer [2].

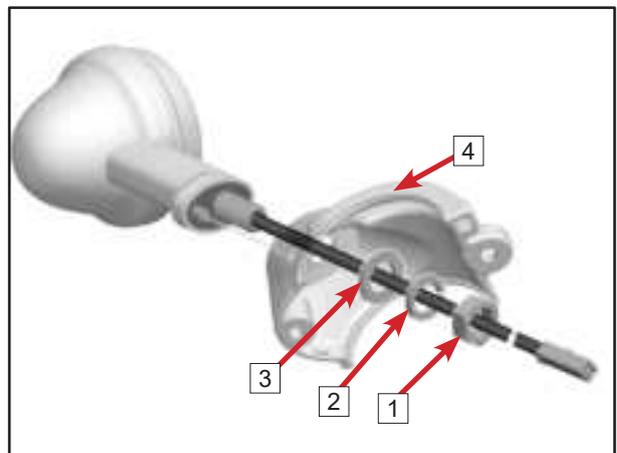
Remove the washer [2];

Remove the front LH turning light mount seat [4].

The disassembly of the front LH turning light mount seat as shown. Share the same method to disassemble the front RH turning light mount seat.

Installation

Reverse the removal procedures for installation.



5.13 II sprocket

Removal

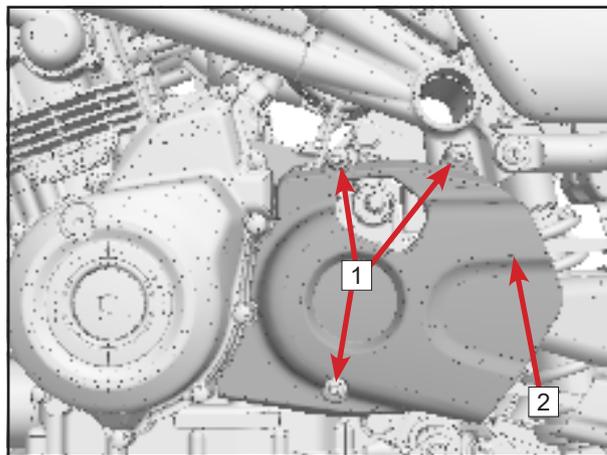
Remove the gear rod assy (See the detailed chapter)

Remove the bolts **1**.

Remove the small sprocket **2**.

Installation

Reverse the removal procedures for installation.



5.14 Belt upper & lower guard

Removal

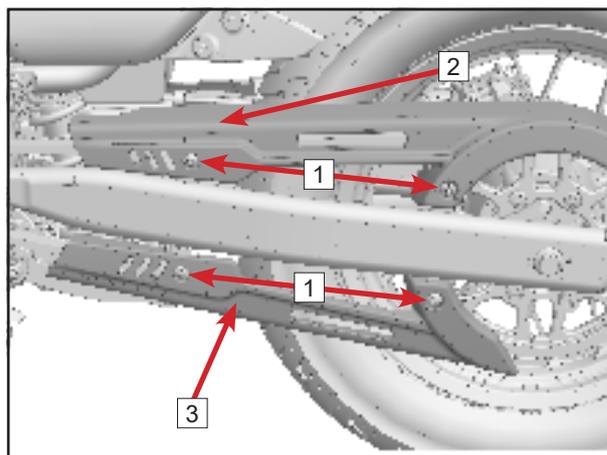
Remove the bolts **1**.

Remove the belt upper guard **2**.

Remove the belt lower guard **3**.

Installation

Reverse the removal procedures for installation.



5.15 Carbon tank deco cover

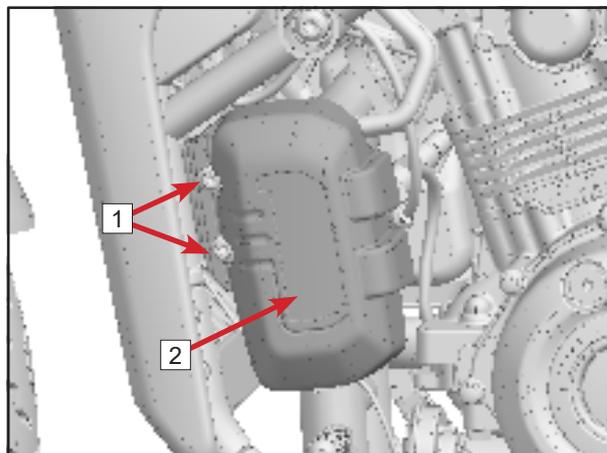
Removal

Remove the bolts .

Remove the carbon tank cover **2**.

Installation

Reverse the removal procedures for installation.



5.16 Reservoir deco cover

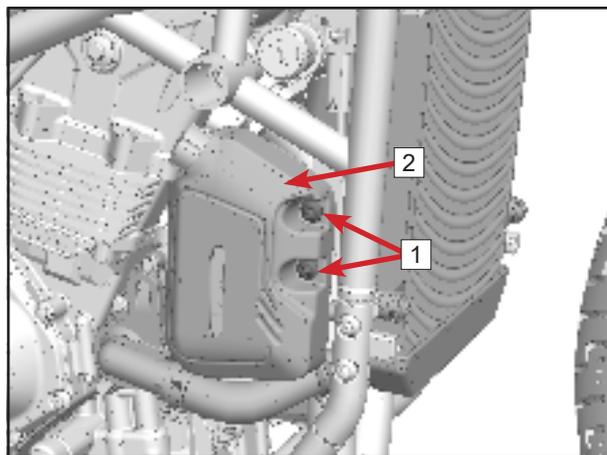
Removal

Remove the bolts **1**.

Remove the reservoir deco cover **2**.

Installation

Reverse the removal procedures for installation.



5.17 Rear shock absorber fender (Double Seats)

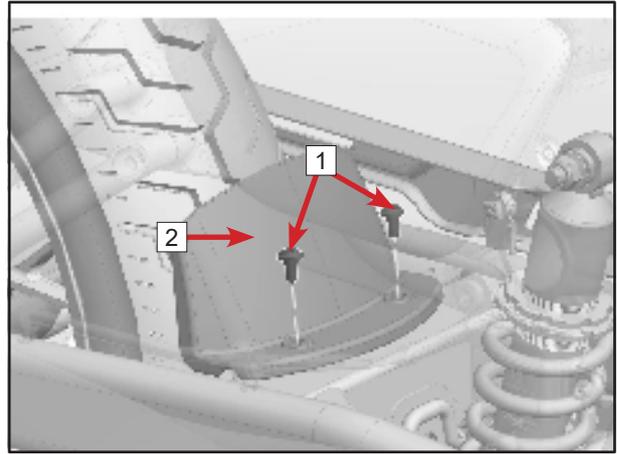
Removal

Remove the bolts [1].

Remove the rear shock absorber fender [2].

Installation

Reverse the removal procedures for installation.



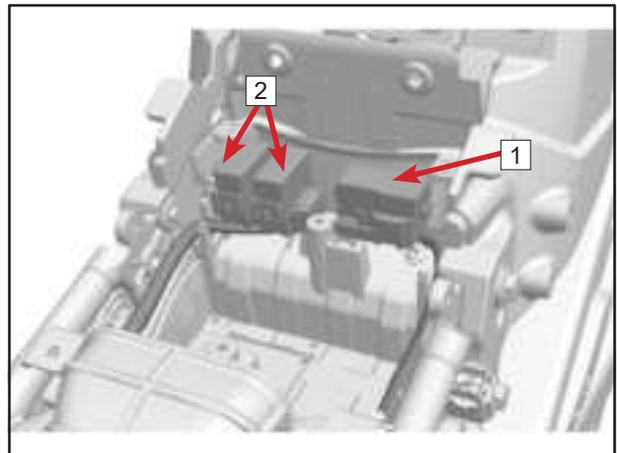
5.18 Battery box and battery cartridge assy

5.18.1 Battery box

Removal

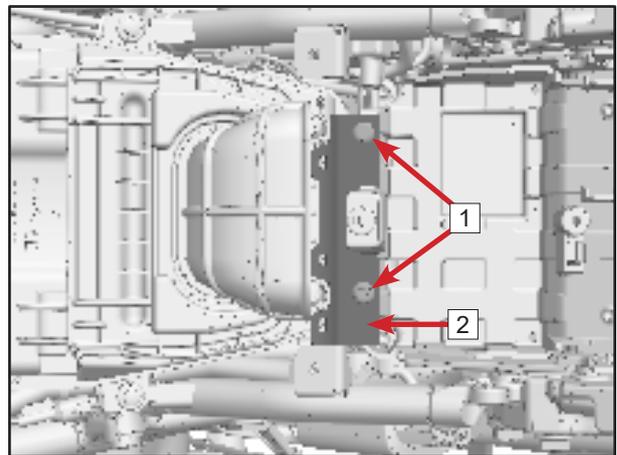
Remove the battery (See the details in chapter 07)

Pull out the fuse box [1] and relay box [2].



Remove the plastic screw [1].

Remove the rubber shield [2].

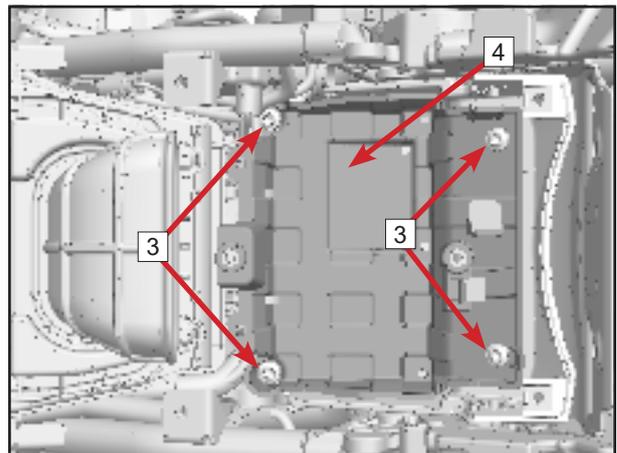


Remove the bolts [3].

Remove the battery box [4].

Installation

Reverse the removal procedures for installation.



5.18.2 Battery box cartridge

Removal

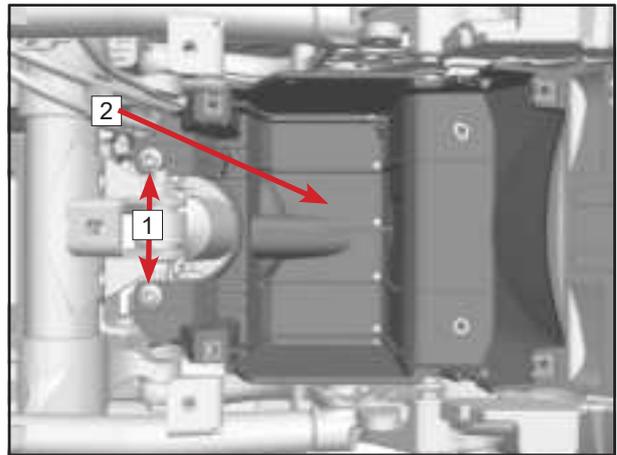
Remove the ECU(See the detailed chapter)

Remove the bolts **1**.

Remove the battery box cartridge **2**.

Installation

Reverse the removal procedures for installation.



5.19 Fender (Double Seats)

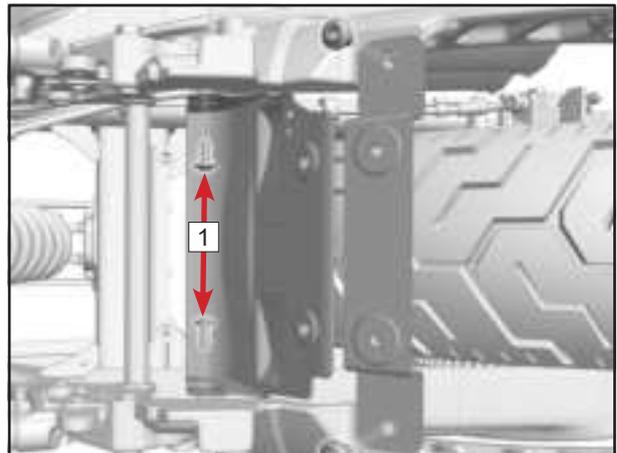
Removal

Remove the bolts **1**.

Remove the battery box cartridge **2**.

Installation

Reverse the removal procedures for installation.



6 Fuel System

6.1 Fuel Tank Removal.....	3
6.2 Fuel Evaporation System.....	4
6.3 Fuel Pump	4
6.4 Fuel level sensor	5

 DANGER:

Fuel is extremely flammable and can be explosive under certain conditions. Always maintain it in a well-ventilated area, turn off the engine in advance and wait for the engine and muffler to cool. No smoking or any acts that cause sparks is allowed in the fuel filling area or fuel storage area.

Never tilt or place upside down the tank. Avoid overflowing onto high temperature parts.

Fuel is toxic and harmful to health. Avoid touching with skin, eyes and clothes. Do not inhale fuel vapor.

If touched skin, wash with plenty of clean water.

If touched to eyes, wash eyes immediately with clean water and see a doctor immediately.

If touched to clothes, change the clothes immediately.

Seek medical attention immediately if accidentally contact your eyes or swallow gasoline.

Dispose of fuel properly to avoid damage to the environment.

 WARNING:

Please use genuine parts for maintenance. Otherwise, the normal operation of the electronic injection system cannot be guaranteed.

During maintenance, do not disassemble electrical parts.

Carefully handle electrical parts during maintenance.

Turn the ignition switch off during unplugging or plugging in connectors to prevent damaging electrical parts.

Do not electrify the oil pump during removal to prevent electric spark and fire.

The fuel pump is not allowed to run in dry condition or in water. Otherwise, its service life will be reduced. The positive and negative wires of the fuel pump can't be connected backwards.

The pressure is high (around 400kPa) in fuel system. All fuel hoses are high-pressure resistance. The fuel rail keeps high fuel pressure even the engine doesn't work. Do not remove fuel hose during maintenance.

Spark jumping test should be carried out only when necessary. The testing time should be as short as possible. The throttle valve should not be opened during the test. Otherwise, a large amount of unburned fuel will enter the exhaust pipe and damage the three-way catalytic converter.

When the fuel system needs to be repaired, the fuel system should be decompressed before the oil hoses are removed. The method of pressure relief: to remove the oil pump relay and start the engine to idle until the engine stops by itself.

Fuel hoses removal and fuel filter replacement shall be operated by professional technicians in a well-ventilated place.

Do not mis-connect the positive and negative pole of battery. Remove the negative wire first if disassembling battery, in case it damages electrical elements. The system of this vehicle uses negative earth mode.

Battery wires are not allowed to be removed while the engine is working.

Battery positive/negative wires and electrical control units have to be removed before welding on the vehicle.

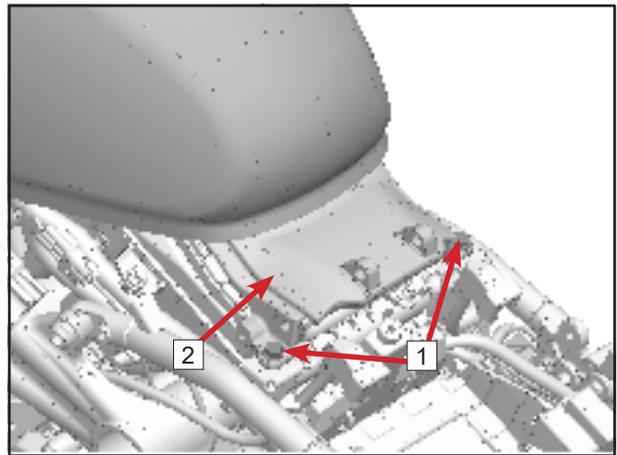
It is forbidden to puncture the wire to test the input/output electrical signals.

Establish the awareness of environmental protection and effective disposal of waste generated during maintenance.

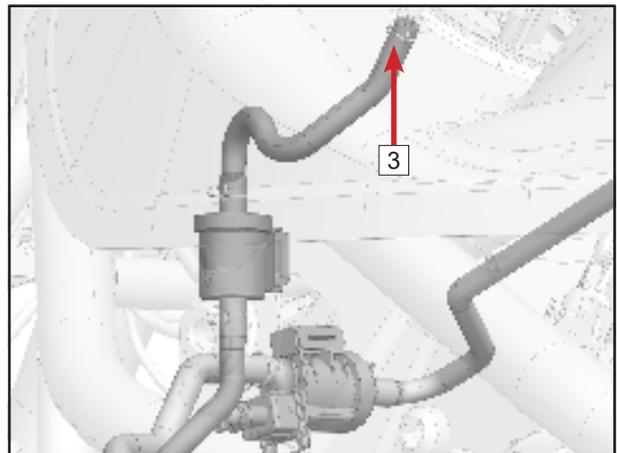
6.1 Fuel Tank Removal

Remove the bolts [1].

Lift the tail part [2] of fuel tank.



Disconnect the fuel adsorption pipe [3].



Disconnect the quick joint of high-pressure fuel pipe [4].

Remove the fuel tank assembly.

⚠ DANGER: Never put fuel tank up side down to prevent fuel leaking.

⚠ WARNING: When installing the fuel tank, install the quick joint of high-pressure oil pipe first, and check that the pipes cannot be squeezed or damaged.



Inspection

Inspect the appearance of fuel tank for dents, cracks or other damages. Replace the fuel tank assembly if it does.

Inspect the hose for cracks, aging or oil leakage. Replace it if it does.

Installation

Reverse the removal procedures for installation.

NOTE: When installing fuel tank, all hoses, pipes and cables can not be extruded or excessive bended.

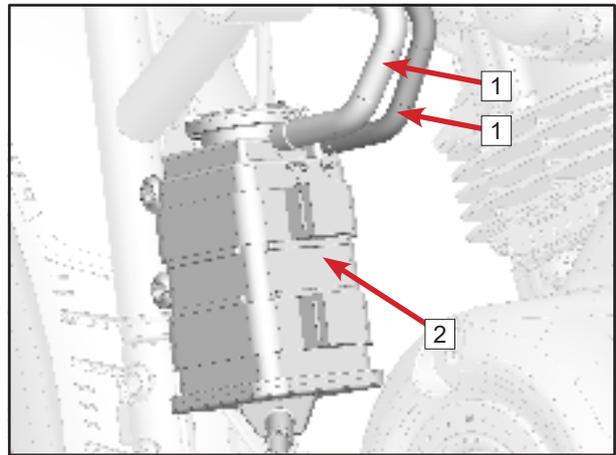
6.2 Fuel Evaporation System

Removal

Remove canister deco cover (refer to chapter 05).

Remove fuel vapor desorption hoses [1].

Remove the canister [2].



6.3 Fuel Pump

Release pressure in fuel system.

Ground the vehicle.

Unplug cables related to fuel pump.

Unplug quick joint. Cover with cloth to prevent fuel leaking.

Remove fuel pump cables and connectors.

Clean fuel tank and fuel pump to prevent foreign matters into fuel tank.

NOTE: Excessive foreign matter in the tank may cause the fuel pump to wear out prematurely or block fuel filter.

Remove bolt [1] to bolt [6] in sequence.

Remove fuel pump [7] carefully.

NOTE: There is still some fuel remained in removed fuel pump. Be careful to transfer the fuel pump into a proper container.

Check the fuel tank for impurities. Clean the tank thoroughly with clean fuel before reinstalling a new fuel pump. Do not use water or other chemicals to clean the tank.

Installation

Put the fuel pump seal ring in place from bottom to top and then position the fuel pump on the mounting hole on fuel tank assembly.

NOTE: The arrow on fuel pump aligns to fuel tank mark all the way.

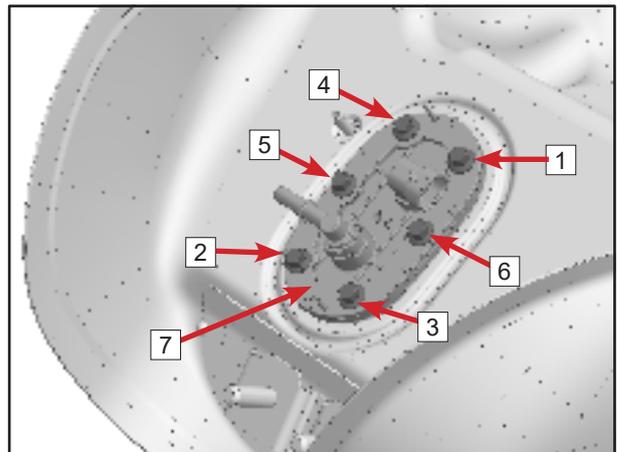
Put fuel pump cap on the junction area of fuel pump and fuel tank.

Install bolt [1] to bolt [2] in sequence.

Plug in quick joint, cables and connectors.

Start to check if fuel pump works.

Fuel pump inspection refers to 08 Electrical System.



6.4 Fuel level sensor

Release pressure in fuel system.

Ground the vehicle.

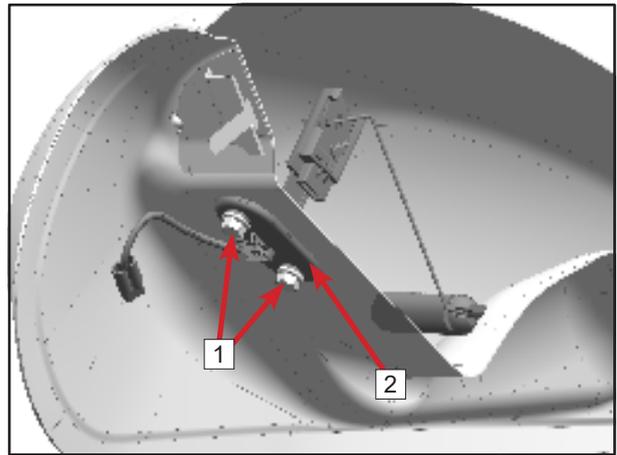
Remove two bolts **1** in criss-cross way.

Remove fuel level sensor **2** carefully.

The fuel level sensor is a bit bent. Lean fuel level sensor during removal to prevent damage.

Installation

Make sure the fuel level sensor face toward the back side of fuel tank. Wrong direction affects the position function of fuel level sensor.



Inspection

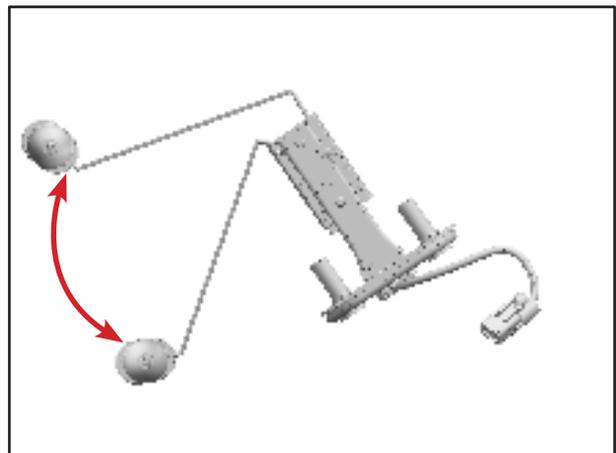
Inspect fuel level sensor seal ring for deformation, damage or hardening. Replace if it does.

Check the electrical resistance of the oil level sensor at high and low poles.

Resistance:

High: $(10 \pm 1.5) \Omega$

Low: $(450 \pm 5) \Omega$



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Connect fuel level sensor and main cable.
Turn on ignition switch, the floater of fuel level sensor swings up and down slowly.
See the fuel gauge pointer on dashboard.

If the pointer can not reach F or E, it means the fuel gauge is not qualified, replace a new one.

If the pointer swings unsteadily, it means the fuel gauge is not qualified, replace a new one.

NOTE: Check leakage after fuel level sensor installation.

7 Lights, Dashboard and Switches

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7.1 Maintenance Information

7.2 Operation Caution

WARNING:

- If the Inspection has to be done 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.

7.2.1 Inspection Standard

Item		Standard
Fuse	Main fuse	30A
	Auxiliary fuse	1×5A 2×7.5A 2×10A 2×15A
Light&Bulb	Headlight	High-beam LED:16W Low-beam LED:27.5W Position light LED:14.5W
	Turn light	LED: 0.5W×3
	Tail light	Rear position light LED: 4.5W Brake light LED: 10.5W

7.3 Trouble Shooting

Switch light cannot turn on, Hi/Lo switch doesn't work.

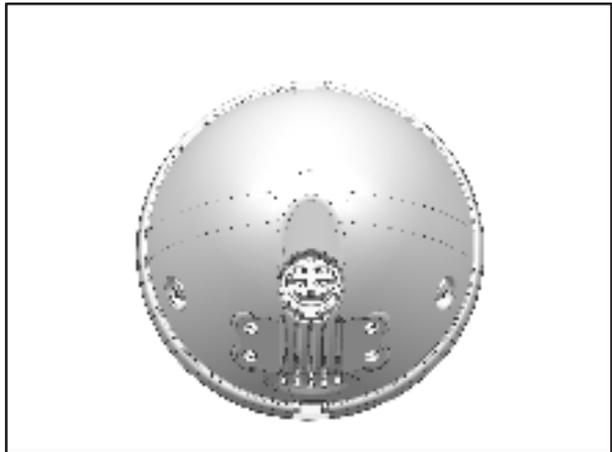
Possible cause:

- 1) Fuse is blown
- 2) Switch is damaged
- 3) Battery bad connection or no electricity
- 4) Abnormal connection such as the needle is withdrawn, the needle is crooked, or the connector is not in place.
- 5) BCM is faulty
- 6) Headlight controller is faulty

Headlight

Removal

Refer to the removal part of chapter 05 Body Covering Part.



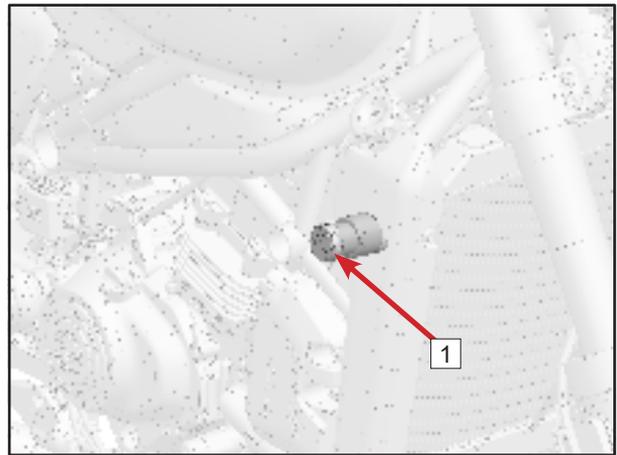
7 Lights, Dashboard and Switches

7.4 Ignition Switch

Inspection

Pull out the connectors between ignition switch 1 and main cable to check its performance.

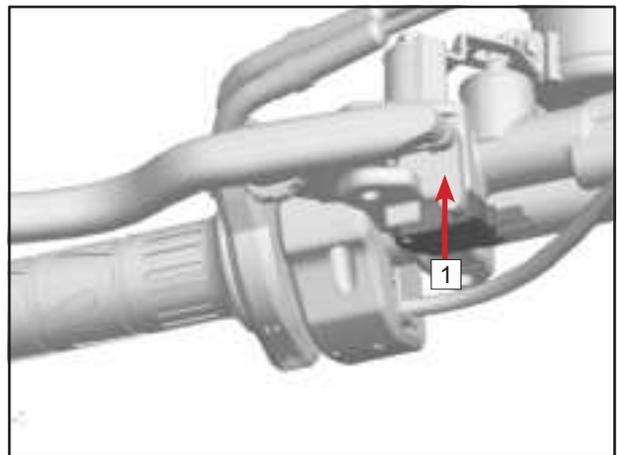
Ignition switch			
Gear/Color	R	B	Occlusion reaches out or not
	●	●	No
			Yes
			Yes



7.5 Front Brake Light Switch

Pull out the connectors between front brake light switch 1 and main cable to check its performance:

1. Grip front brake lever, the brake light is on.
2. Loosen front brake lever, the brake light is off.



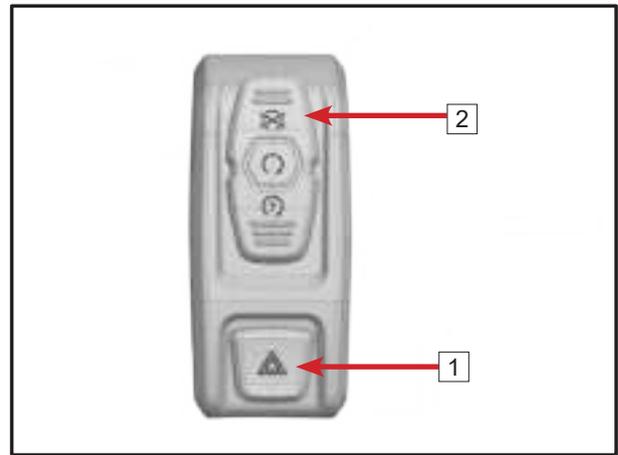
7 Lights, Dashboard and Switches

7.6.2 RH Handlebar Switch

Unplug the connectors between RH handlebar switch and main cable to check its performance.

Warning switch 1			
Function \ Color	O	GR	SB
▲ (press)	●—————●—————●		
▲ (bounce)			

Stop/Start switch 2			
Function \ Color	B/BR	BR/B	Y/R
⊗			
↻	●—————●		
⚡	●—————●—————●		



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7.7 Battery

⚠ CAUTION:

Even if the battery is not used, it also loses power every day.

Charging condition and charging mode are very important for the service life of the battery. Using high charging current will have a negative impact on the service life.

If the charging current, charging voltage and charging time are exceeded, the battery will be damaged.

If the battery becomes empty due to repeated start of the vehicle, it needs to be charged immediately.

When the battery is stored in the discharge condition for a long time, deep discharge and sulfuric acid salination will occur, which damages the battery.

The battery does not need to be maintained, which means the acid level does not need to be checked.

Battery wires are not allowed to be removed while the engine is working.

It is forbidden to puncture the wire to test the input/output electrical signals.

Establish the awareness of environmental protection and effective disposal of waste generated during maintenance.

Battery Removal

Remove the seat.

Remove the battery plate.

Remove negative bolt [1] and positive bolt [2].

Remove the battery [3].

⚠ CAUTION: Negative wire must be removed first. Otherwise, it will cause battery short circuit.

Charging

Turn off all the electrical devices and engine.

Remove the battery.

Connect charger and battery, and charge.

After charging, remove the charger from the battery.

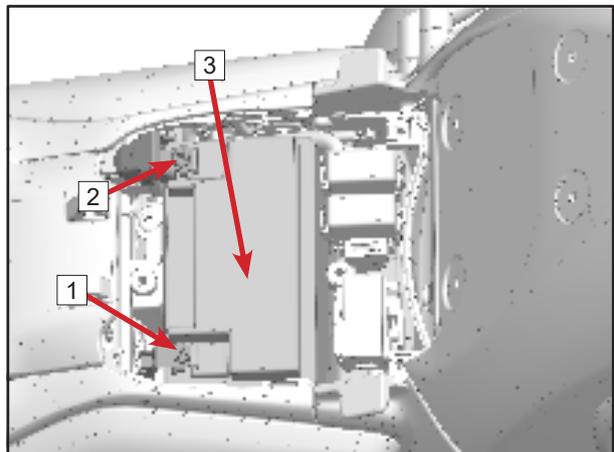
CFMOTO recommends for vehicles not used within 30 days (battery remains in the vehicle) to charge the battery monthly or keep the battery connected to a trickle charger (battery maintainer).

Charging Voltage Inspection

The battery has proper performance and is fully charged.

Start the vehicle and measure the voltage.

Measuring point is positive pole (+), the other measuring point connects ground (-).



If less than specification:

Inspect the connectors between engine and regulator.

Inspect the connectors between regulator and cables.

Inspect engine electronic winding.

If more than specification:

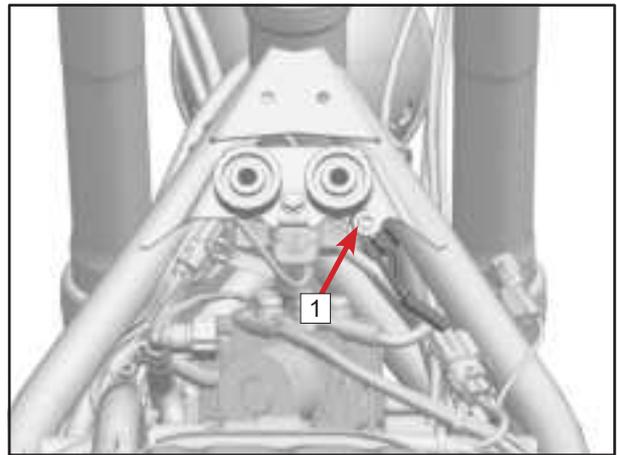
Replace the regulator.

Charge voltage	
5000rpm	13.5V~15.0V

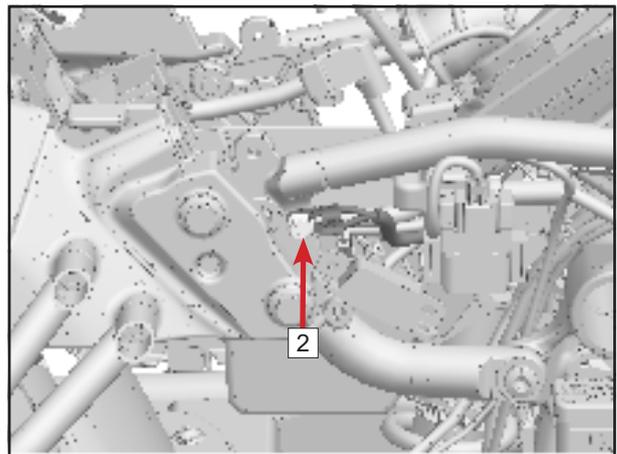
7 Lights, Dashboard and Switches

7.8 Ground Wire

Ground wire **1** locates above the front right side of the frame.



Ground wire **2** locates on the left side of the frame.



Ground wire **3** locates on the left side of the frame.



Inspection

Shut down engine and all electrical parts.
Inspect ground wire for abnormality.
Inspect bolt **1** **2** **3** for looseness.

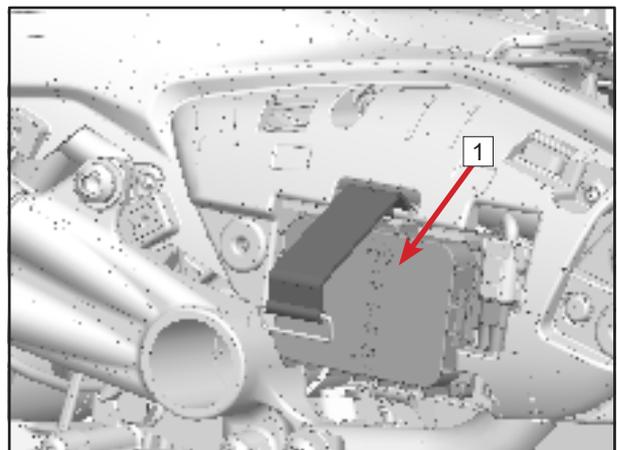
7.9 Vehicle Telematics

Refer to chapter 05

Vehicle telematics (T-BOX) locates in the fuel tank shield.

Remove telematics **1**.

Inspect connectors for performance.



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Telematics (T-BOX) Fault Code

No	DTC Code	DTC	Fault Condition	Release Condition	Possible Cause	Proposal
(demo)	B111716	Vehicle power supply voltage below threshold	1.Ignition state shall be IGN ON; 2.The engine status is not in Cranking;(FV only) 3.Power supply voltage $\leq 9V$, and keep the status at least at $t \geq 1000ms$;"	1.battery voltage $\geq 10V$, and keep the status at least at $t \geq 1000ms$;	Battery voltage too low	Check power supply battery;
1	B111716	The system power supply voltage is too low	1.Ignition state shall be IGN ON; 2.The engine status is not in Cranking;(FV only) 3.Power supply voltage $< 9V$, and keep the status at least at $t \geq 1000ms$;	1.battery voltage $\geq 10V$, and keep the status at least at $t \geq 500ms$;	Battery voltage too low	Check power supply battery;
2	B111717	The system power supply voltage is too high	1.Ignition state shall be IGN ON; 2.The engine status is not in Cranking;(FV only) 3.Power supply voltage $> 16V$, and keep the status at least at $t \geq 1000ms$;	1.battery voltage $\leq 15V$, and keep the status at least at $t \geq 500ms$;	Battery voltage too high	Check power supply battery;
3	U007388	BICAN main cable BusOff	1.Ignition state shall be IGN ON; 2.Power supply voltage is in the range of 9-16V; 3.BusOff fault definition Refer to ISO-11898-1 is met;	1.Refer the BusOff fault demature definition in ISO-11898-1;	CAN bus circuit is short or open	Check the CAN bus circuit or EMC.
4	U118287	MMI point communication lost	1.Ignition state shall be IGN ON; 2.Power supply voltage is in the range of 9-16V; 3.The condition of diag enable time=1.5s is met; 4.Lost MMI(CANID=0x151) message time ≥ 10 times the transmission cycle and Lost MMI(CANID=0x151) message time $\geq 500ms$;	1.Received MMI (CANID = 0 x 151) message at least once;	CAN bus circuit is short or open	Check the CAN bus circuit or EMC.

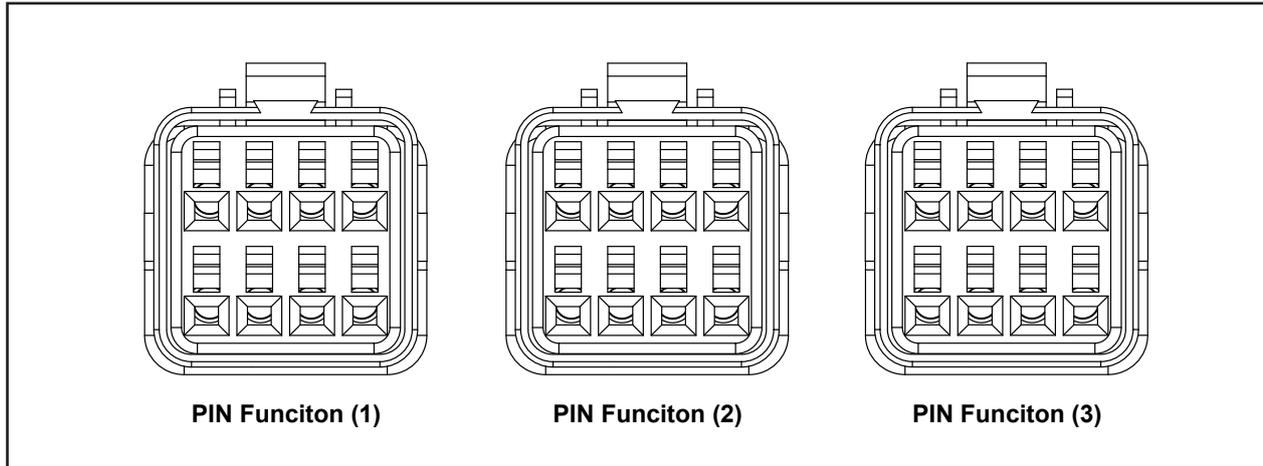
7 Lights, Dashboard and Switches

5	U11C087	BCM point communication lost	<p>1.Ignition state shall be IGN ON;</p> <p>2.Power supply voltage is in the range of 9-16V;</p> <p>3.The condition of diag enable time=1.5s is met;</p> <p>4.Lost BCM(CANID=0x150) message time >= 10 times the transmission cycle and Lost BCM(CANID=0x150) message time >= 500ms;</p>	1.Received BCM (CANID = 0 x 130) message at least once;	CAN bus circuit is short or open	Check the CAN bus circuit or EMC.
6	B1A4087	KL15 is open, KL30 disconnects	When KL15 is open, KL30 disconnects for more than 30s	KL15 is open KL30 connects for more than 1s	Wire damage	
7	U220D00	The network management limps home. Procedure	<p>1.Power supply voltage is in the range of 9-16V;</p> <p>2.Nmrxcnt >4 or Nmtxcnt >8;</p> <p>3.tLimpHomeDTC >= 2000ms.</p>	1.Received and sent ring message successfully at least once;	CAN bus circuit is short or open	Check the CAN bus circuit or EMC.

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7.10 Dashboard

7.10.1 Dashboard Pin Function



PIN Funciton(1)			
Pin	Cable color	Function	Description
1	Red	Power Positive	Constant 12V Power
2	G/B	Power negative	GND
3	B/BR	E-door lock	12V
4	O/W	Handlebar switch: up	Active Low
5	Y/W	Handlebar switch: down	Active Low
6	L/Y	Handlebar switch: confirm	Active Low
7	BR/W	Handlebar switch: return	Active Low
8	R/L	Oil pressure pilot lamp	GND Signal, GND Lights Up

PIN Funciton(2)			
Pin	Cable color	Function	Description
1	B/W	Gear signal 1	GND Displays 1st Gear
2	R/W	Gear signal 2	GND Displays 2st Gear
3	Y/B	Gear signal 3	GND Displays 3st Gear
4	GR/B	Gear signal 4	GND Displays 4st Gear
5	LG/Y	Gear signal 5	GND Displays 5st Gear
6	LG/BR	Gear signal 6	GND Displays 6st Gear
7	W/Y	Gear signal N	GND Neutral Gear Lights Up
8	L/W	Fuel signal	Resistance signal

PIN Funciton(3)			
Pin	Cable color	Function	Description
1	Blue	High-beam light pilot lamp	High side control signal 12V
2	Orange	LH turn light pilot lamp	High side control signal 12V
3	Sky Blue	RH turn light pilot lamp	High side control signal 12V
4	Brown	Position light	High side control signal 12V
5	P/G	CAN-H	Speed signal RPM signal Water signal Time signal pilot lamp signal(Indicators lit by hardwired signals not included)
6	G/L	CAN-L	
7	/	reserved	reserved
8	/	reserved	reserved

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8.1 Service Tool

CFMOTO DSCAN

Function: Read erase trouble code of EFI system, observe data flow and re-write ECU programs, etc.



Digital multimeter

Function: Inspect the parameter of EFI system like voltage, current and resistant etc.



8.2 Charging System

8.2.1 Magneto Coil Resistance

Measure 3-phase magneto stator coil resistance. If the resistance is out of specification, replace with a new stator.

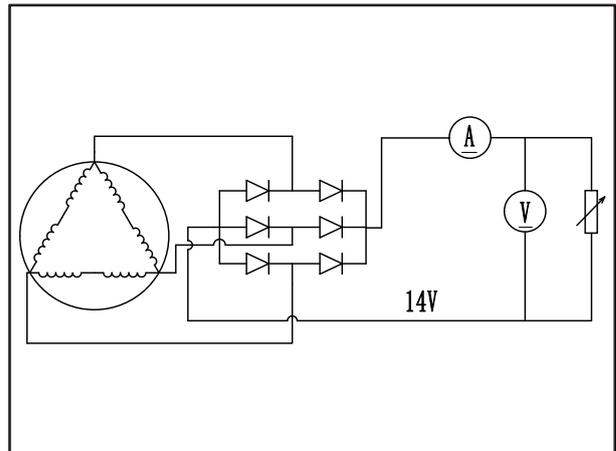
MAG Coil Resistance:

0.55Ω~1.5Ω (Yellow-Yellow).

Resistance: ∞ Ω (Yellow - Ground).

Check for the insulation between stator coil and core.

Turn multimeter to 1×10Ω.

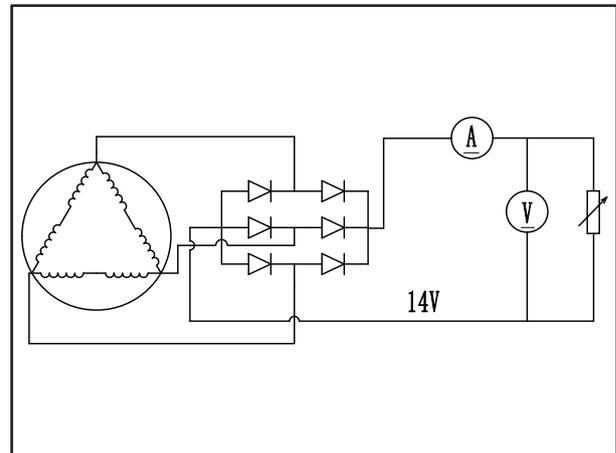


8.2.2 MAG Non-loaded Performance

Start the engine and allow it run at 5000r/min. Use multimeter to measure the voltage between 3 output lines. If the reading is below specification, replace with a new magneto.

Voltage between Output Lines When MAG Non-loaded: >50V(AC) at 5000r/min

Turn Multimeter to **V(AC)**.



8.2.3 Starter Relay

Put DC12V between positive and negative terminal. Use multimeter to check connection between 2 contacts.

If multimeter clicks, there is connection.

If DC12V is removed, no connection between contacts.

If both above 2 items are proved, it indicates the replay is good. Turn multimeter to DIODE.

⚠ CAUTION: The voltage loaded between terminals can not exceed 2 minutes. Otherwise, starter relay may overheat or burn.

Use multimeter to measure the start relay coil resistance. Replec it if the resistance is out of the specified range of 3Ω to 5Ω .

Turn multimeter to $1X10\Omega$.

Auxiliary Relay

Put 12V between auxiliary starter relay positive and negative terminal. Use multimeter to check the continuity between A and B.

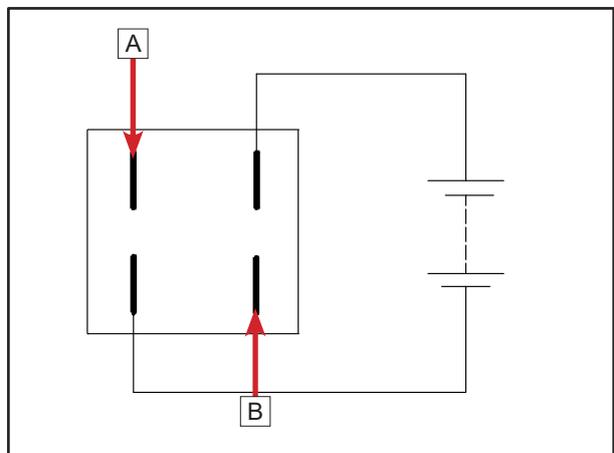
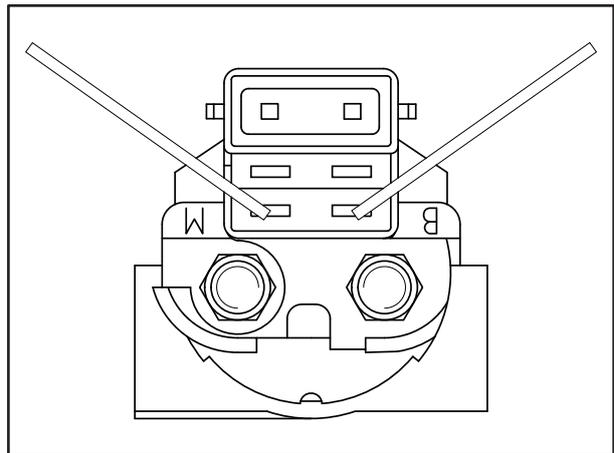
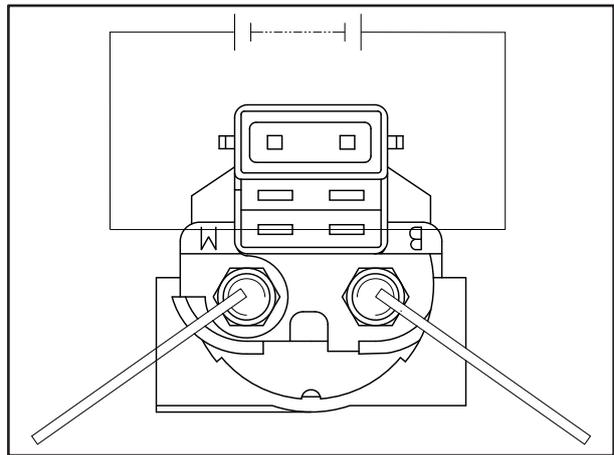
Turn multimeter to DIODE.

If multimeter clicks, it indicates there is connection between A and B.

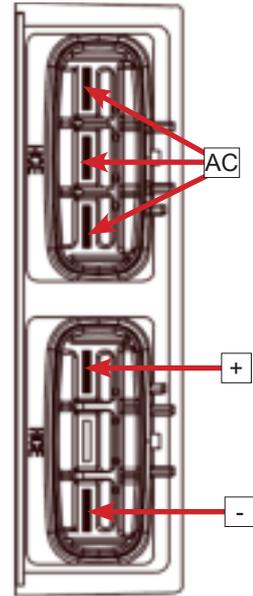
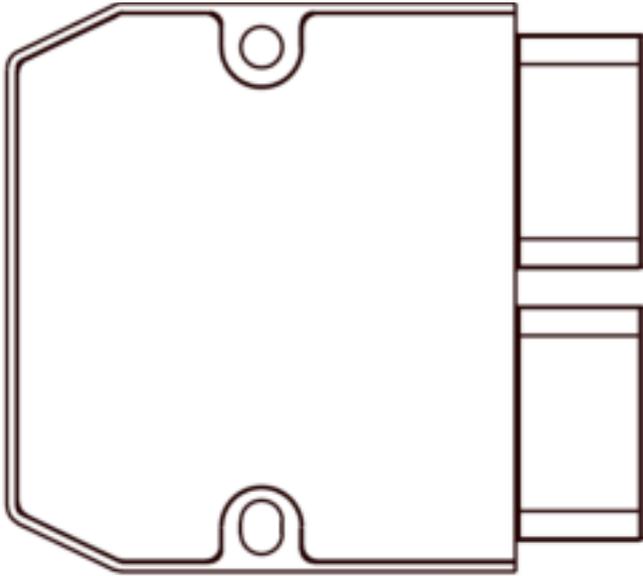
If 12V is removed, no connection remains between contacts.

If both above 2 items are proved, it indicates the replay is good.

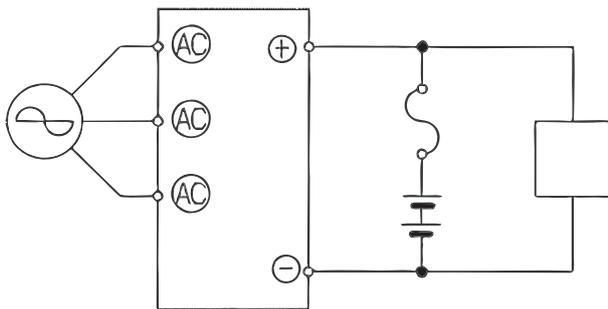
Auxiliary starter relay resistance: $90\Omega\sim 100\Omega$



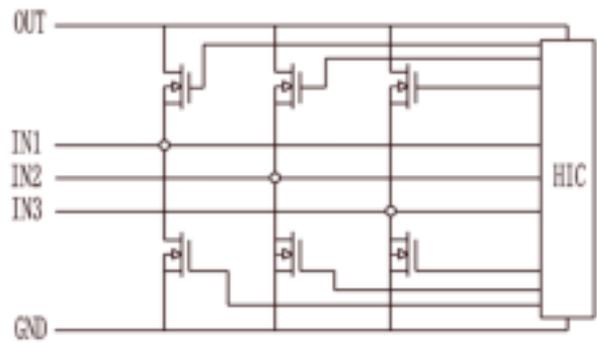
8.2.4 Regulator



Connection Diagram

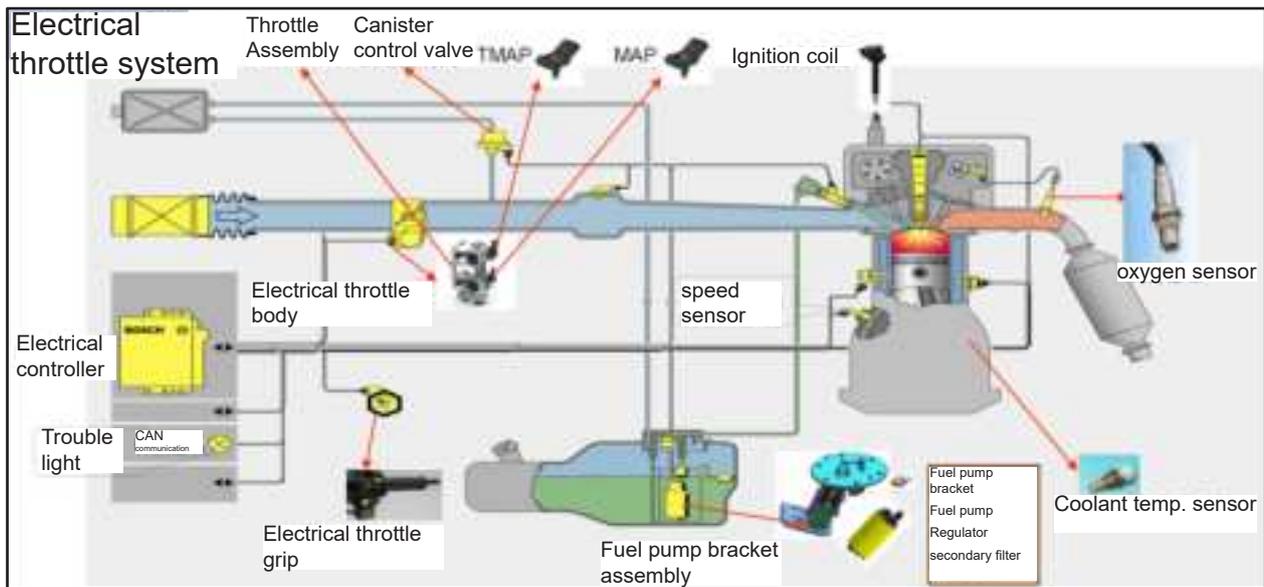


Line Diagram



8.3 EFI System

8.3.1 EFI Structure



8.3.1.1 Sensors

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

- **Air pressure sensor (Load information)**
- **Air temp. sensor (Air density information)**
- **TPS (Load, load range, speed information)**
- **Trigger (Crankshaft information)**
- **Water temp. sensor (Engine temp.)**
- **Speedometer sensor (Output shaft RPM information)**
- **Gear sensor (Gear information)**
- **Oxygen sensor (Air factor= $\lambda > 1$ or < 1)**
- **Roll-over gear sensor (Output vehicle gradient information)**

8.3.1.2 ECU

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

8.3.1.3 Actuators

Actuators execute the EFI instruction. Main actuators include:

- **Fuel Pump** (Provide high-press fuel)
- **Fuel Injector** (Inject the fuel to make it spray better)
- **Ignition Coil** (Provide high ignition energy to spark plug)
- **Idle Air Control Valve** (Provide idle inlet air)

8.3.2 EFI System Maintenance Notice

- Always use genuine CFMOTO parts for maintenance. Otherwise it can not assure a normal performance to EFI system.
- During the maintenance procedure, never try to 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 400kPa), 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.
- 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 EFI system, so it's unadjustable.

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.

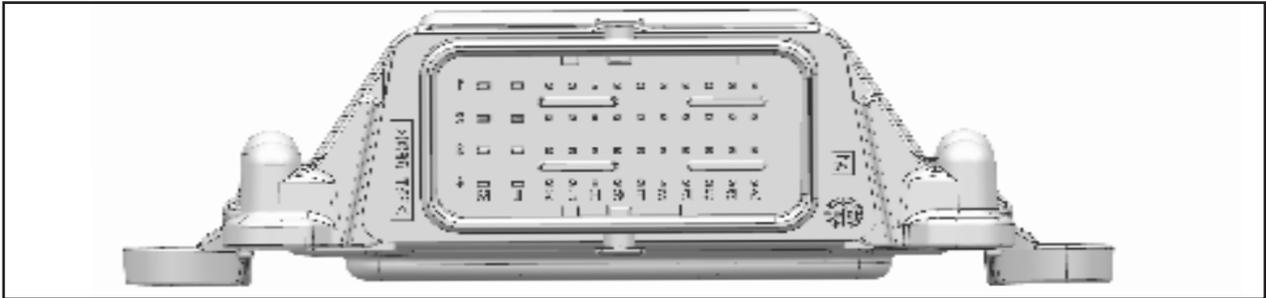
- Don't reverse the battery cable connections. This may damage electrical components. This system uses negative ground.
- Never remove the battery cables When the engine is running.
- Always remove cables and electrical control units which are connected with battery terminals.
- Never test the component input and output electric signal by piercing the cable plastic jacket.
- Respect the environment and dispose of the waste left during maintenance.

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8.3.3 Structure and Performance of EFI Parts

8.3.3.1 ECU

Electronic control unit , is the brain of EFI system. It analyzes and cope with the information provided by sensors, and send the conclusion in the form of instruction to actuator, then make the engine run in the optimal condition.

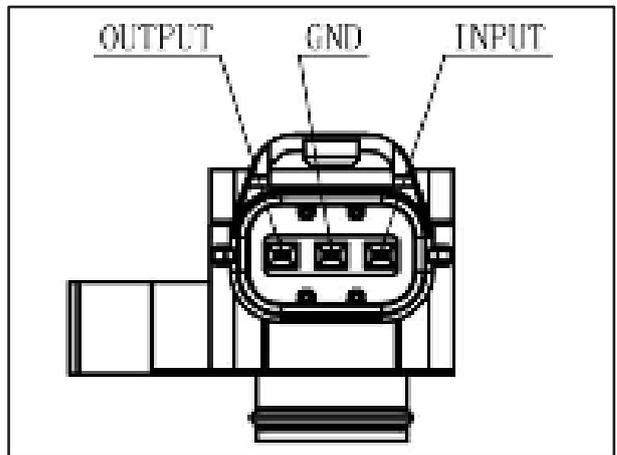
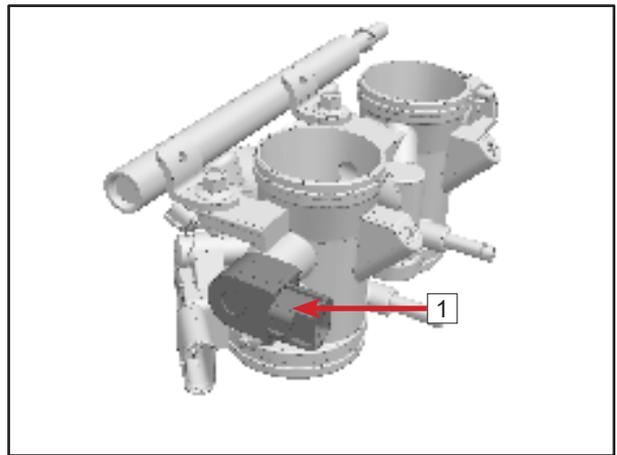
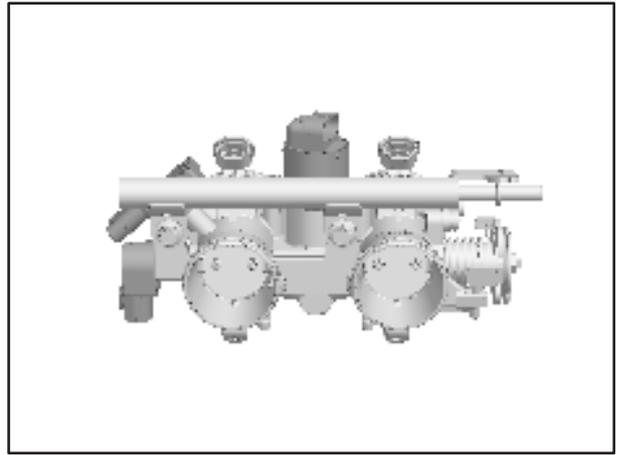


ECU pin function:

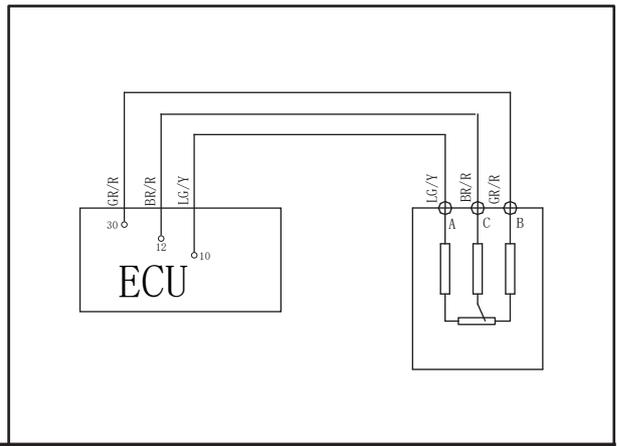
Item	Pin Function	Item	Pin Function	Item	Pin Function
1(M1)	Oxygen sensor heated 2	2(L1)	Oxygen sensor heated 1	3(M2)	Ignition coil 1
4(L2)	Secondary gulp valve	5(M3)	Ignition to ground	6(L3)	Canister valve fuel evaporation control
7(M4)	Ignition coil 2	8(L4)	Interruptible battery UBR1	9(K1)	Intake air pressure sensor 1 (DS)
10(J1)	Sensor to ground 1	11(H1)	Intake air temp. sensor (TANS)	12(G1)	TPS (DKG)
13(F1)	Engine temp. sensor (TMOT)	14(E1)	Main relay	15(D1)	CAN1 I/F 1 Low
16(C1)	CAN1 I/F 1 High	17(B1)	Stepping motor phase D	18(A1)	Stepping motor phase C
19(K2)	Oxygen sensor signal 1	20(J2)	Oxygen sensor 2	21(H2)	Ignition diagnosis 2
22(G2)	Null	23(F2)	Side stand switch	24(E2)	Null
25(D2)	Null	26(C2)	Starter relay	27(B2)	Stepping motor phase A
28(A2)	Stepping motor phase B	29(K3)	MIL	30(J3)	5V output 1
31(H3)	Null	32(G3)	Ignition switch	33(F3)	Uninterrupted battery (UBD)
34(E3)	K_line	35(D3)	Neutral switch	36(C3)	Ignition diagnosis 1
37(B3)	Clutch switch	38(A3)	Roll-over switch	39(K4)	Mode switch
40(J4)	RPM output	41(H4)	Speed signal	42(G4)	RPM sensor B (DGB)
43(F4)	RPM sensor A (DGA)	44(E4)	Headlight relay	45(D4)	Fan relay
46(C4)	Fuel pump relay	47(B4)	Injector 2	48(A4)	Injector 1

8.3.3.2 Throttle Body

Connect with air filter and the engine, control the on-off angle of throttle by throttle cable. Send out the angle signal through TPS to ECU.



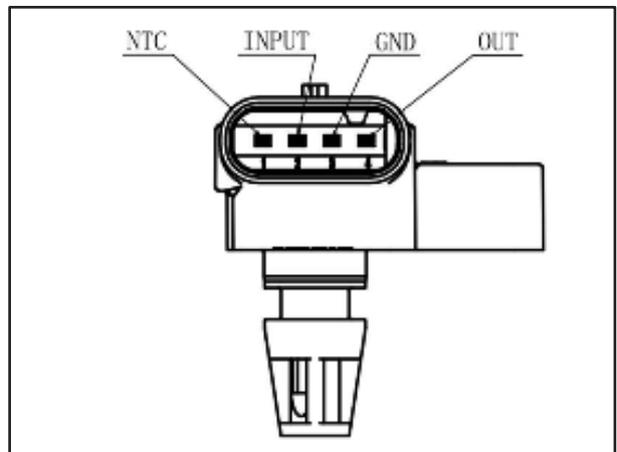
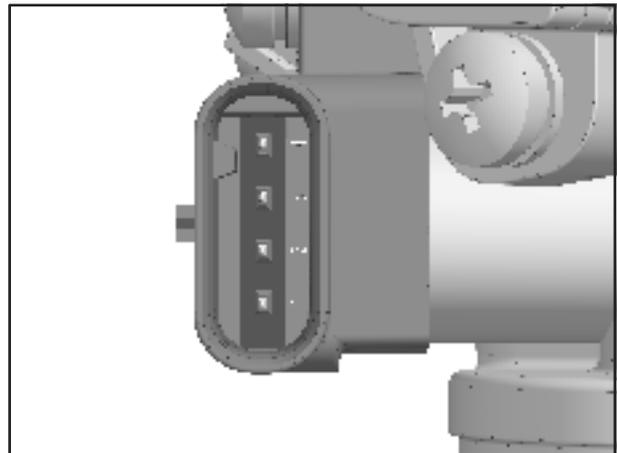
Circuit connecting with ECU.



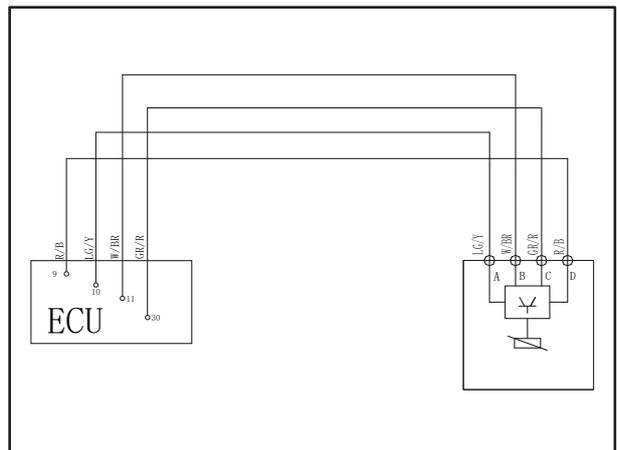
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8.3.3.3 T-MAP

This sensor monitor inlet air pressure, which provides the engine load signal to ECU.



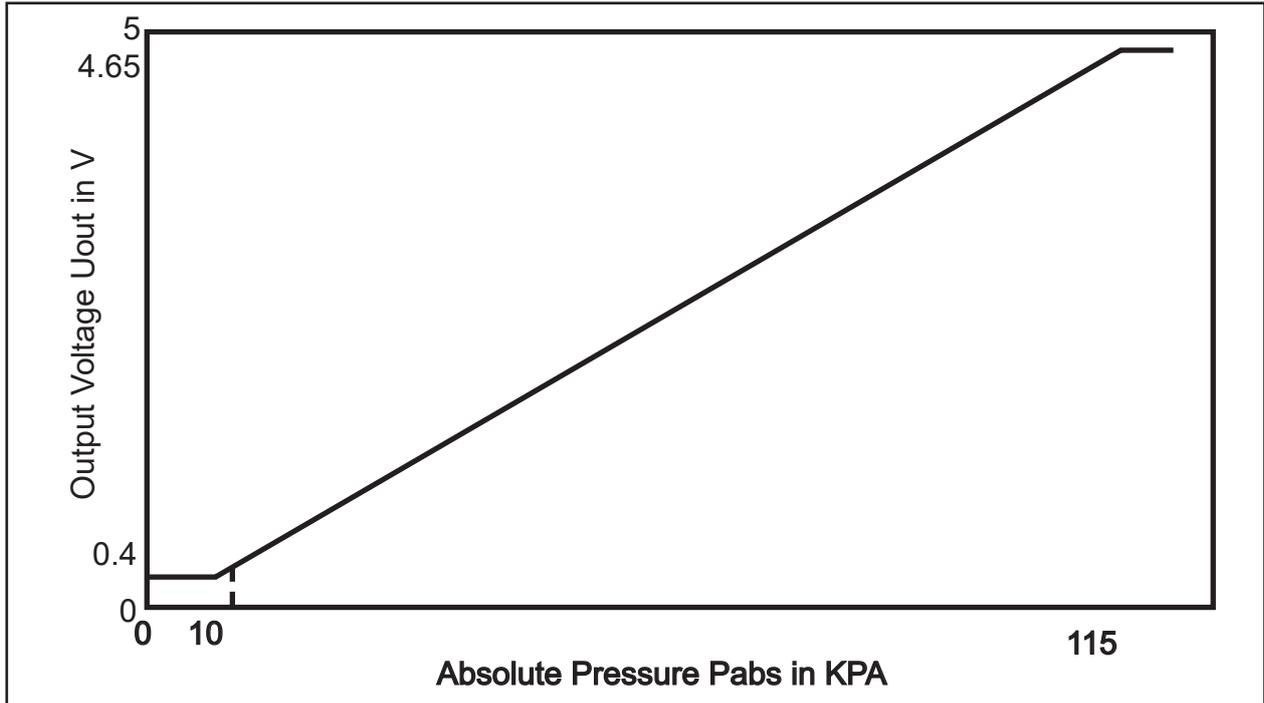
Circuit connecting with ECU.



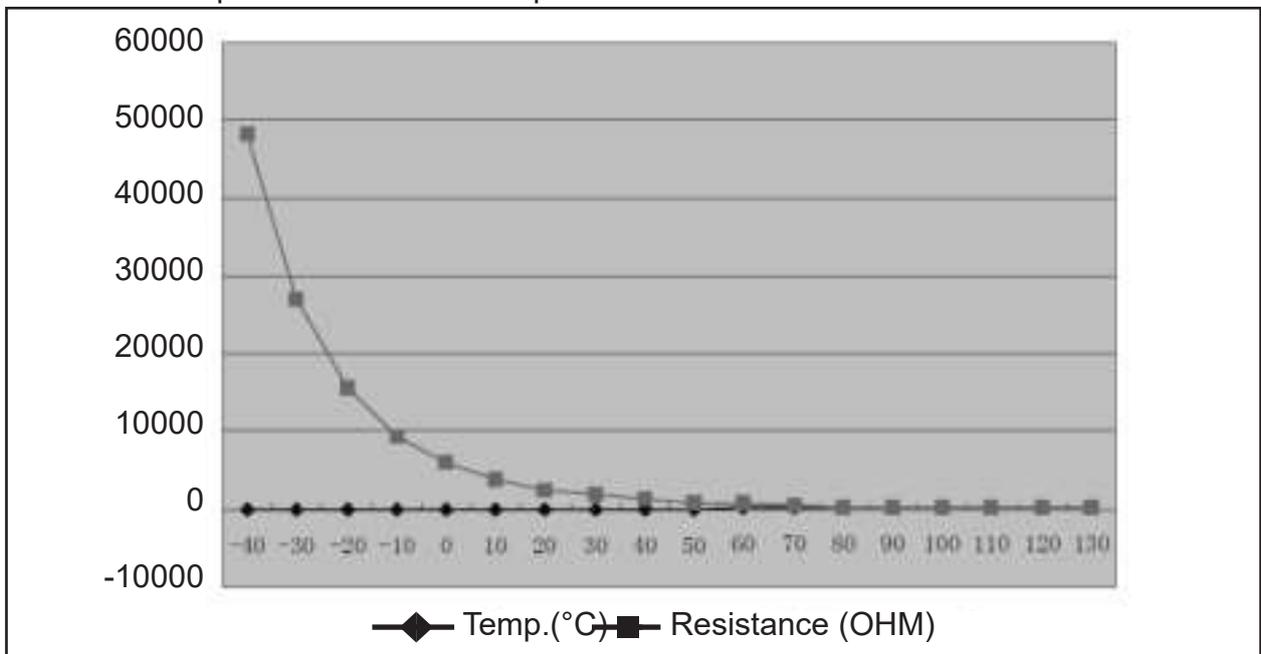
8 Electrical System

The relationship between output voltage and pressure.

Pressure range: (10~115) kPa



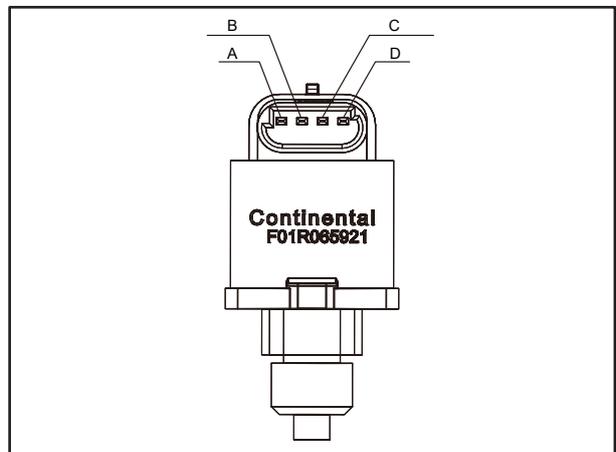
The relationship between sensor temperature and resistance.



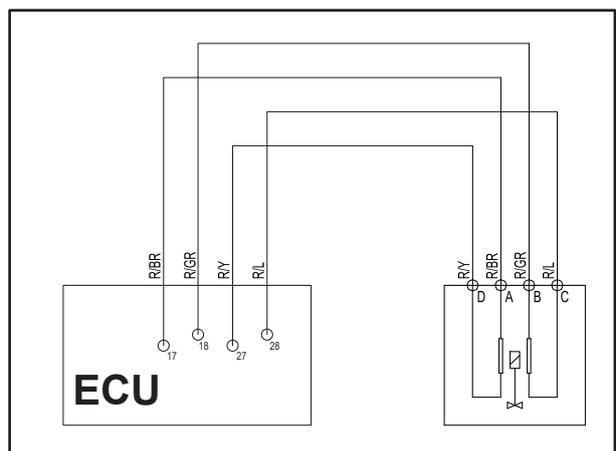
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8.3.3.4 Idle Stepper Motor

This sensor monitor inlet air pressure, which provides the engine load signal to ECU.



Circuit connecting with ECU.



8 Electrical System

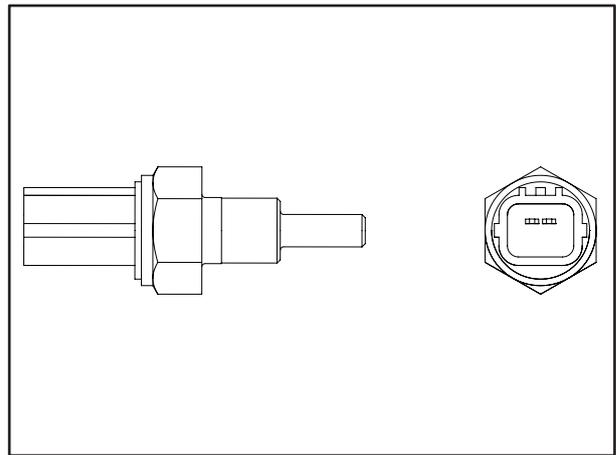
8.3.3.5 Water Temp. Sensor

This sensor is a NTC thermo resistance. The resistance becomes lower when the air temperature becomes higher, but it is not a liner relationship.

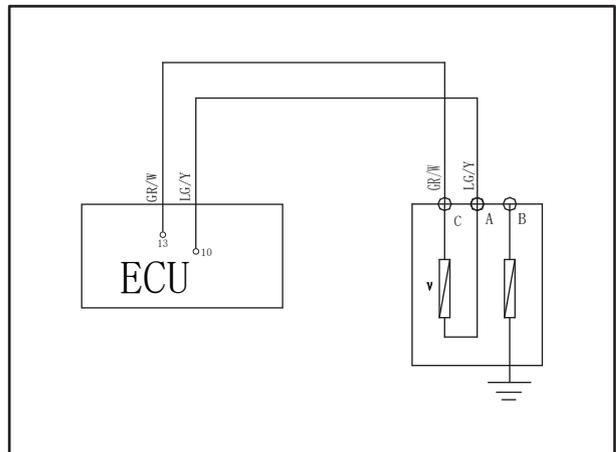
One group of parameters is sent to ECU to monitor engine temperature condition, One group is sent to dashboard to monitor coolant temperature condition.

A and C are one group which provides water temperature signal to the ECU.

Through ECU, B sends the water temperature signal to dashboard.



Circuit connecting with ECU.



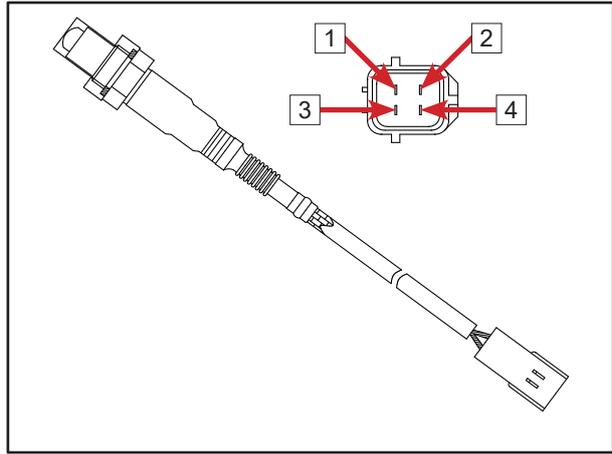
The right table shows the relationship between picture A, C and temperature and resistance. This signal is sent to ECU.

Temp.°C	Resistance between B and housing (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

8.3.3.6 Oxygen Sensor

This sensor is used in closed-loop feedback controlled fuel injection to improve the air-to-fuel ratio accuracy and control the emission.

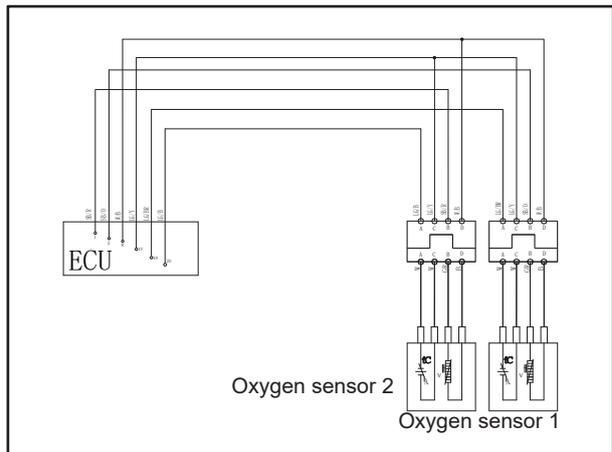
It's located in the exhaust stream to measure the amount of oxygen in exhaust and send the signal to ECU, which can revise the fuel injector output, so as to reduce the amounts of unburnt fuel and make catalytic converter convert HC, CO and NO_x of Nitrogen efficiently.



Pin Function:

1. Output signal voltage +
2. Output signal voltage -
3. Heated ground -
4. Heated power +

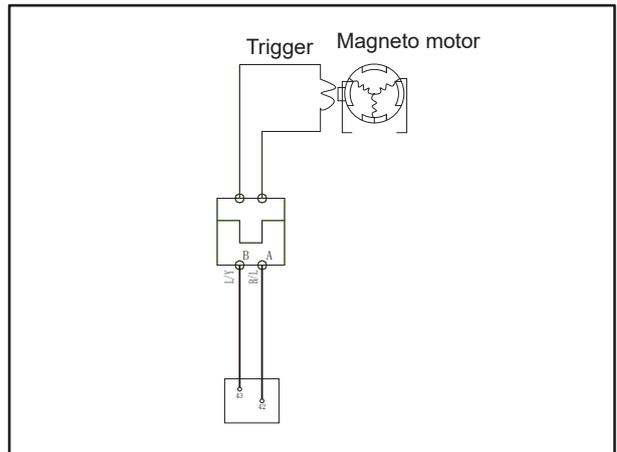
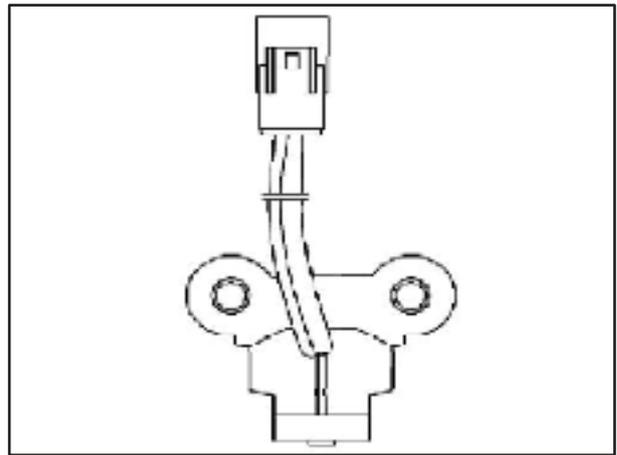
Circuit connecting with ECU.



8.3.3.7 Trigger

The trigger transfers signal of engine speed to ECU and by which ECU to confirm engine speed ignition angle and injecting phase.

Circuit connecting with ECU.



Measure trigger resistance

Set multimeter to $1 \times 100\Omega$ range.

Trigger coil resistance: $260\Omega \sim 300\Omega$ (20°C)

Replace a new one when resistance is not within above value range.

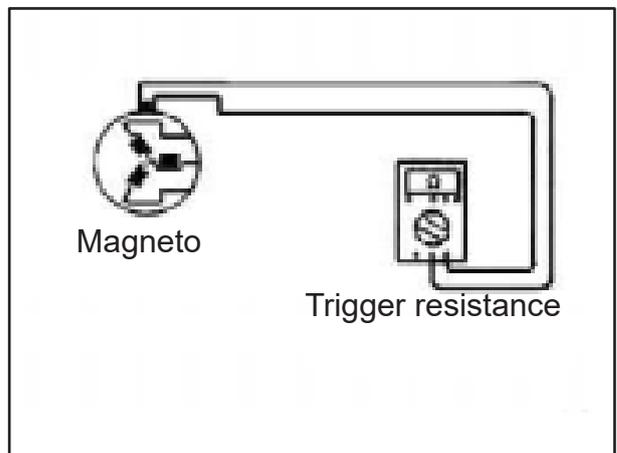
Measure trigger peak voltage

Connect multimeter and peak voltage adapter as shown as right picture:

+ Probe: Green (B) wire

- Probe: Blue (A) wire

NOTE: Refer to owner manual when using peak value voltage adapter.



Set multimeter to ACV range.

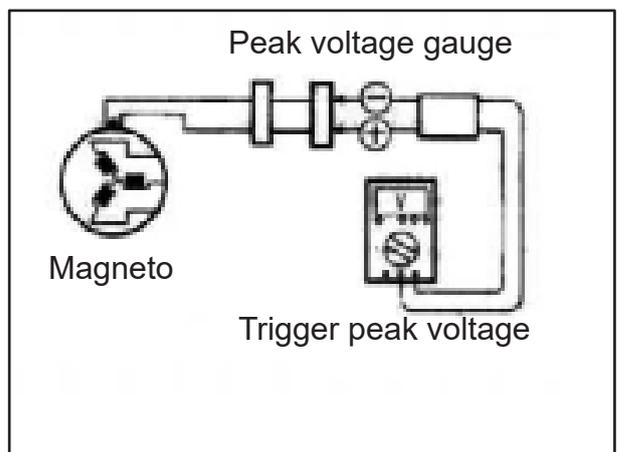
Set engine to Neutral gear, turn on ignition switch.

Press starter button and keep engine running for seconds, then measure trigger coil peak value voltage.

Repeat a few times and record the highest value.

Trigger coil peak value voltage: $\geq 20\text{V}$ (1300r/min)

Replace a new one when peak value voltage is not within above value range.



8.3.3.8 Fuel Pump

The right picture shows the fuel pump assembly, fuel pump relay and ECU wiring diagram.

This fuel pump assembly consists of fuel pump, plastic bracket, fuel strainer, fuel filter element and pressure-regulating valve. It delivers fuel from the tank to the engine at a certain fuel pressure and flow rate.

Pin function:

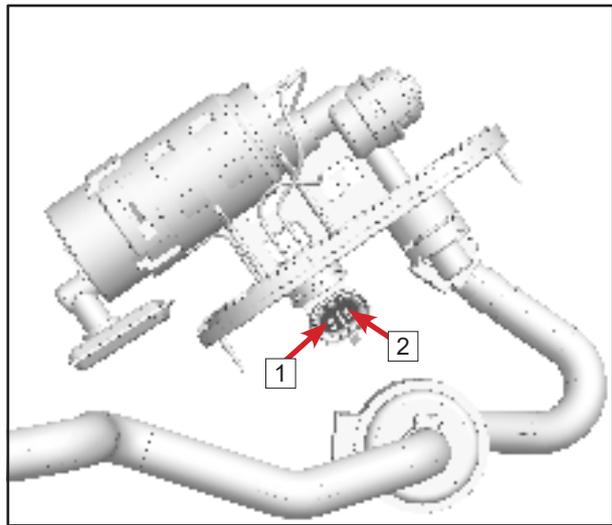
①: Ground

②: Fuel pump relay output port

Performance parameter:

Pressure-regulating valve open pressure:
(0.4±0.007) MPa

Flow rate: 80L/h



Install the fuel pump assembly on the fuel tank.

Do not run the fuel pump assembly when there is no fuel inside the fuel tank, in case of fuel pump damage.

Handle the fuel pump gently. Do not drop it on hard surfaces.

The battery supplies power to the fuel pump through the relay. Only when starting or running the engine can the circuit be switched on.

Measure fuel pressure:

Connect fuel pressure gauge and fuel pump fuel port, lock with clamp to ensure there is no leak from the junction.

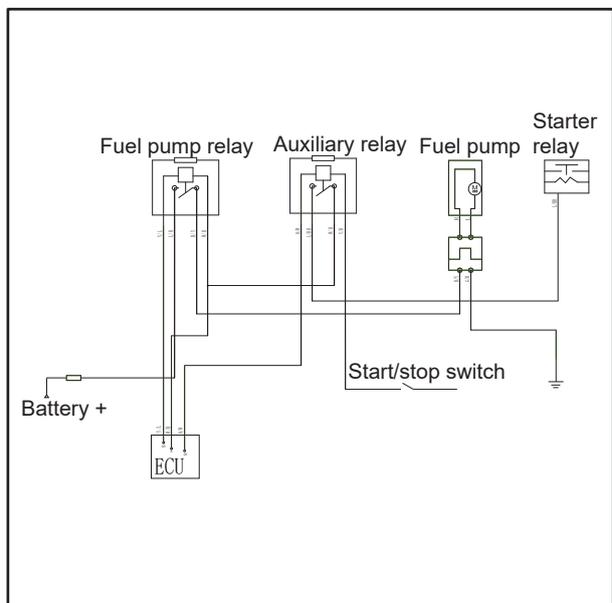
Connect the circuit as the picture shows.

Turn on ignition switch and stop switch.

The fuel pump will work for 5 seconds. When stop working, the fuel pressure should reach the specified value. Otherwise, replace with a new fuel pump. After stopping working, the pressure should maintain **0.2MPa for at least 5 minutes**.

Fuel hose pressure release method:

The fuel supply pressure in EFI system is high, all fuel hoses are high-pressure resistance. Even the engine does not work, the pressure in fuel passage is still high. So when in the maintenance process, be careful not to remove the fuel hose casually. When servicing EFI system, release the pressure before removing the fuel hose.



Remove the fuel pump relay. Start the engine and make it idle until the engine stops automatically.

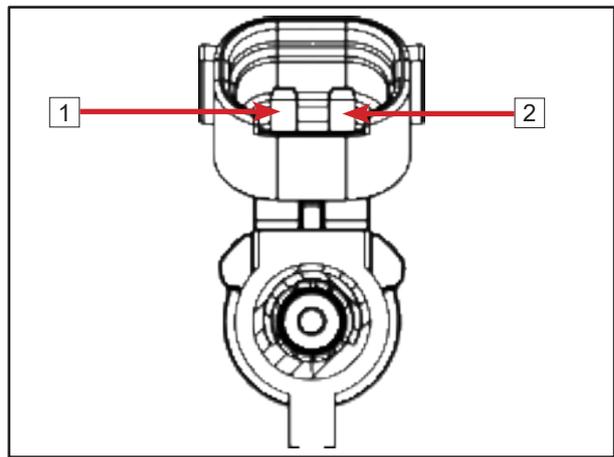
8.3.3.9 Fuel Injector

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.

Pin function:

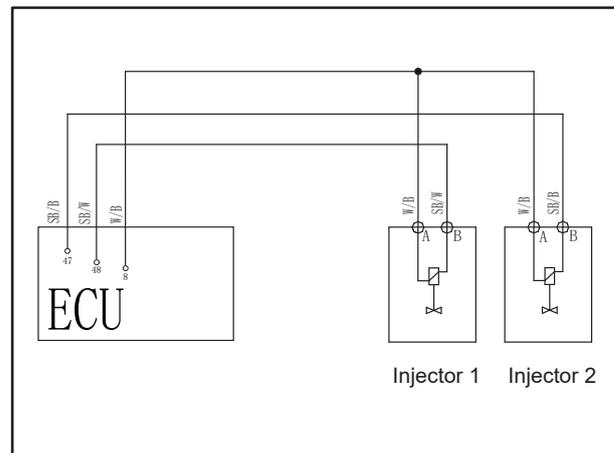
- 1: + connects fuel pump relay
- 2: - connects ECU

Fuel injector resistance: $12\Omega \pm 0.6\Omega (20^\circ\text{C})$



1	+ connects fuel pump relay	2	- connects ECU
---	----------------------------	---	----------------

Circuit connecting with ECU.



Fuel Injector Installation:

Install fuel injector manually. Never knock fuel injector with a hammer.

When removing and installing fuel injector, the O-rings on both ends must be replaced.

Perform pressure relief before fuel injector removal if necessary.

Test the fuel injector sealing after installation to ensure no leaks.

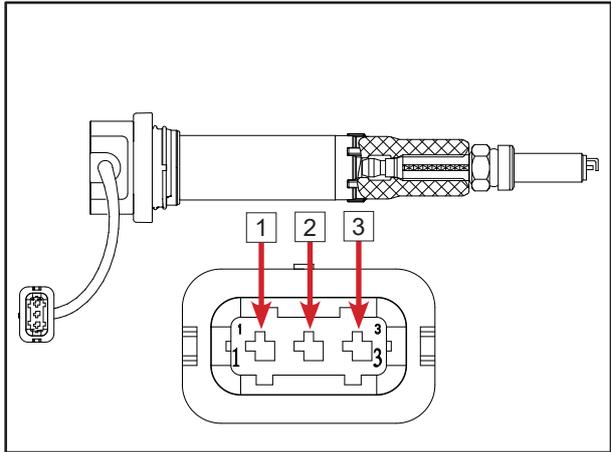
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8.3.3.10 Ignition coil

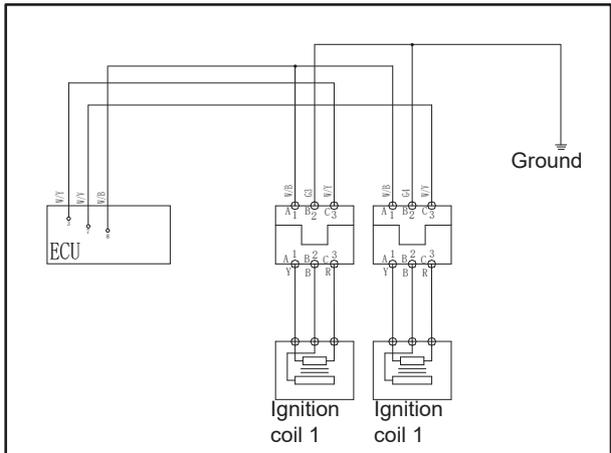
Ignition coil transforms the low voltage of primary coil to high voltage of secondary coil needed to spark the spark plug and ignite the mixture of air and fuel in cylinder.

Pin function:

- 1 . Signal
- 2 . Ground
- 3 . Power



Circuit connecting with ECU.



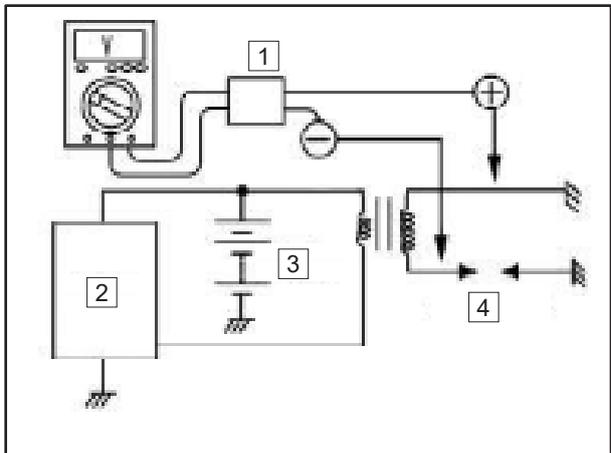
Secondary Ignition Voltage Test:

Connect the engine according to EFI wiring diagram.

Connect the peak voltage tester according to the right diagram.

Start the engine.

Secondary ignition voltage should be more than 15 kV.



Ignition coil parameter chart table:

1	Peak voltage gauge	3	Battery
2	ECU	4	Spark plug

Item	Value			Unit	
	Min	Standard	Max		
Stated Voltage		14		V	
Operating Voltage	6		16.5	V	
Resistance (20°C~25°C)	Primary	0.74	0.76	0.78	Ω
	Secondary	/	2600	/	kΩ
Primary Current		7		A	

8.3.4 UP6.0 Fault Code

No.	Code	Instruction
1	P0030 00	1 Oxygen Sensor Heated Control Circuit Faulty
2	P0031 00	1 Oxygen Sensor Heated Control Circuit Low
3	P0032 00	1 Oxygen Sensor Heated Control Circuit High
4	P0050 00	2 Oxygen Sensor Heated Control Circuit Faulty
5	P0051 00	2 Oxygen Sensor Heated Control Circuit Low
6	P0052 00	2 Oxygen Sensor Heated Control Circuit High
7	P0053 00	2 Oxygen Sensor Heated resistance Unreasonable
8	P0059 00	Air Intake Pressure Sensor 2 Signal Unreasonable
9	P0130 00	1 Oxygen Sensor Signal Unreasonable
10	P0131 00	1 Oxygen Sensor Signal Circuit Voltage Low
11	P0132 00	1 Oxygen Sensor Signal Circuit Voltage High
12	P0133 00	Delay Reaction of 1 Oxygen Sensors to Thick Mixture and Thin Mixture
13	P0134 00	1 Oxygen Sensor Signal Circuit
14	P0150 00	2 Oxygen Sensor Signal Unreasonable
15	P0151 00	2 Oxygen Sensor Signal Circuit Voltage Low
16	P0152 00	2 Oxygen Sensor Signal Circuit Voltage High
17	P0153 00	Delay Reaction of 2 Oxygen Sensors to Thick Mixture and Thin Mixture
18	P0154 00	2 Oxygen Sensor Signal Circuit
19	P0122 00	TPS 1 Signal Circuit Voltage Low
20	P0123 00	TPS 1 Signal Circuit Voltage High
21	P0105 00	Air Intake Pressure Sensor Signal
22	P0106 00	Intake Pressure Sensor Signal Overlimit
23	P0107 00	Air Intake Pressure Sensor Short to Ground
24	P0108 00	Air Intake Pressure Sensor Short to Power
25	P0111 00	Unreasonable Air Intake Temp. Signal
26	P0112 00	Intake Air Temperature Sensor 1 Circuit Low
27	P0113 00	Intake Air Temperature Sensor 1 Circuit High
28	P0116 00	Engine Coolant Temperature Sensor 1 Reasonal
29	P0117 00	Engine Coolant Temperature Sensor 1 Circuit Low
30	P0118 00	Engine Coolant Temperature Sensor 1 Circuit High
31	P0119 00	Engine Coolant Temperature Sensor Signal Uninterrupted
32	P1116 00	Engine Coolant Temperature Overlimit
33	P0201 00	1 Cylinder Injector Circuit/Open
34	P0261 00	1 Cylinder Injector Circuit Low
35	P0262 00	1 Cylinder Injector Circuit High
36	P0202 00	2 Cylinder Injector Circuit/Open
37	P0264 00	2 Cylinder Injector Circuit Low
38	P0265 00	2 Cylinder Injector Circuit High
39	P2300 00	1 Cylinder Ignition Coil Low
40	P2303 00	2 Cylinder Ignition Coil Low
41	P0300 00	Cylinders Misfire Detected
42	P0301 00	Cylinder 1 Misfire Detected
43	P0302 00	Cylinder 2 Misfire Detected

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44	P0322 00	Speed Sensor Signal Faulty
45	P0413 00	Secondary Air Injection System Switching Valve "A" Circuit Open
46	P0414 00	Secondary Air Injection System Switching Valve "A" Circuit Shorted
47	P0412 00	Secondary Air Injection System Switching Valve "A" Circuit
48	P0411 00	Secondary Air System Flow Detection Faulty
49	P0441 00	Wrong Canister Valve Flow
50	P0444 00	Evaporative Emission System Purge Control Valve Circuit Open
51	P0458 00	Evaporative Emission System Purge Control Valve Circuit Low
52	P0459 00	Evaporative Emission System Purge Control Valve Circuit High
53	P0480 00	Fan 1 Control Circuit
54	P0691 00	Fan 1 Control Circuit Low
55	P0692 00	Fan 1 Control Circuit High
56	P0501 00	Speed Sensor Signal Faulty
57	P0506 00	Idle Control Speed Lower Than Target Idle Speed
58	P0507 00	Idle Control Speed Higher Than Target Idle Speed
59	P0511 00	Stepper Motor Drive Control Circuit
60	P0615 00	Starter Control Circuit Open
61	P0616 00	Starter Control Circuit Voltage Low
62	P0617 00	Starter Control Circuit Voltage High
63	P0627 00	Fuel Pump Relay Control Circuit Open
64	P0628 00	Fuel Pump Relay Control Circuit Voltage Low
65	P0629 00	Fuel Pump Relay Control Circuit Voltage High
66	P0650 00	MIL Drive Circuit Faulty
67	P0560 00	System Battery Voltage Signal Unreasonable
68	P0562 00	System Battery Voltage Low
69	P0563 00	System Battery Voltage High
70	P1098 00	Roll-over Sensor Signal Voltage Low
71	P1099 00	Roll-over Sensor Signal Voltage High
72	P2177 00	The Upper Limit of Air-fuel ratio Self-learning for Closed Loop Control
73	P2178 00	The Lower Limit of Air-fuel ratio Self-learning for Closed Loop Control
74	P2179 00	The Upper Limit of Air-fuel ratio Self-learning for Closed Loop Control
75	P2180 00	The Lower Limit of Air-fuel Ratio Self-learning for Closed Loop Control
76	P0602 00	Electric Control Unit Code Faulty
77	P0604 00	Electric Control Unit RAM Faulty
78	P0605 00	Electric Control Unit ROM Faulty
79	U0198 00	TOX CAN Communication Faulty
80	U0155 00	ECU and IPC (Dashboard control mode) Communication Abnormal
81	U0073 00	CAN Main Cable Bus off
82	U0121 00	ECU and ABS Control Mode Communication Lost
83	P0508 00	Idle Actuator Control Circuit Short to Ground
84	P0509 00	Idle Actuator Control Circuit Short to Power
85	P0511 00	Idle Actuator Control Circuit Faulty
86	P0511 00	Idle Actuator Control Circuit Faulty

8.4 Fault Diagnosis and Treatment

Engine Body:

Troubles	Possible Cause	Countermeasures
Cannot start or difficult to start	Cylinder pressure too low 1. Cylinder worn 2. Piston ring worn 3. Air leakage of cylinder gasket 4. Valve stem worn or unsuitable valve seat 5. Spark plug loosen 6. Starting motor rotate too slowly 7. Improper valve timing 8. Improper valve clearance Spark plug cannot ignite or weak ignition 1. Improper spark plug clearance 2. Spark plug dirty or wet 3. Defect ignition coil 4. Trigger short circuit or open circuit 5. Magneto malfunction Insufficient fuel inside throttle body 1. Breather hole block 2. Injector blocked or failure 3. High Pressure oil pump failure 4. Low pressure, oil pump 5. Oil pump Filter net blocked	Replace Replace Replace Repair or replace Tighten Check electrical parts Adjust Adjust Adjust or replace Clean & dry or replace Replace Replace Replace Clean or replace Clean or replace Inspect or replace Inspect or replace Clean or replace
	1. Improper valve clearance 2. Unsuitable valve seat 3. Defective valve 4. Rocker or rocker arm wear 5. Dirty spark plug 6. Incorrect valve clearance 7. Ignition coil failure 8. In & Ex a air hose blocked, idle valve 9. Magneto failure	Adjust Repair or replace Replace Replace Replace Repair or replace Replace Repair or replace Replace

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Troubles	Possible Cause	Countermeasures
High RPM unstable	<ol style="list-style-type: none"> 1. Valve spring getting worn 2. Camshaft worn 3. Spark plug dirty 4. Spark plug gap too narrow 5. Valve timing incorrect 6. Ignition coil failure 7. Low pressure,oil pump 8. Air filter too dirty 	<p style="text-align: center;"> Replace Replace Clean or replace Adjust or replace Adjust Replace Adjust or replace Clean or replace </p>
Blue or black exhaust gas	<ol style="list-style-type: none"> 1. Engine oil too much 2. Piston ring worn 3. Valve worn 4. Cylinder worn or scraped 5. Valve stem worn 6. Oil seal of valve stem damaged 	<p style="text-align: center;"> Check oil level and drain Replace Replace Replace Replace Replace </p>
Engine Power not enough	<ol style="list-style-type: none"> 1. Valve clearance improper 2. Valve spring getting weak 3. Valve timing incorrect 4. Cylinder worn 5. Piston ring worn 6. Improper valve seat 7. Spark plug dirty 8. Improper spark plug gap 9. Injector blocked 10. Insufficient pressure,oil pump 11. Air filter too dirty 12. Rocker arm or camshaft worn 13. Air leakage of inlet pipe 14. Engine oil too much 	<p style="text-align: center;"> Adjust Replace Adjust Replace Replace Replace or repair Clean or replace Clean or replace Clean or replace Adjust or replace Clean or replace Replace Tighten or replace Check oil level and change </p>
Engine Overheating	<ol style="list-style-type: none"> 1. Carbon deposit on piston head 2. Engine oil too less or too much 3. Oil pump failure 4. Fuel hose blocked 5. Air leakage of inlet pipe 6. Unsuitable engine oil 7. Cooling system failure 	<p style="text-align: center;"> Clean Check and add or drain Replace Replace Clean Tighten or replace Change oil </p>

8 Electrical System

Troubles	Possible Cause	Countermeasures
Engine abnormal noise	Valve abnormal noise 1. Valve clearance too big 2. Valve spring worn or broken 3. Swing arm or camshaft worn	Adjust Replace Replace
	Piston abnormal noise 1. Piston worn 2. Cylinder worn 3. Carbon deposit inside combustion chamber 4. Piston pin or pin hole worn 5. Piston ring or groove worn	Replace Replace Clean Replace Replace
	Timing chain abnormal noise 1. Chain stretched out 2. Chain sprocket worn 3. Tensioner failure	Replace chain and sprocket Replace chain and sprocket Repair or replace
	Clutch abnormal noise 1. Clutch gear worn or damaged 2. Cushion rubber aging or damaged	Replace clutch gear Replace clutch gear
	Crankshaft abnormal noise 1. Bearing noise 2. Crankshaft pin bearing down 3. Clearance too big	Replace Replace Replace
	Transmission abnormal noise 1. Gear worn or damaged 2. Main shaft or counter shaft worn 3. Bearing worn 4. Bushing worn	Replace Replace Replace Replace
Clutch slippery	1. Clutch drive disc worn 2. Clutch driven disc worn or damaged 3. Clutch spring getting weak	Replace Replace Replace

Ignition System:

Troubles	Possible Cause	Countermeasures
No spark or weak spark	1. Flame ignitor malfunction	Replace
	2. Spark plug burnt	Replace
	3. Incorrect spark plug clearance	Adjust
	4. Carbon deposit in spark plug	Clean
	5. Magneto motor malfunction	Replace
	6. Battery low voltage	Charge or replace
	7. Ignition coil malfunction	Replace
	8. Trigger coil malfunction	Replace
	9. Incorrect trigger clearance	Adjust
	10. Other circuit malfunction	Inspect

8.5 Trouble Diagnosis In Accordance With Engine Error

Before trouble diagnosis by engine problems, initial checking should be done as follows.

1. Confirm if trouble light is ok.
2. Confirm there's no trouble code record by DSCAN checking.
3. Confirm there's really trouble existing complained by end-users.

Then check the following points:

- (1) Check fuel hoses if any fuel leakage.
- (2) Check vacuum pipes if any broken, twist or improper connection.
- (3) Check intake manifold if any blocked, air leakage or damaged.
- (4) Check high-tension cable if any damaged, aging or ignition order is correct.
- (5) Check wiring close to ground if it's clean and firm.
- (6) Check connector of all sensors and actuator if any loose or improper connection.

Important note: In case there are some problems as above-mentioned, then removal work should be done firstly, then go to next diagnosis.

Diagnosis helps:

1. Confirm engine without any trouble record.
2. Confirm there's really trouble existing.
3. During checking, do not neglect vehicle periodic maintenance, cylinder pressure, valve timing, fuel supply and so on.
4. Replace ECU to test.

In case trouble disappears, then it's a problem of ECU. If trouble still exists, then assemble original ECU and check other points.

Frequent troubles list:

1. When starting the engine, engine cannot rotate or rotate slowly.
2. When starting engine, starter motor can rotate but cannot start engine.
3. Difficult to start warm or hot engine.
4. Difficult to start cold engine.
5. RPM is ok, but difficult to start engine.
6. Starting is ok, but idle speed is unstable at any time.
7. Starting is ok, but idle speed is unstable during engine warm-up period.
8. Starting is ok, but idle speed is unstable after engine warm-up.
9. Starting is ok, idle speed is unstable or engine stop when switch on some lights or other electric components.
10. Starting is ok, but too high idle speed.
11. RPM cannot go up or engine stop when acceleration.
12. Slow acceleration.
13. Insufficient power and bad performance when acceleration.

8 Electrical System

(1) Starting Failure/Hard Starting

General failure part: 1. Battery; 2. Starter motor; 3. Wirings harness or ignition switch; 4. Engine mechanism part.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Use multi-meter to check battery voltage if voltage is between 8-12V or not when engine starts.	YES	Next step
		NO	Replace battery
2	Turn on ignition switch, stop switch side stand switch and check if voltage of ECU pin 32 is around 12V.	YES	Next step
		NO	Repair or change harness
3	Keep ignition switch "on", use multi-meter to check if voltage of starting motor anode is over 8V.	YES	Next step
		NO	Repair or change harness
4	Disassemble starting motor and check its working status, especially whether there was broken circuit or jammed by bad lubrication.	YES	Repair or replace starting motor
		NO	Next step
5	If error only occur in Winter, check if starting motor resistance is too big caused by improper oil used.	YES	Change to proper lubricant
		NO	Next step
6	Check if mechanical resistance is too big inside engine.	YES	Check engine inside resistance
		NO	Repeat above procedures

(2) When starting, engine can rotate but cannot start

General failure part: 1. No fuel; 2. Fuel pump; 3. Trigger; 4. Ignition coil; 5. Mechanical parts of engine

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kpa.	YES	Next step
		NO	Check and repair fuel supply system
2	Connect DSCAN, check if there's signal of RPM data after starting engine.	YES	Next step
		NO	Check and repair RPM sensor circuit
3	Disconnect high-tension cable, connect spark plug and set its electrode 5 mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Check and repair ignition system
4	Test cylinder pressure and check if pressure is enough.	YES	Eliminate engine mechanical failures
		NO	Next step
5	Use EFI system connector to test, turn on ignition switch, check if power supply of ECU pin 30 and pin 33 is normal; check if pin 5 and pin 10 works normally.	YES	Diagnosis help
		NO	Repair related circuit

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(3) Difficult to start hot engine

General failure part: 1. Water in fuel tank; 2. Fuel pump; 3. Water temp. sensor; 4. Ignition coil.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kpa.	YES	Next step
		NO	Check and repair fuel supply system
2	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Check and repair ignition system
3	Disconnect water temp. sensor connector, check whether the engine can be started or not. (Or replace water temp. sensor with a 300Ω resistance. Check whether the engine can be started or not.)	YES	Repair circuit or change sensor
		NO	Next step
4	Check whether the failure happens right after fueling.	YES	Change fuel
		NO	Next step
5	Use DSCAN to test, turn on ignition switch, check if power supply of ECU pin 32 and pin 33 is normal; check if pin 5 and pin 6 works normally.	YES	Diagnosis help
		NO	Repair related circuit

(4) Difficult to start cold engine

General failure part: 1. Water in fuel tank; 2. Fuel pump; 3. Engine temp. sensor; 4. Injector; 5. Ignition coil; 6. Throttle body and by-pass; 7. Mechanical parts of engine

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pump gauge ,start engine, check if pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
2	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Check and repair ignition system
3	Disconnect water temp. sensor connector, check whether the engine can be started or not. (Or replace water temp. sensor with a 2500Ω resistance. Check whether the engine can be started or not.)	YES	Repair circuit or replace sensor
		NO	Next step
4	Slightly draw throttle cable and check if engine could start easily.	YES	Clean throttle body and by-pass
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage or block.	YES	Change
		NO	Next step
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanical failures
		NO	Next step

8 Electrical System

(5) Difficult to start in any conditions

General failure part: 1. Water in fuel tank; 2. Fuel pump; 3. Water temp. sensor; 4. Injector; 5. Ignition coil; 6. Throttle body and by-pass; 7. Air intake pipe; 8. Ignition timing; 9. Spark plug; 10. Mechanical part of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
2	Connect fuel pump gauge, start engine, check if pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
3	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Check and repair ignition system
4	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
5	Disconnect water temp. sensor connector, check whether the engine can be started or not.	YES	Repair circuit or replace sensor
		NO	Next step
6	Slightly draw throttle cable and check if engine could start easily.	YES	Clean throttle body and by-pass
		NO	Next step
7	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
8	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
9	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanical failures
		NO	Next step

(6) Normal starting, but unstable idle speed

General failure part: 1. Water in fuel tank; 2. Injector; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Ignition timing; 8. Spark plug; 9. Mechanical part of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
2	Check if air control valve is blocked.	YES	Clean or replace
		NO	Next step
3	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
4	Check if there is carbon deposit inside throttle body and air control valve.	YES	Clean
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage, block or wrong fuel flow.	YES	Replace
		NO	Next step

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6	Check whether the failure happens right after fueling.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanical failures
		NO	Next step
8	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing

(7) Normal starting, but unstable idle speed during engine warming

General failure part: 1. Water in fuel tank; 2. Injector; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Mechanical part of engine

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
2	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
3	Check if there is carbon deposit inside throttle body and air control valve and by-pass.	YES	Clean
		NO	Next step
4	Disconnect water temp. sensor connector and start engine to check idle speed is stable or not.	YES	Repair circuit or replace sensor
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after fueling.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanical failures
		NO	Next step

(8) Normal starting, but unstable idle speed after engine warming

General failure part: 1. Water in fuel tank; 2. Water temp. sensor; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Mechanical part of engine

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
2	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
3	Check if there is carbon deposit inside throttle body and air control valve and by-pass.	YES	Clean
		NO	Next step
4	Disconnect water temp. sensor connector and start engine to check idle speed is stable or not.	YES	Repair circuit or replace sensor
		NO	Next step

8 Electrical System

5	Disassemble injector and use special tool to check if there is leakage, block or wrong fuel flow.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanical failures
		NO	Next step

(9) Normal starting, unstable idle speed or engine stop when it is electronic loaded (e.g. headlight is on)

General failure part: 1. Air control valve; 2. Injector

General diagnosis procedures:

Item	Procedures	Results	Next
1	Disassemble air control valve and check if there is carbon deposit inside throttle body, idle adjustment and by-pass.	YES	Clean
		NO	Next step
2	Check if output power increases when lighting, by using DSCAN to test if ignition advance angle, fuel spray and air intake volume is normal.	YES	To step 4
		NO	Next step
		NO	Check and repair air-condition system
3	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next step
4	Use EFI system connector to test, turn on ignition switch, check if power supply of ECU pin 30 and pin 33 is normal; check if pin 5 and pin 10 works normally.	YES	Diagnose help
		NO	Check and repair the related circuit

(10) Engine starts normally, but idle speed is too high

General failure part: 1. Throttle body and by-pass; 2. Injector seat; 3. Air control valve; 4. Water temp. sensor; 5. Ignition timing

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if throttle cable is jammed or too tight.	YES	Adjust
		NO	Next step
2	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
3	Check if there is carbon deposit inside throttle body and air control valve and by-pass.	YES	Clean
		NO	Next step
4	Remove water temp. sensor connector, start engine to check if idle speed is too high.	YES	Repair wiring or replace sensor
		NO	Next step
5	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing

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(11) RPM cannot increase or engine stop when accelerating

General failure part: 1. Water in fuel tank; 2. TPS; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Injector; 8. Ignition timing; 9. Exhaust pipe

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked.	YES	Check and repair air intake system
		NO	Next step
2	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kpa.	YES	Next step
		NO	Check and repair fuel supply system
3	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
4	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean
		NO	Next step
5	Check if TPS and its circuit is normal.	YES	Next step
		NO	Repair wiring or replace sensor
6	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
7	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
8	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing
9	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe

(12) Low acceleration

General failure part: 1. Water in fuel tank; 2. TPS; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Injector; 8. Ignition timing; 9. Exhaust pipe

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked.	YES	Check and repair air intake system
		NO	Next step
2	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kpa.	YES	Next step
		NO	Check and repair fuel supply system
3	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
4	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean
		NO	Next step
5	Check if TPS and its circuit is normal.	YES	Next step
		NO	Repair wiring or replace sensor

8 Electrical System

Item	Procedures	Results	Next
6	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
7	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
8	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing
9	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe

(13) Difficult to accelerate and bad performance

General failure part: 1. Water in fuel tank; 2. TPS; 3. Spark plug; 4. Ignition coil; 5. Throttle body and by-pass; 6. Air intake pipe; 7. Air control valve; 8. Injector; 9. Ignition timing; 10. Exhaust pipe.

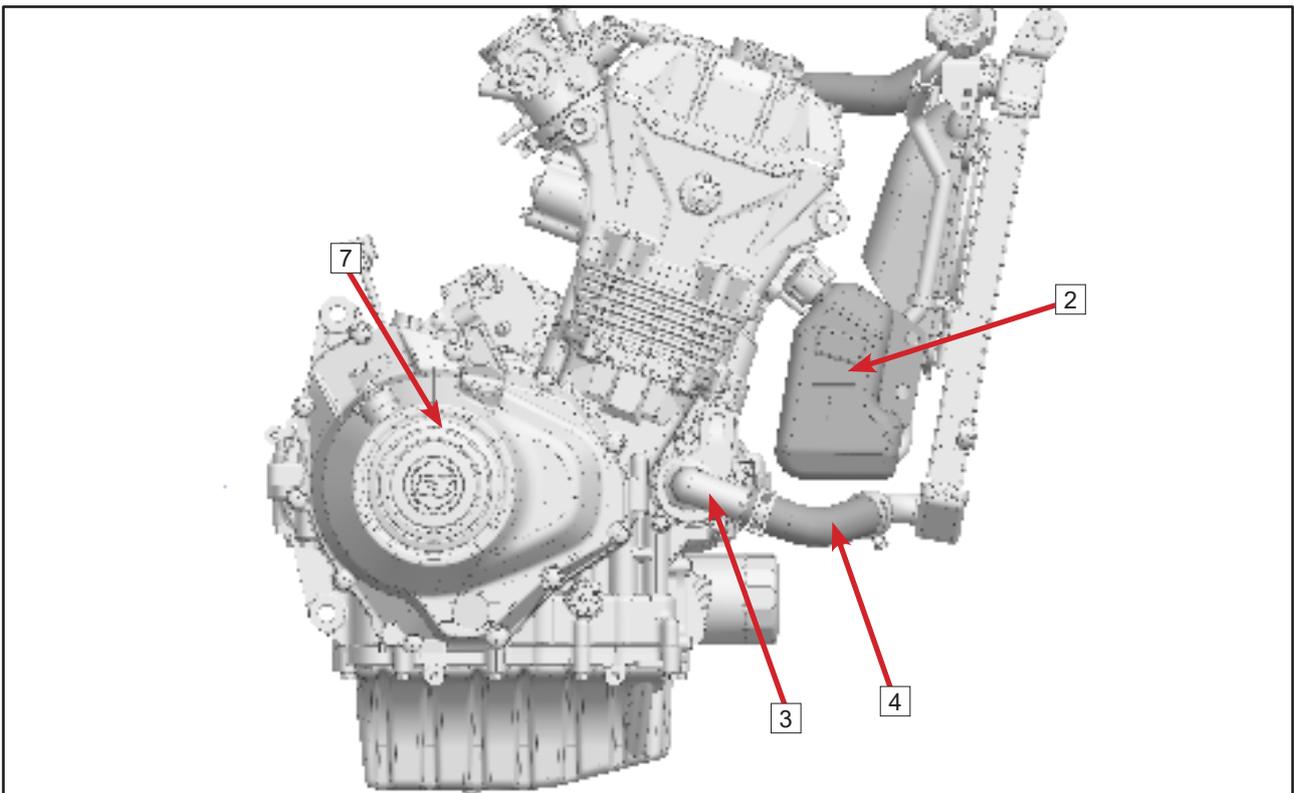
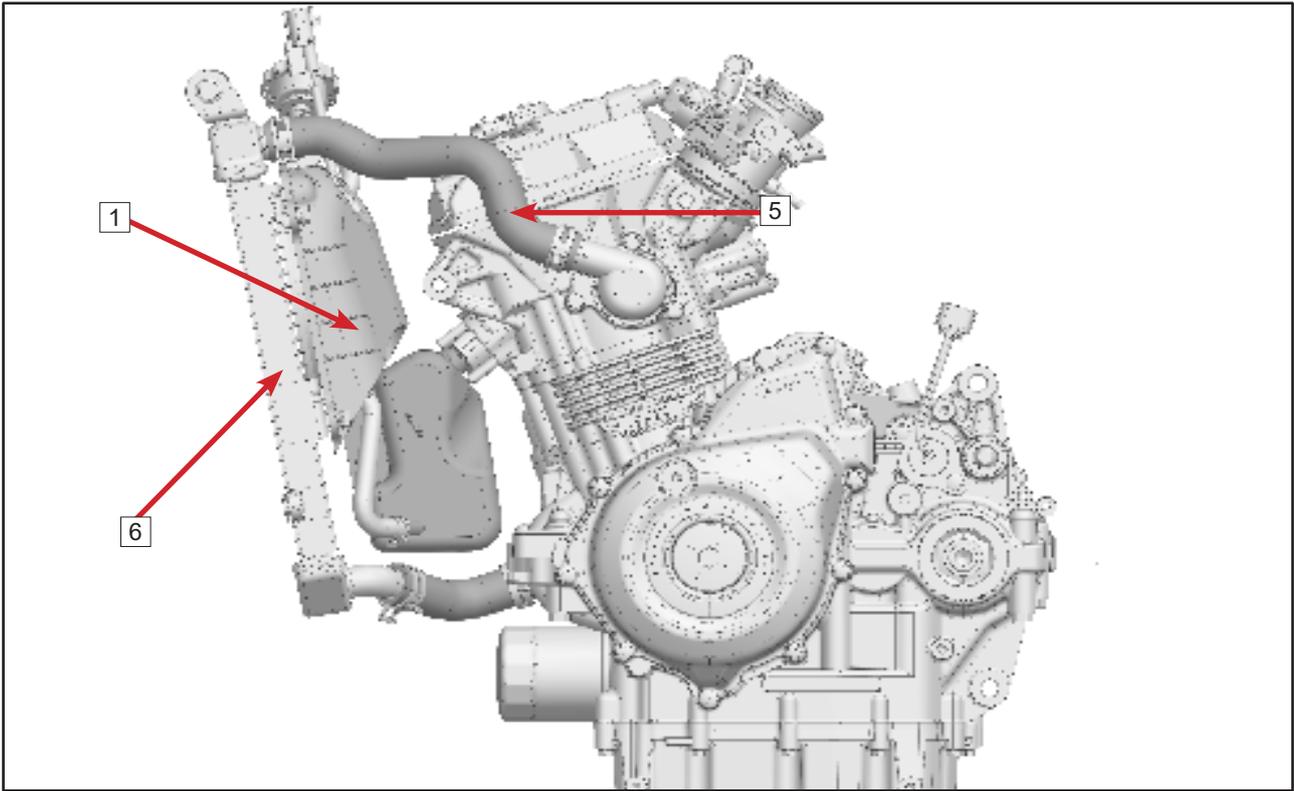
General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if clutch sliding, low tire pressure, bad brake or wrong tire size.	YES	Repair
		NO	Next step
2	Check if air filter is blocked.	YES	Check and repair air intake system
		NO	Next step
3	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kpa.	YES	Next step
		NO	Check and repair fuel supply system
4	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if spark is strong enough.	YES	Next step
		NO	Check and repair ignition timing
5	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Replace
6	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean
		NO	Next step
7	Check if TPS and its circuit is normal.	YES	Next step
		NO	Repair wiring or replace sensor
8	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
9	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
10	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing
11	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe

- 9.1 Cooling System Diagram 2**
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- 9.3 Engine Coolant 6**
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Cooling System

9.1 Cooling System Diagram



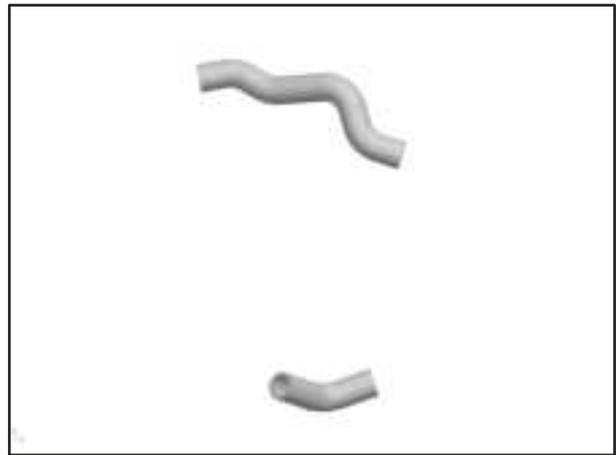
1	Fan motor assembly	2	Reservoir assembly	3	Water pump assembly
4	Radiator outlet pipe	5	Radiator inlet pipe	6	Radiator
7	Engine assembly				

Inlet Pipes and Outlet Pipes

Check the radiator pipes for damage or cracks.

Rubber hoses will naturally age due to heating and time. To inspect hoses, pinch with your fingers and check whether there are cracks or damage. If cracks have formed or damage is found, replace them.

Check the tightness of the coolant hose clamps, and for leaks at connection points of the water pump and hoses. If leaks are found, tighten or replace components as necessary.



Reservoir

Check for damage or cracks in the reservoir. If damage is found, replace it.

Check if there is damage or crack in the pipe of the reservoir. If damage is found, replace it.



Clamps

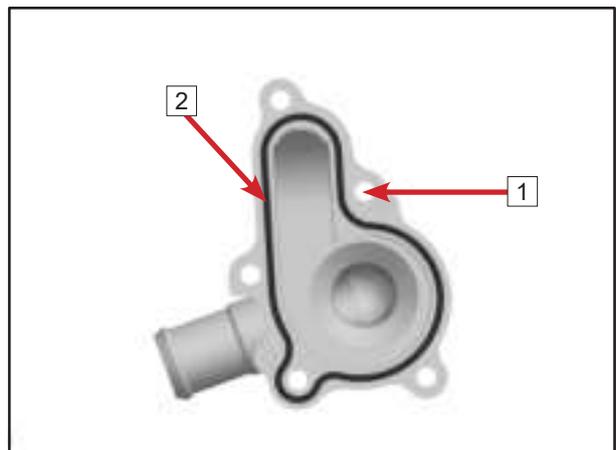
Check the hose clamps for wear, deformation, or cracks. If damage is found, replace them.



Pump Cover

Inspect the pump cover **1** for cracks, sealing surface pits or protrusions. If damaged, replace with new parts.

Check the sealing ring **2** of the water pump cover for hardening, cracks or damaged. If damaged, replace it.



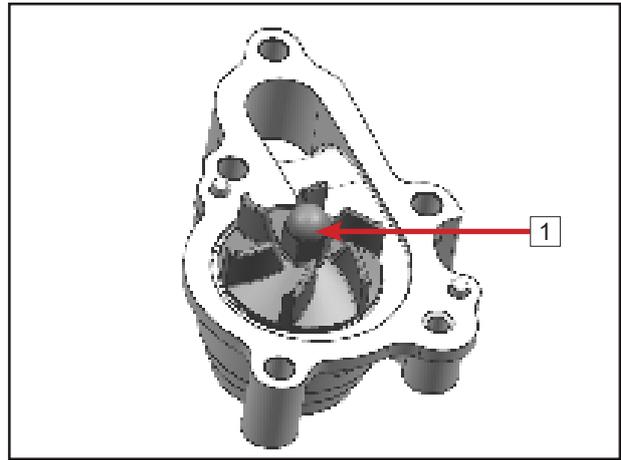
Cooling System

Water Pump

(For details on removal, refer to Chapter 13-Water Pump impeller Removal)

Impeller

Check whether the impeller 1 of the pump is damaged. If damaged, replace it with a new one.



⚠ DANGER:

Coolant is toxic. Do not drink nor spill on skin, eyes, clothing. If coolant is swallowed, induce vomit and seek for medical attention. If you get coolant on your skin or in your eyes, immediately wash it off before medical attention. If you spill coolant on your clothing, change your clothing.

Rusting and corroding residues in engine and radiator must be treated according to regulations. The chemical inside can do harm to humans.

⚠ CAUTION:

If tap water is added to the cooling system, scale deposit will accumulate inside the cooling system. When the temperature is below zero, ice will be generated, which will seriously affect the operation of the cooling system.

Antifreeze is added anti-rust agent and antiseptic. When it is diluted, it will lose resistance of rust and corrosion. The dilution concentration of antifreeze must be consistent with the manufacturer's instructions.

The coolant added into the cooling system is green and contains ethylene glycol. When the ambient temperature is at -35°C , please choose the coolant whose freezing point is lower than -35°C .

⚠ WARNING:

The coolant will be very hot and under pressure when the vehicle is running.

Never open the radiator cap when the engine is still hot. Otherwise, the vapor or hot coolant will cause injury.

If get scalded, rinse the wound with flowing cold water for more than 10 minutes until the wound is no longer painful and seek medical advice immediately.

9.2 Cooling System Assembly Removal

Place a container under water pump.

Remove drain bolt **1**.

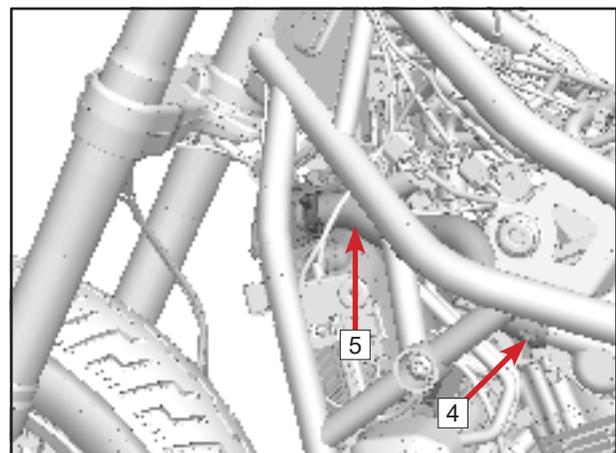
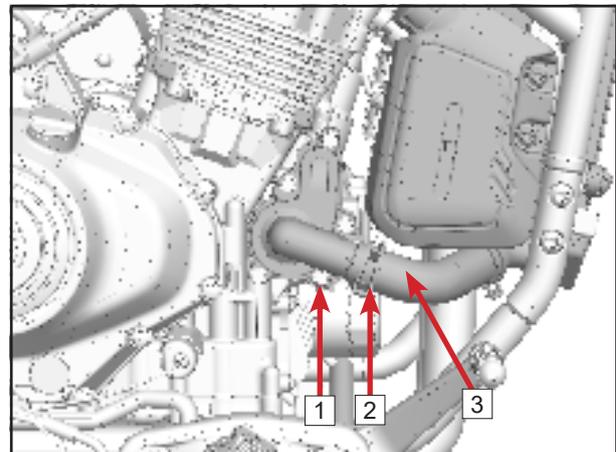
Drain coolant.

Release clamp **2**.

Remove outlet pipe **3**.

NOTE: After water outlet pipe removal, there will be some coolant spilling out.

NOTE: The cooling system has a certain pressure, and the coolant will shoot a long distance after removing the drain bolt.



Release clamp **4**.

Remove inlet pipe **5**.

Cooling System

Remove clamp [6].

Remove siphon pipe [7].

Remove nut [8].

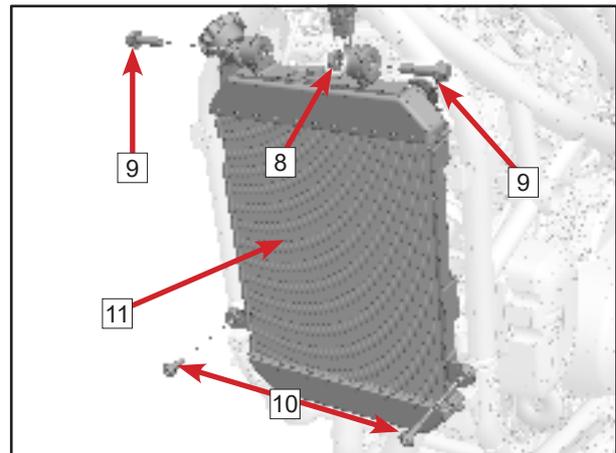
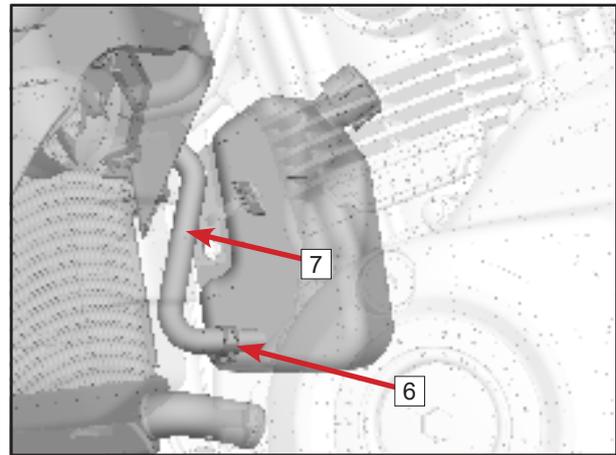
Remove upper bolts on both sides [9].

Remove lower bolts on both sides [10].

Remove radiator [11].

Installation

Installation is in reverse order of removal.



9.3 Engine Coolant

Coolant in cooling system is a mixture of 51.5% water, 46% ethylene glycol antifreeze and 2.5% additive. This mixture ratio provides optimized corrosion resistance and fine heat production. The mixture has good anti-corrosion and endothermic function, and its freezing point is -35°C . If engine works under -35°C , choose coolant of -40% or -50%.

⚠ CAUTION:

Use high quality ethylene glycol base antifreeze mixed with distilled water.

Never mix alcohol base anti-freeze or other different brands of antifreeze.

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

Do not use anti-leak additive.

CFMOTO coolant is an Organic Acid Technology (OAT) formula. When replenishing or replacing coolant, verify the label states 'compatible with one or more of the following formulas: OAT or Si-OAT, G30, G40, G12++'

9.3.1 Coolant Inspection

Prop the vehicle up with support on level ground.

Check the reservoir coolant level after coolant has cooled down.

Level should be at A.

If above A, drain coolant to level A.

If lower than A, add coolant to A.

⚠ CAUTION: The coolant will be very hot and under pressure while the vehicle is running. Do not open any other cooling system parts such as the radiator, radiator hoses, reservoir, etc. until the engine or cooling system has cooled completely. In the event of a burn, rinse the wound with running cold water for 10 minutes or more until the wound is no longer painful and then seek medical attention.

9.3.2 Coolant Addition

Open the reservoir cover and add the same coolant to area A.

⚠ CAUTION: If the coolant needs to be replenished frequently, or if the coolant in the reservoir is frequently backed up and drained, there may be a leak in the cooling system, contact your dealer to have the cooling system checked.

Only the original CFMOTO coolant is recommended. Mixing different coolants may cause engine damage, contact your dealer to replace the coolant.

9.3.3 Coolant Replacement

Support the vehicle upright on level ground.

Place a container under the water pump.

Remove the drain bolt **1**.

Release radiator pressure cap.

Drain the coolant.

Install the drain bolt.

Open the radiator pressure cap **2**.

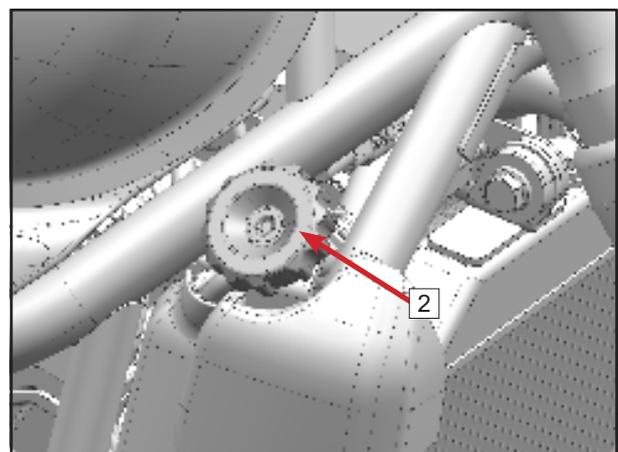
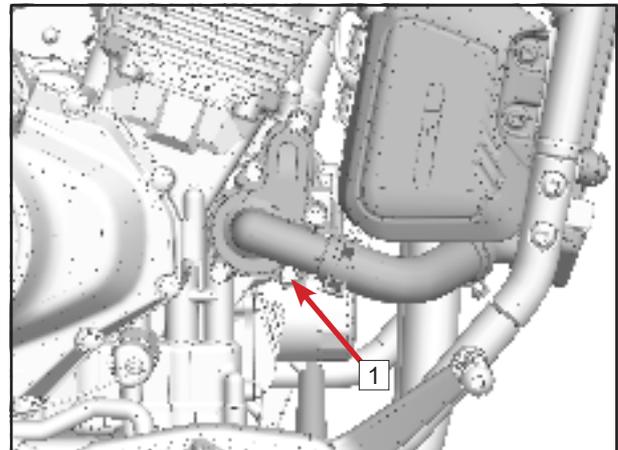
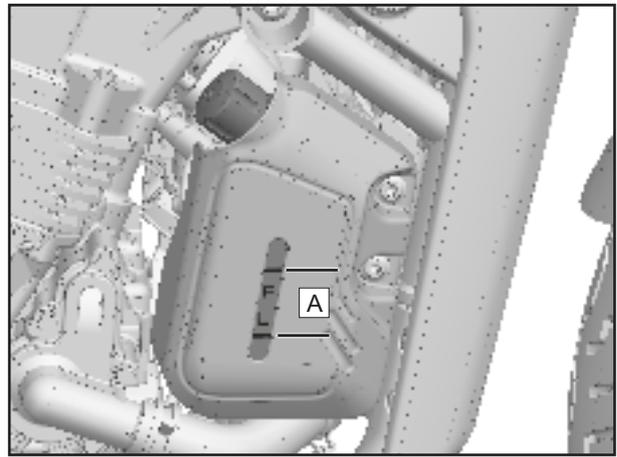
Fill up with coolant using a funnel.

Remove the drain bolt until a steady level of coolant flows out and then immediately tighten the drain bolt.

Continue to fill the radiator with coolant up to the filling point.

Reinstall the pressure cap.

Open the reservoir cap and add the same coolant to area A.



Cooling System

Install the reservoir cap.

Run the engine at idle speed for 2 to 3 minutes.

Recheck coolant level after engine cools down.

9.4 Seal Inspection

Radiator Cap Inspection

Remove radiator cap.

Measure the open pressure of radiator cap with pressure gauge.

If the pressure is out of standard, replace a new part.

Radiator Cap Open Pressure:

135 kPa ~ 160 kPa

1.35 kgf/cm² ~ 1.6 kgf/cm²

19.58 psi~23.2 psi

Standard:

140 kPa

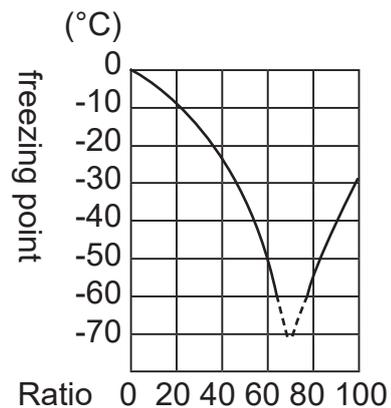
1.4 kgf/cm²

20.3 psi

Seal Inspection

Connect the pressure gauge with reservoir joint.

Mixing ratio	Freezing point
50%	-30°C
55%	-40°C
60%	-55°C



⚠ WARNING: Never open the radiator cap when the engine is still hot. Otherwise, the vapor or hot coolant will cause injury.

Inflate to 135 kPa, and last for 10s.

If the pressure decreases within 10s, there is leaking inside the system. Inspect the whole system and replace the broken parts.

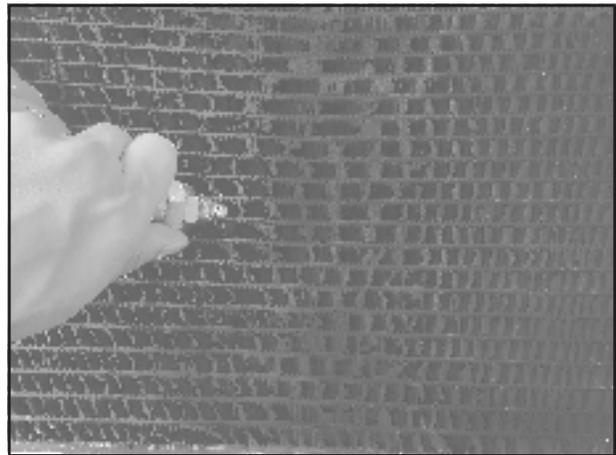
NOTE: When removing the gauge, cover radiator cap with cloth, in case the coolant spills out.

NOTE: The test pressure should not exceed the opening pressure of the radiator cap.

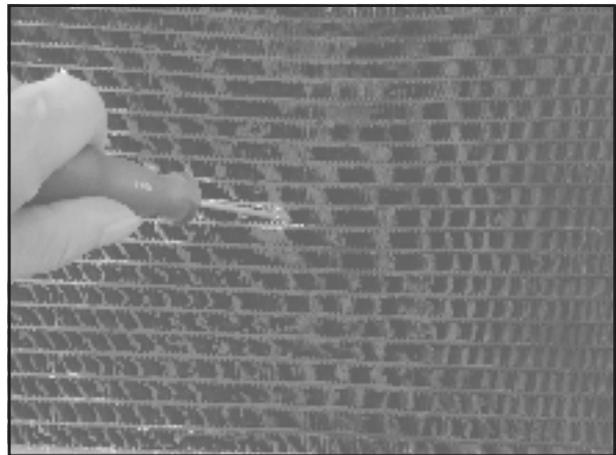
9.5 Radiator and Pipe Cleaning and Inspection

Radiator Cleaning and Inspection

Remove sediment and dirt from the radiator surface with a high-pressure air gun.



Service the radiator blades with a small screwdriver.



Radiator Pipe Inspection

Check the radiator pipe for leaks and breaks, replace with new parts if any is found.

Check the radiator pipe clamps and replace them with new ones if the fastening fails.

After checking the radiator and water pipes, check the coolant and add coolant if necessary.

Cooling System

9.6 Fan Motor Inspection

Remove bolts [1].

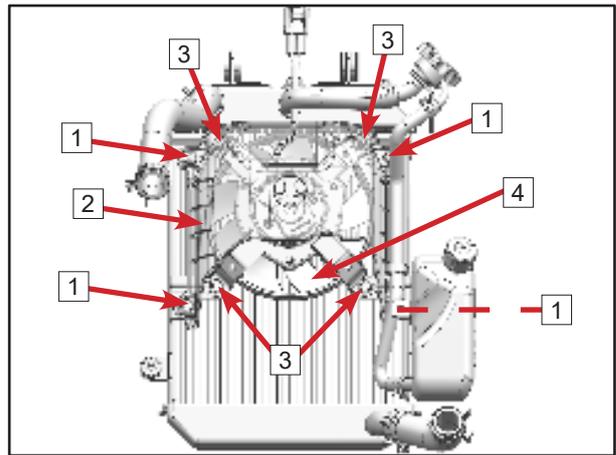
Remove fan cover [2].

Remove bolts [3].

Remove fan motor assembly [4].

Rotate the blades by hand to check the rotational flexibility and integrity, if the blades are stuck or broken, replace with a new fan motor assembly [4].

Battery voltage 12V, motor running at full speed, amperage meter current not more than 5A. If the motor does not rotate or the current exceeds the regulation, replace the fan motor assembly [4].



Installation

Installation is in reverse order of removal.

10.1 Muffler Removal.....	2
10.1.1 Muffler Pipe Assembly	2
10.1.2 Front Muffler	3
10.2 Exhaust Pipe Inspection.....	4

Exhaust System

⚠ DANGER: The muffler is very hot after the engine has been run, and when disassembling or servicing the muffler, the vehicle must not be parked near flammable or explosive materials that could ignite or detonate. Do not operate hot parts such as the muffler while the vehicle is not yet cooled down, as this may cause serious burns to the operator or people in the vicinity. The muffler will emit toxic and harmful gases, and must not be operated in a closed or non-effectively ventilated environment, as the toxic and harmful gases emitted by the muffler may lead to poisoning or even death of the surrounding personnel.

10.1 Muffler Removal

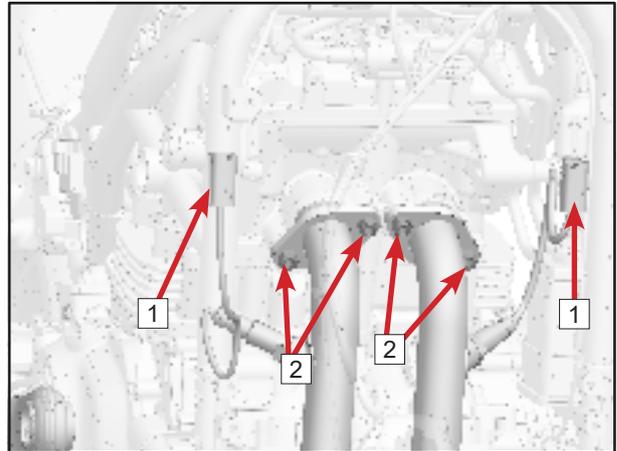
10.1.1 Muffler Pipe Assembly

Removal

Disconnect oxygen sensor connectors **1**.

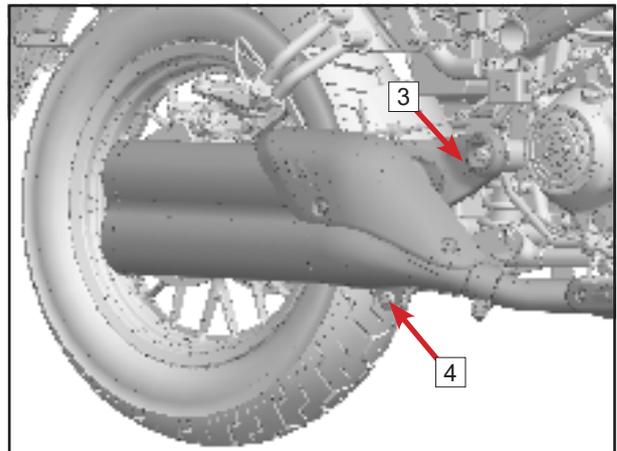
Remove lock nut **2**.

NOTE: Mark the oxygen sensor terminals to correspond to the "L" and "R" markings on the connector.

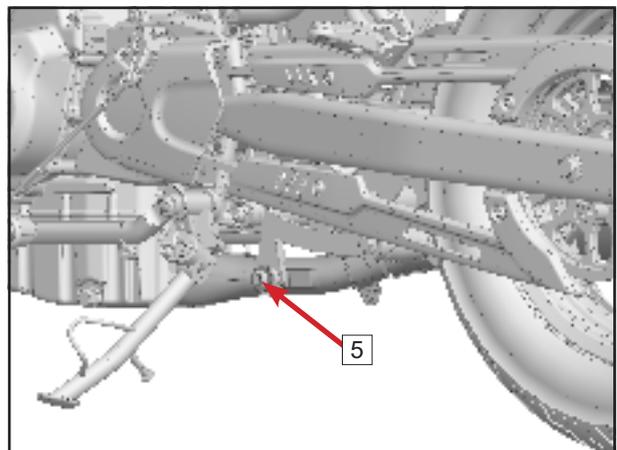


Remove nut **3**.

Remove bolt **4**.



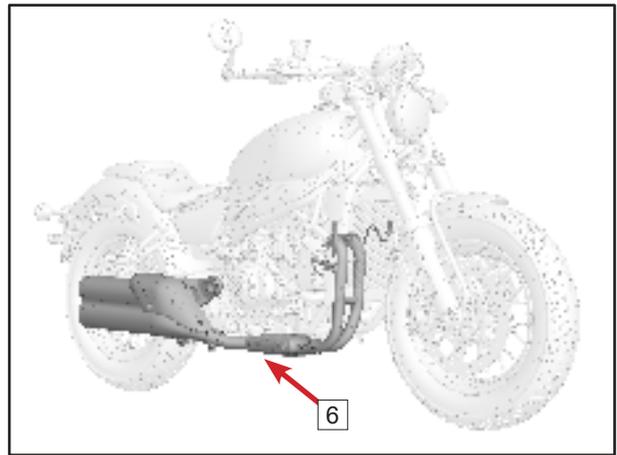
Remove bolt **5**.



Remove exhaust pipe assembly **6**.

Installation

Installation is in reverse order of removal.

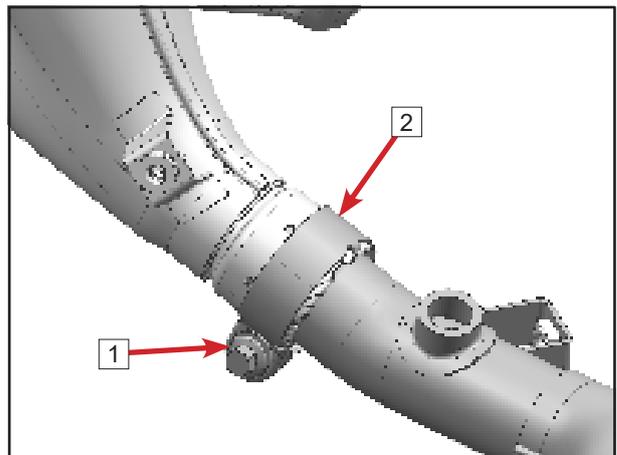


10.1.2 Front Muffler

Remove exhaust pipe front and rear guard.

Remove bolt **1**.

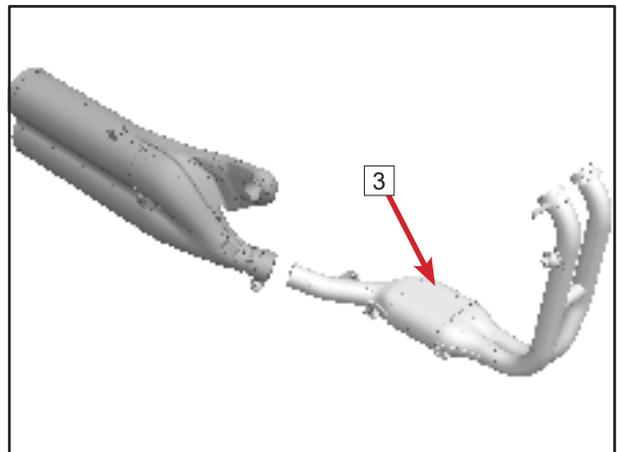
Release clamp **2**.



Remove front muffler body **3**.

Installation

Installation is in reverse order of removal.



Exhaust System

10.2 Exhaust Pipe Inspection

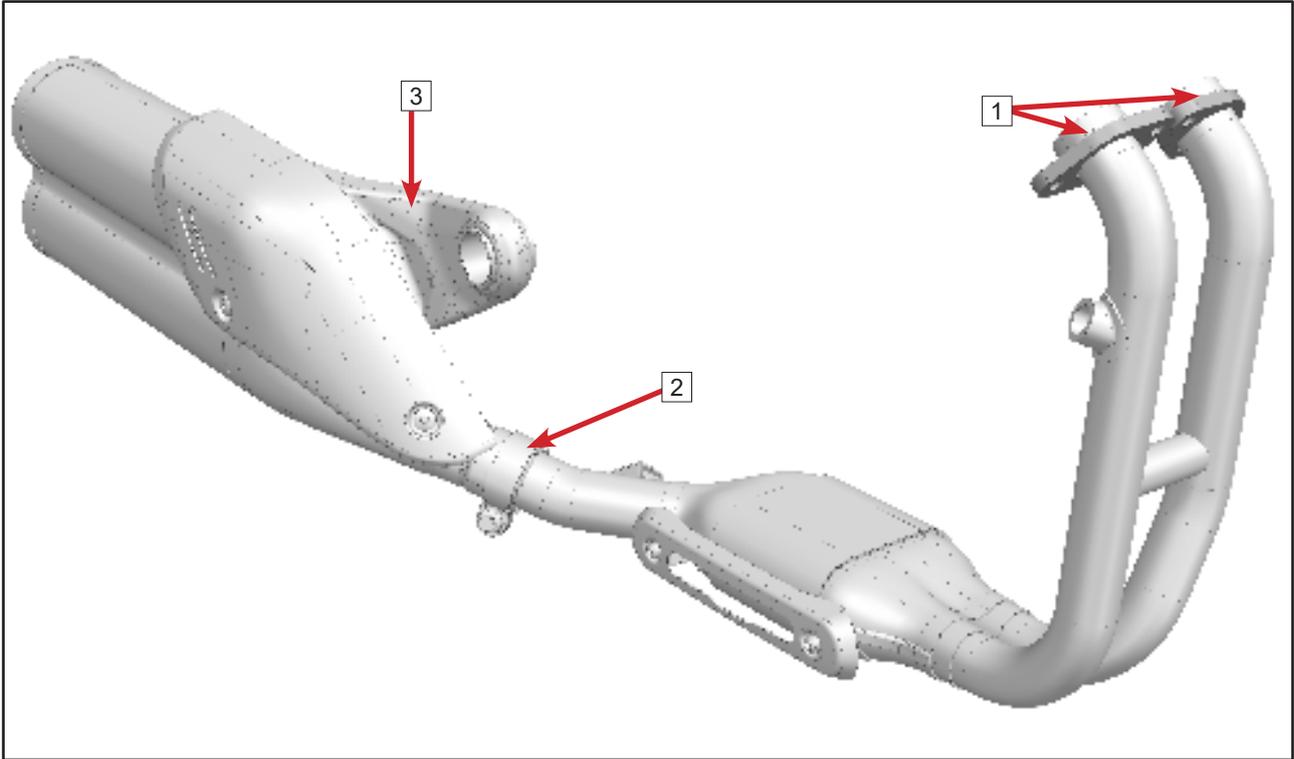
Check whether the appearance of the exhaust pipe is broken, if the exhaust pipe is broken, please replace with new parts.

Check the graphite sealing sleeve I [1] of the exhaust pipe.

Check the exhaust gasket [2].

If there is corrosion, cracks or deformation, please replace with new parts.

Check the buffer sleeve [3], if cracks, corrosion, etc., replace with new parts.



Wheels and Brake System

11.1 Front Brake Caliper	2
11.2 Front Wheel	2
11.3 Rear Wheel (Double Seats)	2
11.4 Rear Wheel (Single Seat)	4
11.5 Rear Brake Caliper (Double Seats)	5
11.6 Rear Brake Caliper (Single Seat).....	5
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11.11 Free Play	14
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Wheels and Brake System

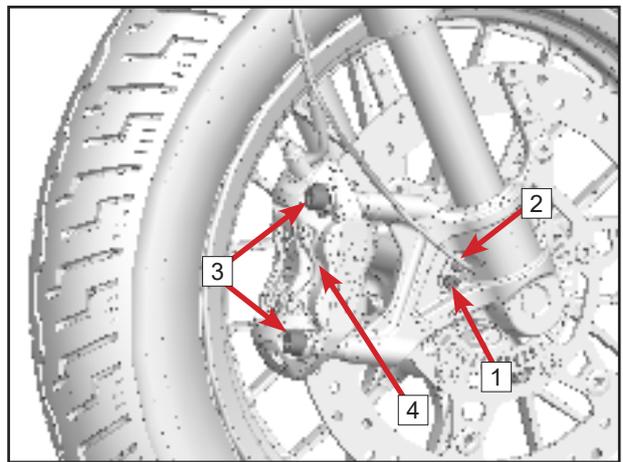
NOTE: Before removing the tires, reinstall the center support/side stand or use a brace to support the vehicle to get the front/rear wheel off the ground.

11.1 Front Brake Caliper

- Remove bolt [1].
- Remove speed sensor [2].
- Remove bolts [3].
- Remove RH front brake caliper [4].

Installation

Installation is in reverse order of disassembly.



11.2 Front Wheel

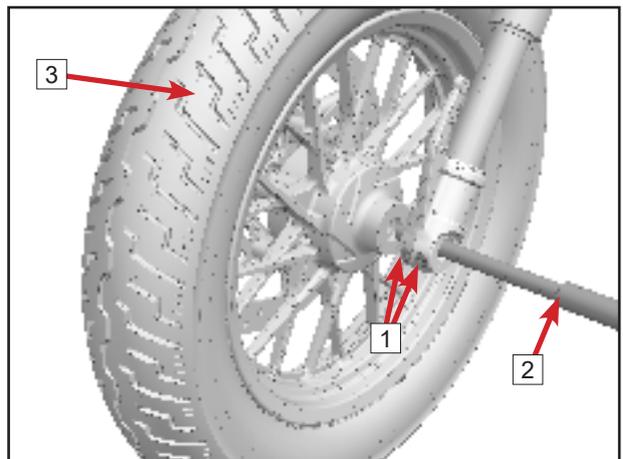
Removal

- Release bolts [1].
- Remove front wheel shaft and push it out [2].
- Remove front wheel [3].

Do not lose front wheel LH and RH bushings [4].

Installation

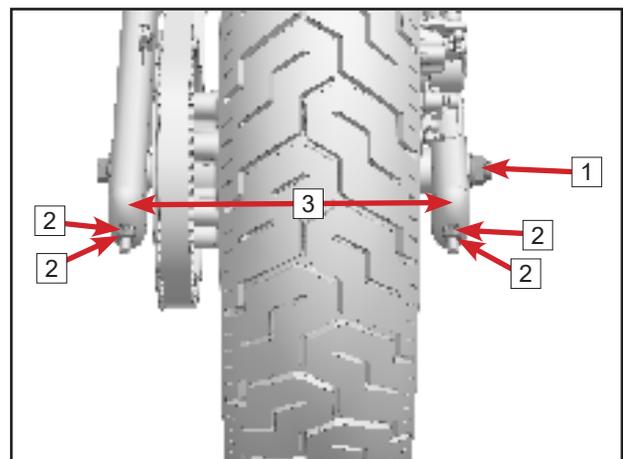
Installation is in reverse order of disassembly.



11.3 Rear Wheel (Double Seats)

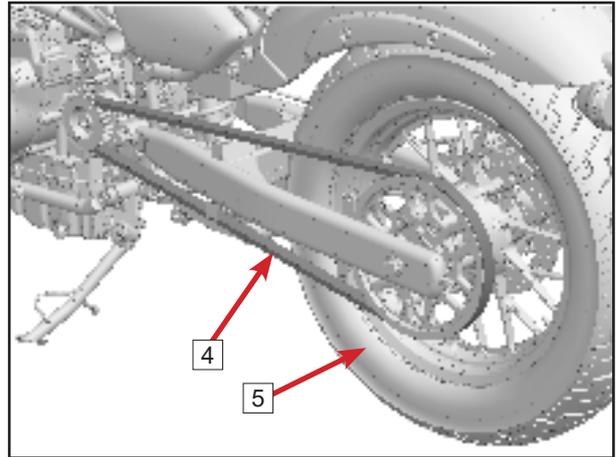
Removal

- Release nut [1].
- Release nuts [2].
- Release drive belt adjusting blocks [3].

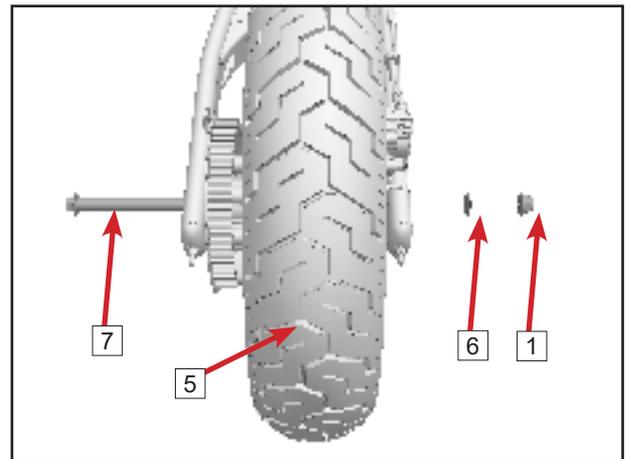


Wheels and Brake System

Remove belt upper and lower guard (see details in Chapter 05).
Push the rear wheel forward of the vehicle [4].
Remove drive belt [5].



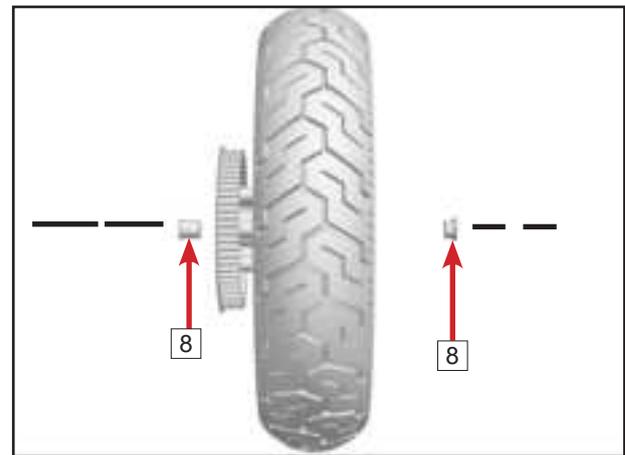
Remove nut [1].
Remove gasket [6].
Push out rear wheel shaft [7].
Remove rear wheel [5].



Do not lose rear wheel LH and RH bushings [6].

Installation

Installation is in reverse order of disassembly.

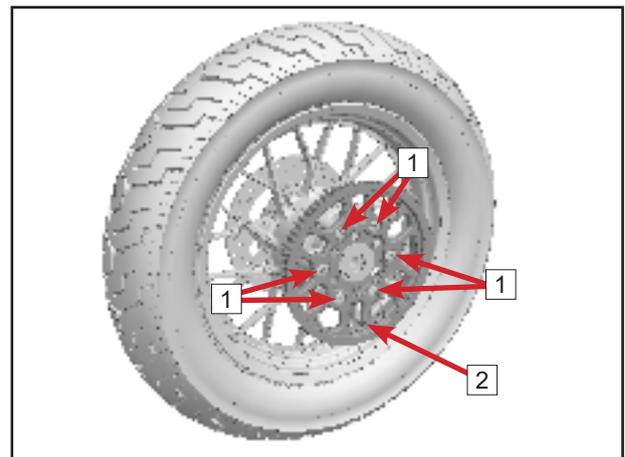


Removal

Remove bolts [1].
Remove rear belt drive wheel [2].

Installation

Installation is in reverse order of disassembly.



Wheels and Brake System

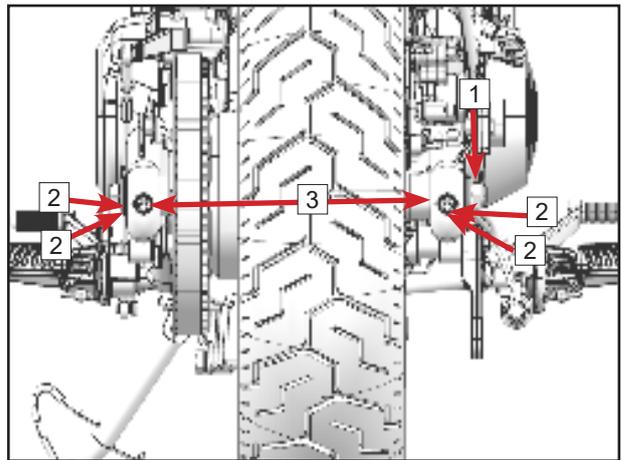
11.4 Rear Wheel (Single Seat)

Removal

Release nut **1**.

Release nuts **2**.

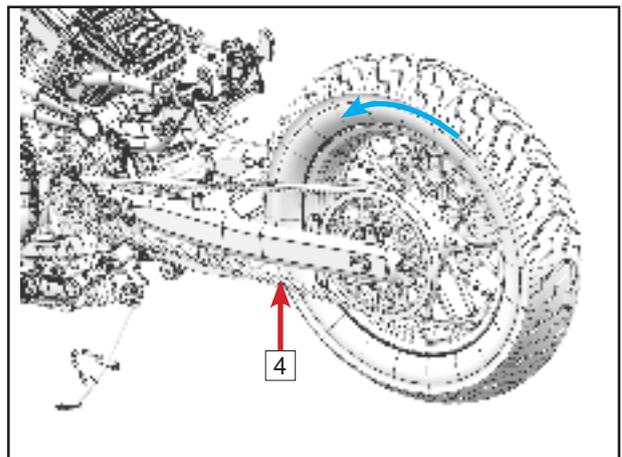
Release drive belt adjusting blocks **3**.



Remove belt upper and lower guard (see details in Chapter 05).

Push the rear wheel forward of the vehicle **4**.

Remove drive belt **5**.

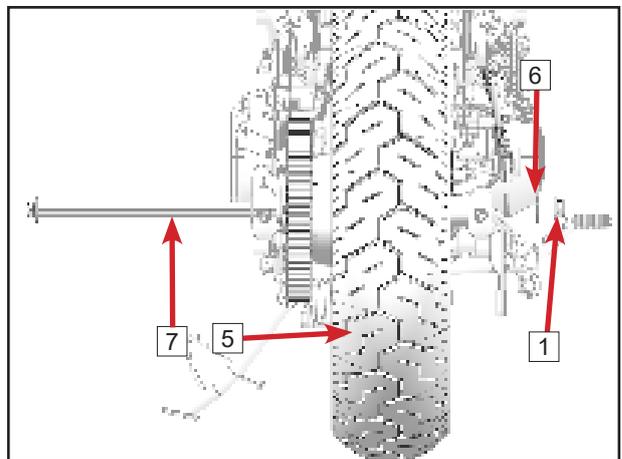


Remove nut **1**.

Remove gasket **6**.

Push out rear wheel shaft **7**.

Remove rear wheel **5**.



Do not lose rear wheel LH and RH bushings **8**.

Installation

Installation is in reverse order of disassembly.



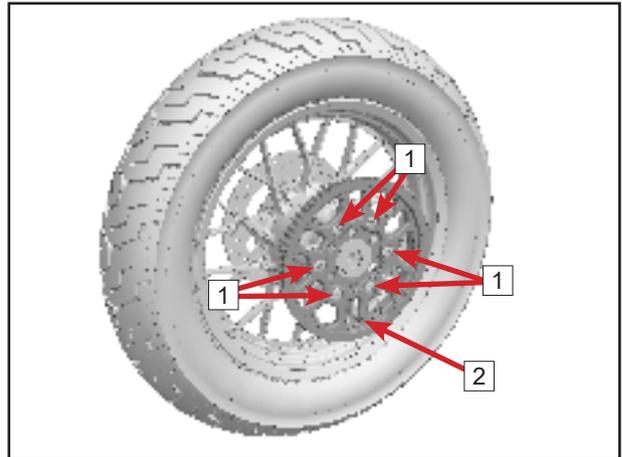
Removal

Remove bolts [1].

Remove rear belt drive wheel [2].

Installation

Installation is in reverse order of disassembly.



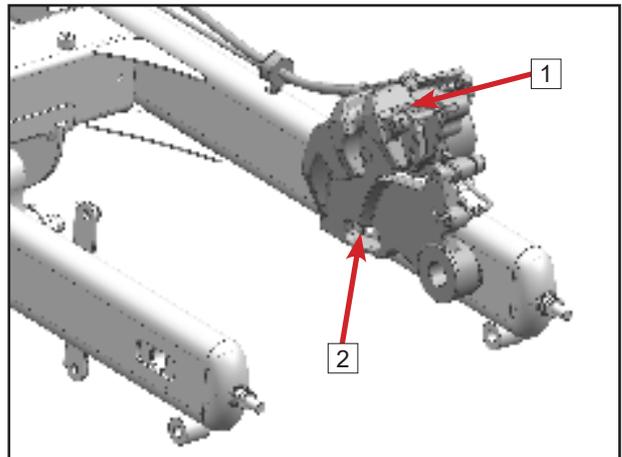
11.5 Rear Brake Caliper (Double Seats)

Removal

Remove rear brake caliper [1] from limit block [2].

Installation

Installation is in reverse order of disassembly.



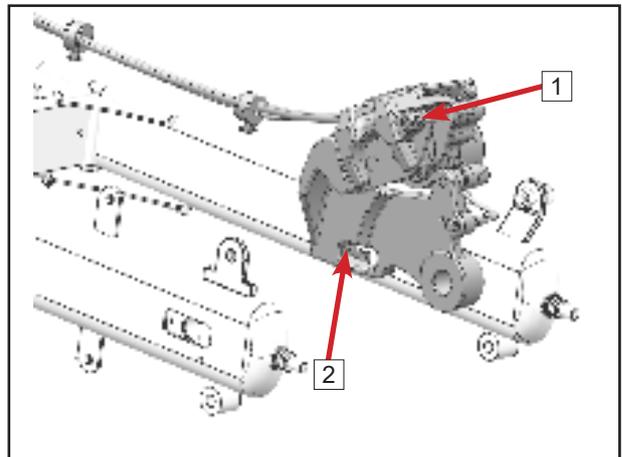
11.6 Rear Brake Caliper (Single Seat)

Removal

Remove rear brake caliper [1] from the limit block [2].

Installation

Reverse the removal procedures for installation.



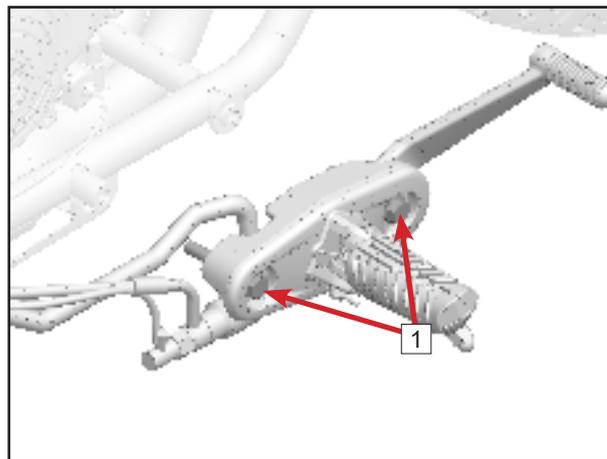
Wheels and Brake System

11.7 Brake Master Cylinder

11.7.4.1 Rear Brake Master Cylinder Removal

Remove RH footrest fixed bolts [1].

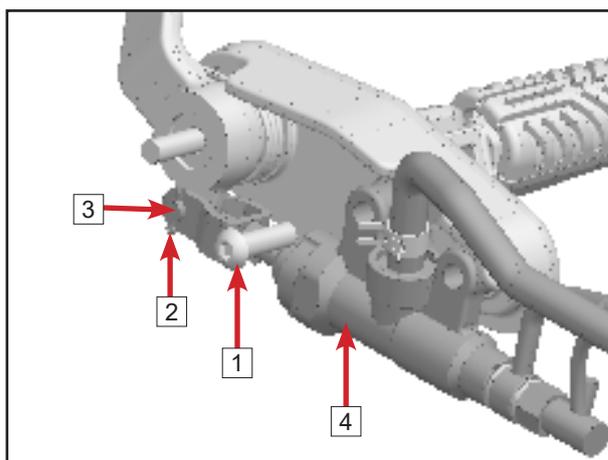
⚠ CAUTION: The reservoir cannot be inverted to prevent air from entering the brake line and causing brake system failure.



Remove main brake pump fixed bolt [1].
Remove main brake pump pin [2].
Remove main brake pump pin shaft [3].
Remove main brake pump [4].

Installation

Installation is in reverse order of disassembly.



11.7.1 Hand Brake Master Cylinder Assembly

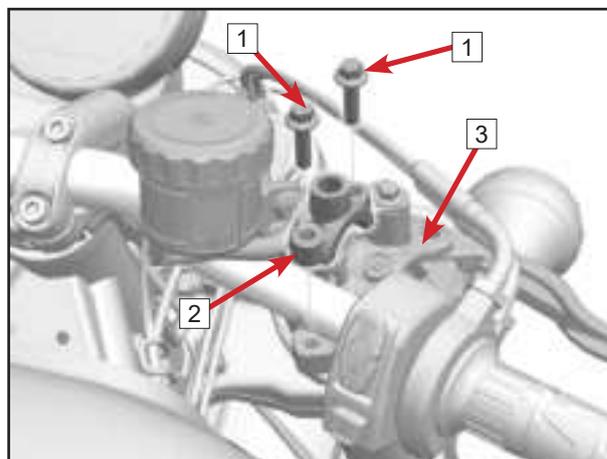
Removal

Remove bolts [1].
Remove press cover [2].
Remove hand brake master cylinder assembly [3].

Installation

Installation is in reverse order of disassembly.

⚠ CAUTION: The reservoir cannot be inverted to prevent air from entering the brake line and causing brake system failure.



11.8 ABS Execution Unit

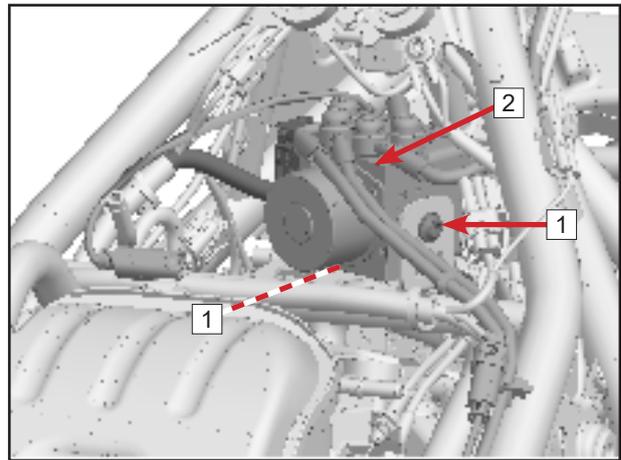
Removal

Remove upper and lower bolts and gaskets on both sides [1].

Remove ABS execution unit [2].

Installation

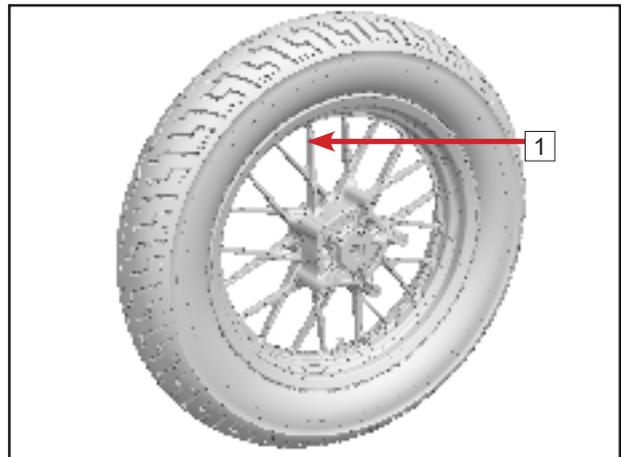
Installation is in reverse order of disassembly.



11.9 Tire Inspection

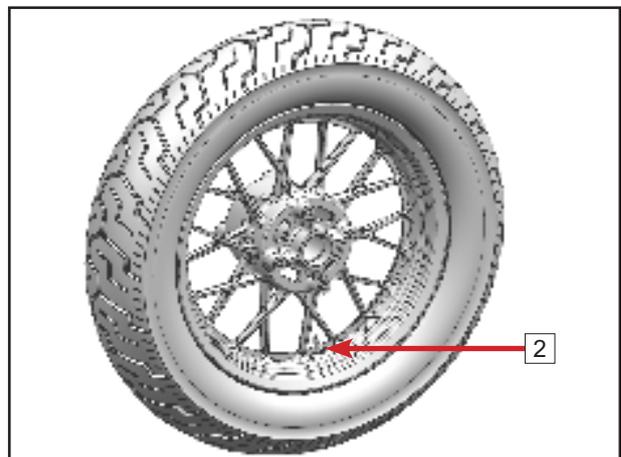
CAUTION: Special tire press machine must be used to remove the tire, and the tire should be avoided near the inflation valve to prevent damage to the tire pressure sensor.

Check whether the rim [1] is distorted, broken, cracked or has other damage, if there is damage, replace the rim.



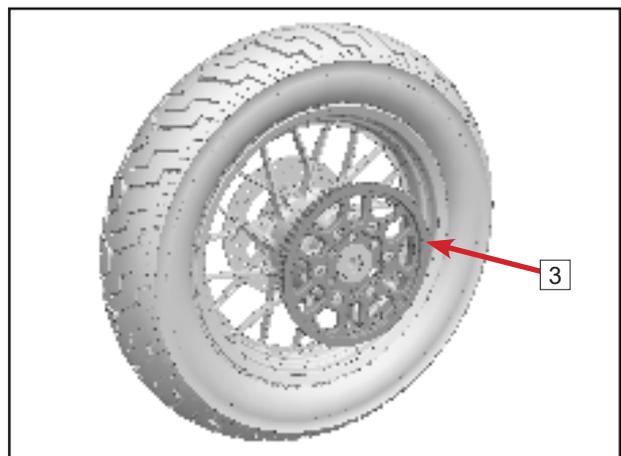
If equipped with tire pressure sensor:

Check whether the inflation valve [2] of the tire pressure sensor is damaged or leaking. The vehicle uses the tire pressure sensor. If the valve is damaged or the tire pressure display is abnormal, replace with a new tire pressure sensor.



Check if the rear belt drive pulley [3] is deteriorated or broken.

If so, replace the rear belt drive pulley.



Wheels and Brake System

11.9.1 Tire Pressure

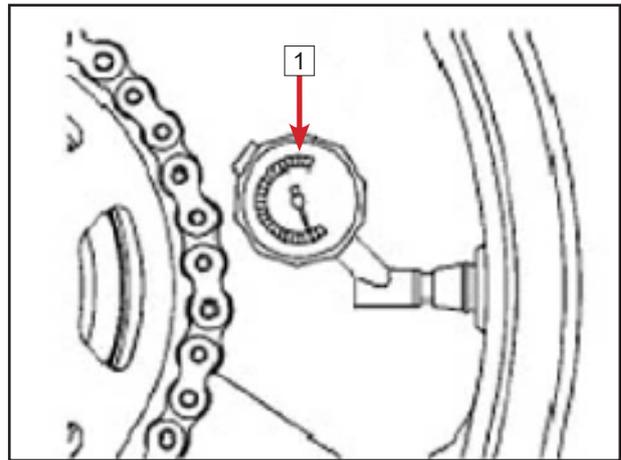
Remove tire inflation valve cap.

Measure the tire pressure with air gauge **1** when it is cool.

Pressure	Single
Front wheel	200kPa
Rear wheel	200kPa

Adjust the tire pressure according to the standard if necessary.

Install tire inflation valve cap.

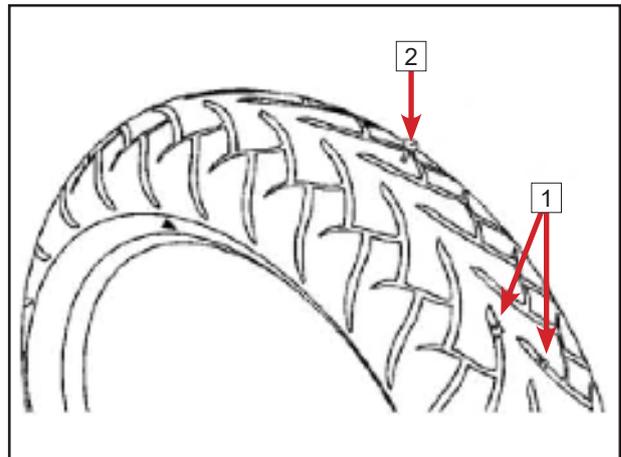


11.9.2 Tire Appearance

Clean the embedded stone **1** or other inclusions **2** on tires.

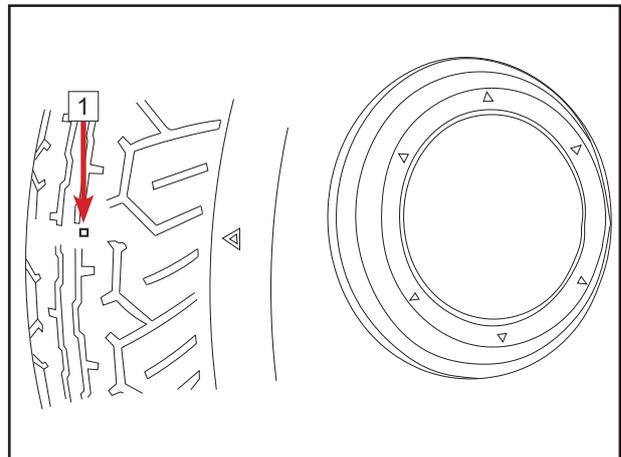
Inspect the tire for cracks, cuts, dents or damages. Replace if any defect is found.

If tire expands or has bulges on it, replace with a new tire.



Inspect tire for wear condition. The tire may be punctured or damaged if beyond service limit. Majority of the tire accidents happen due to exceeding service limit. Pay attention not to use the tire if the pattern is worn in case of injury.

When the tire thread wears to the block **1** height, replace with a new tire.



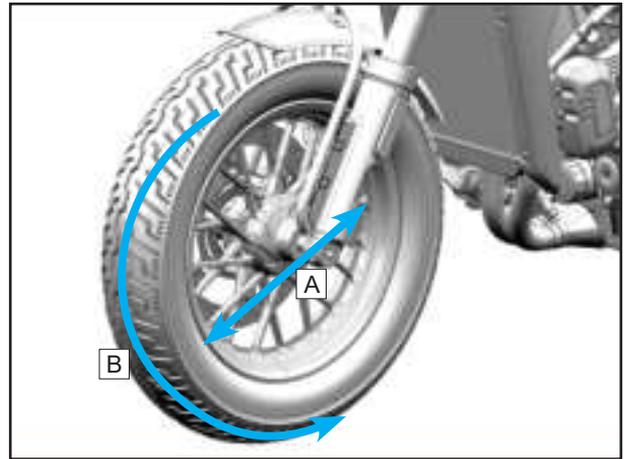
11.9.3 Wheel Bearing

Lift the front wheel with jack.

Inspect the front wheel bearing for damage by pushing or pulling the wheel **A**.

Rotate the front wheel **B** to inspect for smooth movement and noise.

Replace if any defect is found.

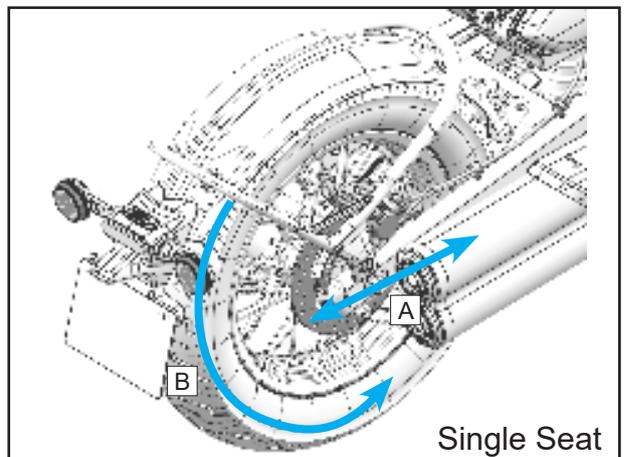
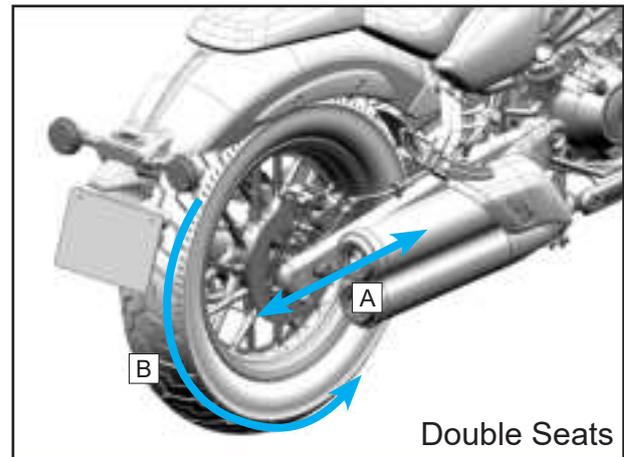


Lift the rear wheel with jack.

Inspect the rear wheel bearing for damage by pushing or pulling the wheel **A**.

Rotate the rear wheel **B** to inspect for smooth movement and noise.

Replace if any defect is found.



Wheels and Brake System

11.10 Brake System Inspection

WARNING:

Brake fluid can irritate the skin.

Keep the brake fluid out of reach of children.

Do not let brake fluid contact skin, eyes or clothing. Wear protective gears and goggles during operation.

If swallow brake fluid by accident, seek for medical attention immediately.

If you get brake fluid on skin, rinse contact area with clean water immediately.

If you get brake fluid in your eyes, immediately wash it off and seek for medical attention.

If you spill brake fluid on your clothing, change your clothing.

11.10.1 Hand Brake Master Cylinder Inspection

Front Brake Fluid Level Inspection

Straighten the vehicle to make the front brake fluid reservoir parallel the ground.

Check the fluid level.

Add or reduce the brake fluid until the level is between UPPER and LOWER line.

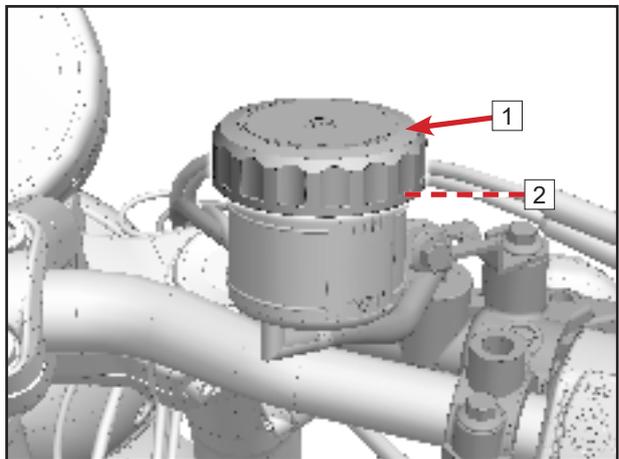


Brake Fluid Replacement

Remove reservoir cap **1**.

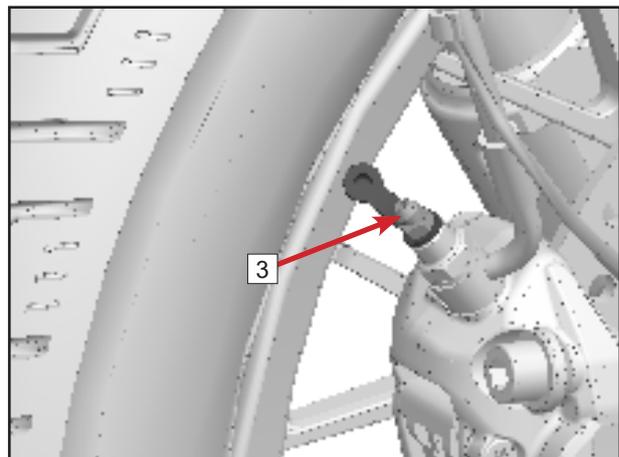
Remove reservoir gasket **2**.

NOTE: Reservoir gasket may be sunk due to negative pressure caused by brake fluid reducing. It does not affect normal use but needs to be restored during installation.



Open air-bleed bolt rubber cap.

Connect a clean hose with air-bleed bolt **3** with other side into a container.



Repeatedly hold and loose [A] brake handle until it feels hard.

Loose air-bleed bolt [3] a little bit.

Tighten the bolt right after the brake fluid stops spraying out or the handle braking effect feels soft.

Add brake fluid.

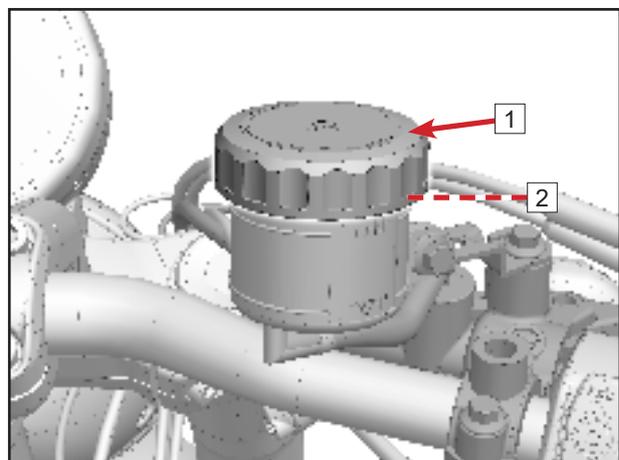
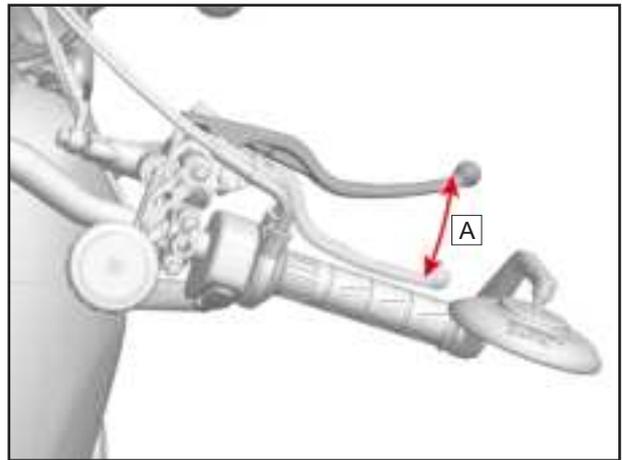
Repeat the above procedures until the new brake fluid sprays out.

⚠ WARNING: Keep brake fluid level above LOWER, to prevent air gets into brake system, which results in brake system failure and injury.

⚠ WARNING: If there is air inside of brake system, replace brake fluid repeatedly until there is no air in drained brake fluid.

Brake Fluid Addition

Add fluid to the level between UPPER and LOWER.



Install reservoir gasket [2].

Install reservoir cap [1].

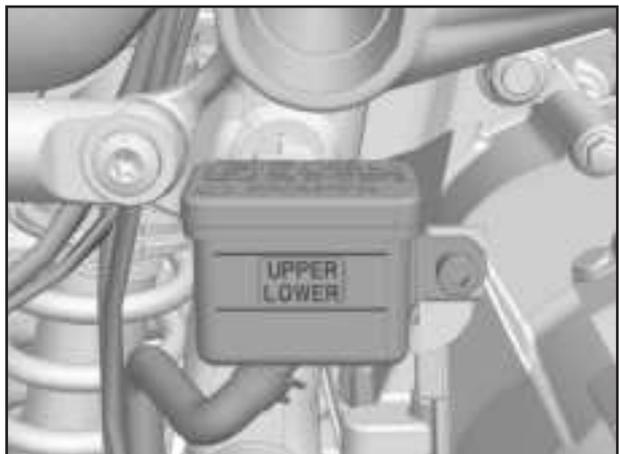
11.10.2 Rear Brake Master Cylinder Inspection

Rear Brake Fluid Level Inspection

Straighten the vehicle to make the rear brake fluid reservoir parallel the ground.

Check the fluid level.

Add or reduce the brake fluid until the level is between UPPER and LOWER line.



Wheels and Brake System

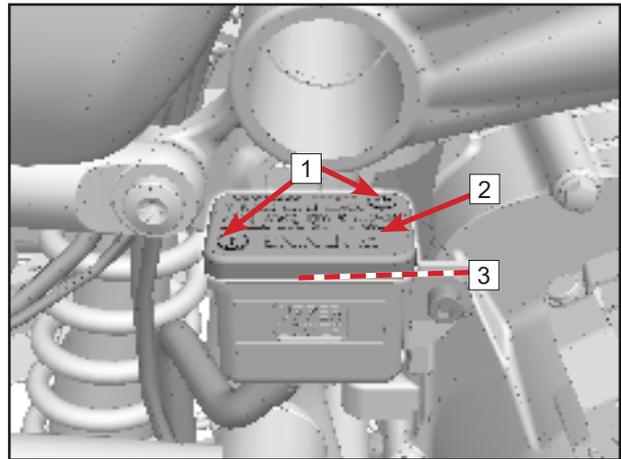
Brake Fluid Replacement

Remove reservoir cap fix screws [1].

Remove reservoir cap [2].

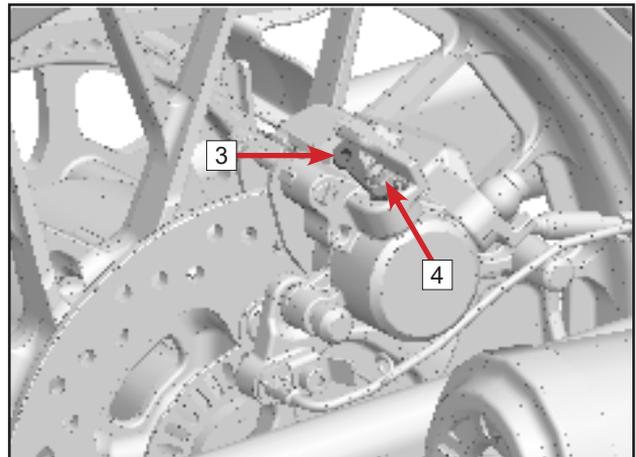
Remove reservoir gasket [3].

NOTE: Reservoir gasket may be sunk due to negative pressure caused by brake fluid reducing. It does not affect normal use but needs to be restored during installation.



Open air-bleed bolt rubber cap [3].

Connect a clean hose with air-bleed bolt [4] with other side into a container.



Repeatedly press and release [A] brake pedal until it feels hard.

Loose air-bleed bolt [5] a little bit.

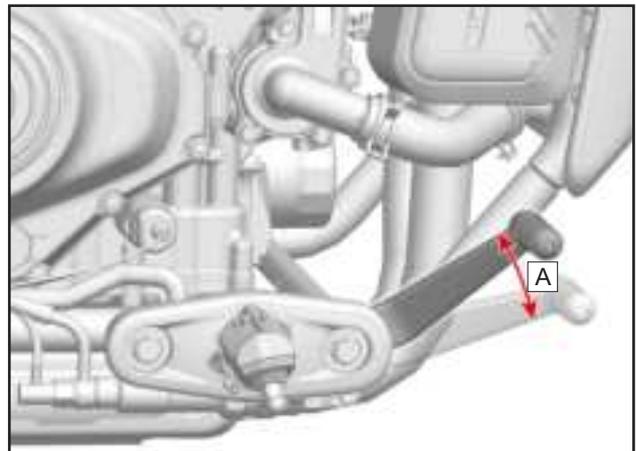
Tighten the bolt right after the brake fluid stops spraying out or the pedal braking effect feels soft.

Add brake fluid until the level is between UPPER and LOWER.

Repeat the above procedures until the new brake fluid sprays out.

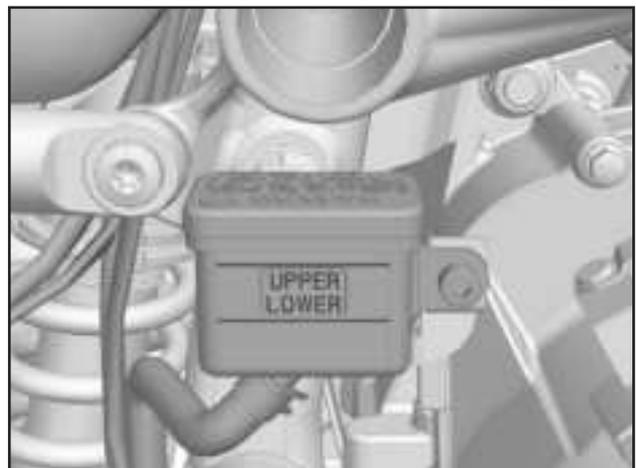
⚠️ WARNING: Keep brake fluid level above LOWER, to prevent air gets into brake system, which results in brake system failure and injury.

⚠️ WARNING: If there is air inside of brake system, replace brake fluid repeatedly until there is no air in drained brake fluid.

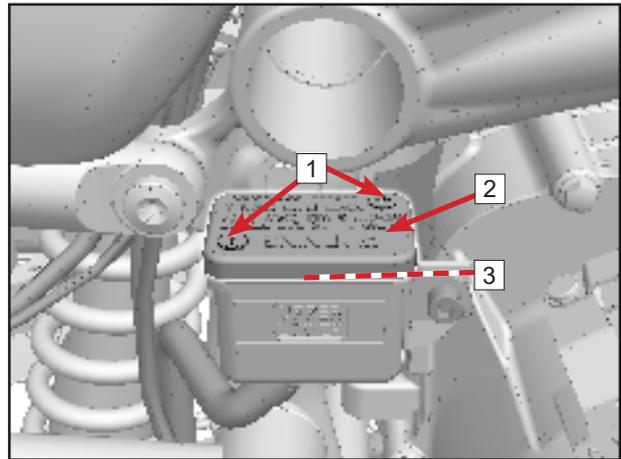


Brake Fluid Addition

Add fluid to the level between UPPER and LOWER.



- Install reservoir gasket [3].
- Install reservoir cap [2].
- Install screws [1].



11.10.3 Brake Hose Inspection

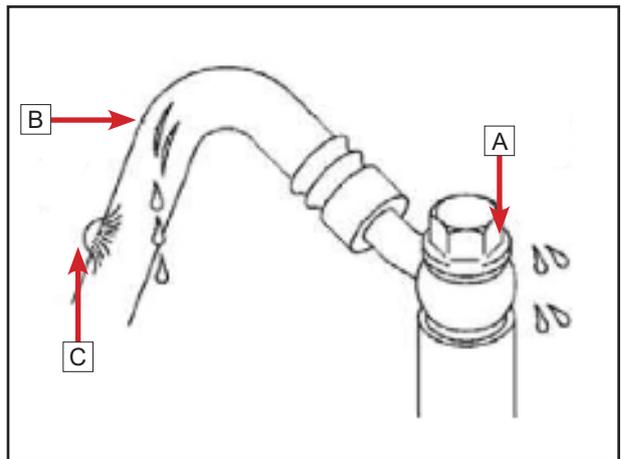
Inspect brake hose, connectors and pipes for damage, cracks or leaking.

With improper maintenance, the high pressure inside the brake hose can cause fluid leaking [A] or hose burst.

Inspect brake hose for bending or twist. Replace with new hoses and pipes if crack [B], bulge [C] or leaking detected.

Tighten all the brake hose connecting bolts and nuts.

Inspect brake hose route. Reset the hose route if not proper or correct.



11.10.4 Brake Calipers and Brake Discs Inspection

Front and Rear Brake Calipers

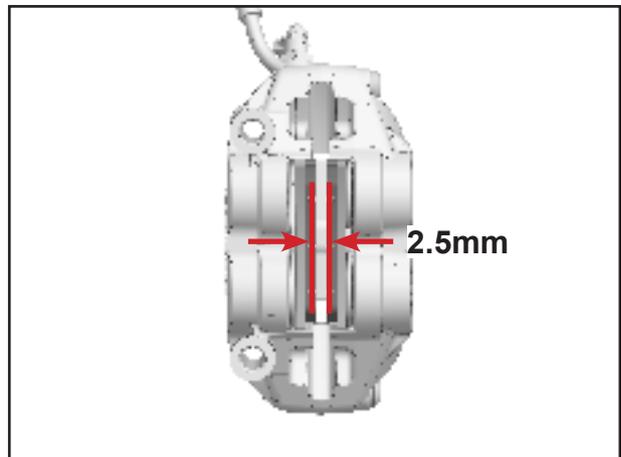
Remove brake caliper.

Inspect each brake pad thickness.

Brake pad thickness service limit: 2.5 mm

Replace brake pads before it reaches to service limit. The two pads needs to be replaced together.

Inspect brake pads for deep scratches or other damages, if so, replace the two pads together.



⚠️ WARNING: Do not drive immediately after replacement of new brake discs or new brake pads. They need to be run in, manipulate the Brake lever several times until the brake disc is well engaged with the brake caliper.

Front and Rear Brake Discs

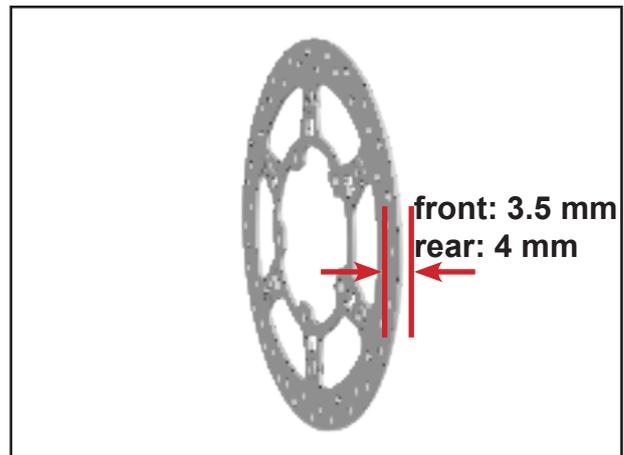
Inspect brake disc thickness.

Front brake disc thickness service limit: 3.5 mm.

Rear brake disc thickness service limit: 4 mm.

Replace brake discs before it reaches to service limit.

Inspect brake discs for deep scratches or other damages. Replace if any defect is found.

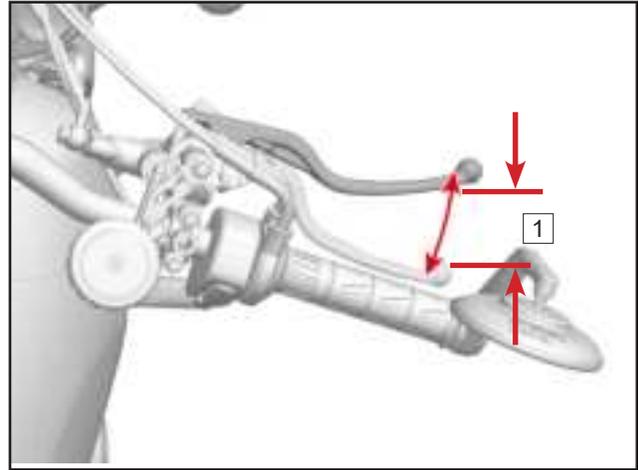


Wheels and Brake System

11.11 Free Play

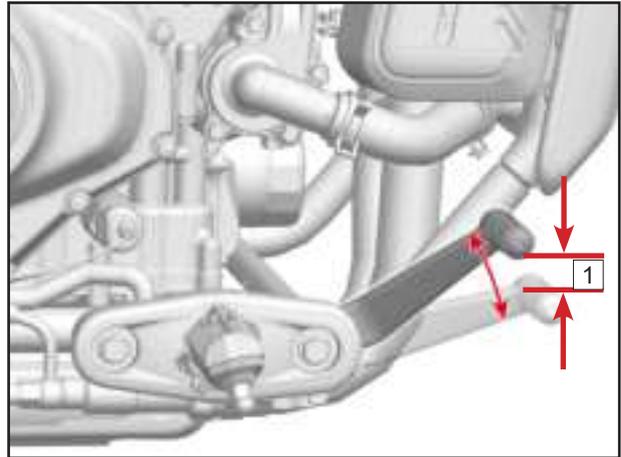
11.11.1 Front Brake Handle Free Play

Inspect front brake handle free play 1.
Standard: 3 mm~6 mm



11.11.2 Rear Brake Pedal Free Play

Inspect rear brake pedal free play 1.
Standard: 10 mm~15 mm



Shock Absorbers and Rear Fork

12.1 LH and RH Front Shock	2
12.2 Drive Belt.....	2
12.3 Rear Fork Assembly	7
12.3.1 Rear Shock Absorber.....	7
12.3.2 Rear Fork	7

Shock Absorbers and Rear Fork

12.1 LH and RH Front Shock

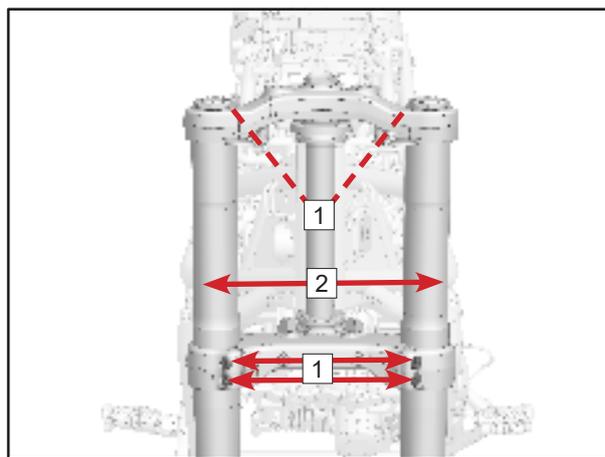
Absorbers

Removal

Remove inner hex bolts [1] on both sides.
Remove LH and RH front shock absorbers [2].

Installation

Installation is in reverse order of removal.



Inspection

Inspect the appearance of the front shock absorber for damage and cracks, etc., and replace parts if any.

Clean the dust and mud on the front shock absorber.

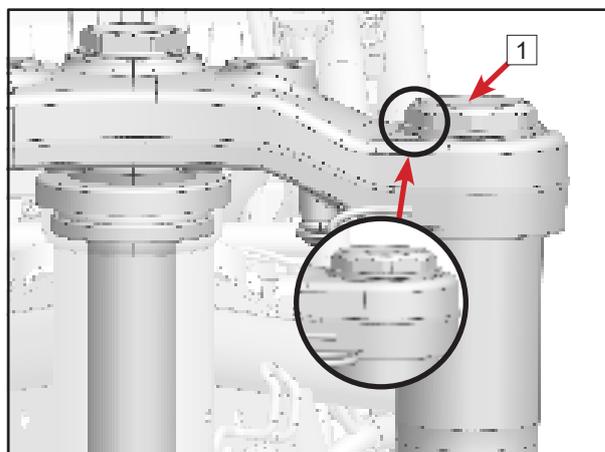
Hold the handlebar and press down several times to check if the front shock absorber compression rebound is normal.

Installation

Installation is in reverse order of removal.



⚠ CAUTION: When installing front shock absorber, ensure that the upper ends [1] of the inner tubes of the two front shock absorbers are flush, and that the number of scales exposed on the upper ends of the inner tubes of the front shock absorbers is the same.



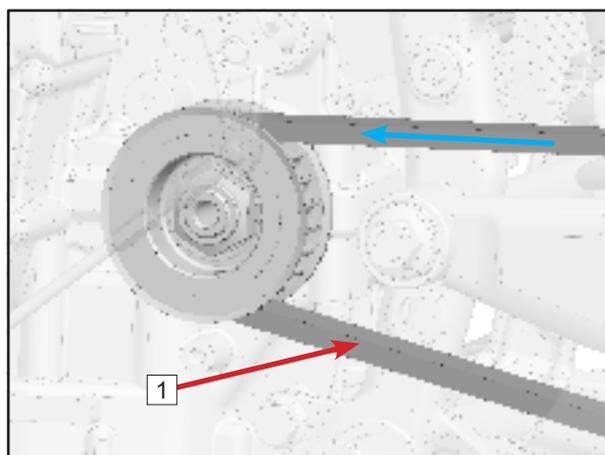
12.2 Drive Belt

Removal

Push the drive belt [1] forward.

Disengage the drive belt [1].

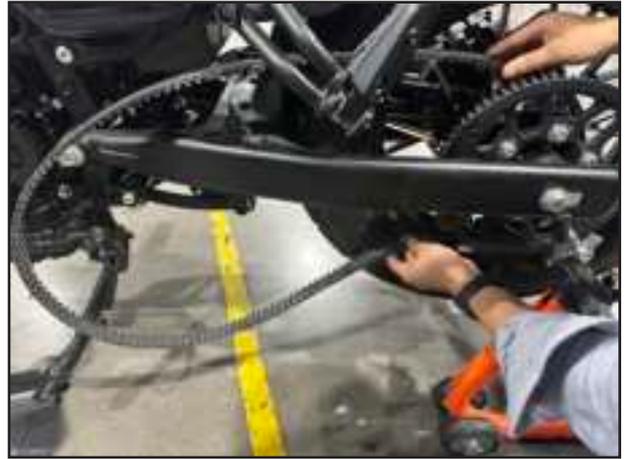
Prevent the drive belt from falling on the ground or coming into contact with other dirt. If the drive belt is dirty, it must be cleaned with a non-woven cloth when reinstalling it.



Shock Absorbers and Rear Fork

Installation

Put the belt over the rear hub ;



Screw the belt regulator nut to the end, then push the rear wheel to the most forward position ;



Insert the belt into the small pulley;



Insert the belt into the large pulley from the flange free side of large pulley;



Shock Absorbers and Rear Fork

Turn the rear wheel forward at least 2 turns ;



Note:

1. Violent installation will damage the core wire of the belt and cause abnormal breakage of the belt. Strictly observe the precautions when removing the belt.

2. It is forbidden to insert the belt halfway, as if assembling a chain, and then turn the rear wheel so that the remaining belt "bites" into the pulley.

3. When putting the belt into the pulley, be careful not to bend the belt too much, and ensure that the minimum bending diameter of the belt is greater than the diameter of the pulley.

4. Before the belt is put into the large pulley, the rear wheel shaft should be in the most forward position, otherwise the belt will be difficult to put into the large pulley.

Belt Leveling

Belt leveling standard:

Turn the rear wheel, the belt runs stably without "moving" to one side, and the distance between the belt and the large pulley flange is 0mm-3mm (image 1).

When the distance between the belt and the flange of the large belt wheel is 0mm, it is necessary to check whether the belt is abnormal. After the detection process is completed, it is necessary to check whether there is a wear mark on the side of the pulley. If there is an abnormal noise or wear mark, it needs to be adjusted again.

Belt leveling steps:

1. Suspend the rear wheel, and the gear is in N gear;

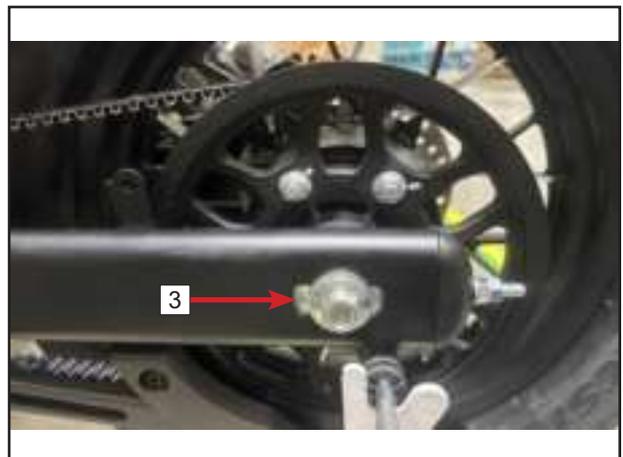
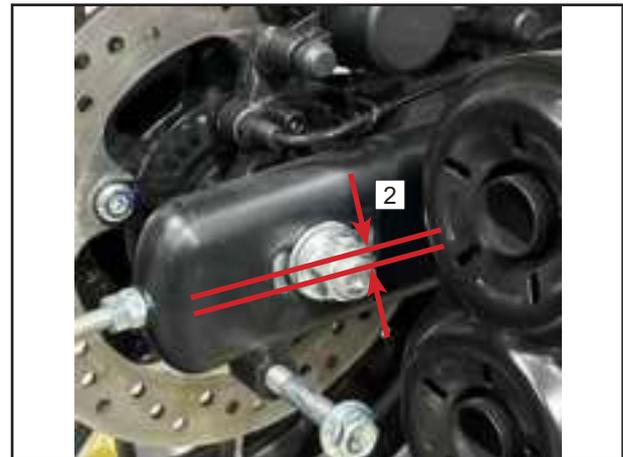
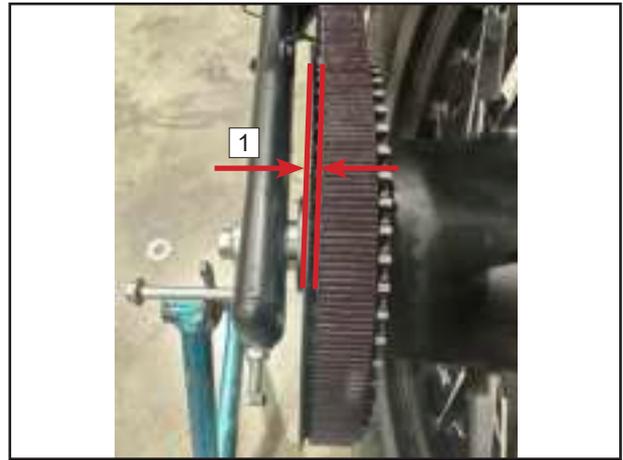
2. Screw in the rear axle nut but do not tighten it, and eliminate the rear axle gap (about 3mm rear axle leakage) (image 2);

3. Screw the left and right belt adjusters to the same position (image 3).

Read the belt adjuster scale based on the vertical edge of the rear fork long hole;

4. Turn the rear wheel to observe whether the belt runs off. If the belt moves to a certain side, fine-tune the belt regulator backward, and then turn the rear wheel again to observe. If the belt continues to move, continue to fine-tune the belt regulator backward until the belt runs stably and the distance between the belt and the large pulley flange is 0mm to 3mm;

5. Observe the scale of the left and right belt adjuster, the scale difference should be within 2 grids, if more than two grids, it needs to be readjusted.



Shock Absorbers and Rear Fork

Tension Adjustment

Measure the belt tension using the tensiometer on the right.

Testing tool: TG179 tensiometer

Start adjusting the tension when the belt is even.

Belt tension standard: Among the four detection points, the lowest point is in the range of $68 \pm 2\text{Hz}$.

1. Suspend the rear wheel, and the gear is in N gear;

2. Find the "67T" mark of the large pulley, turn the rear wheel to make the mark vertically upward (image A), use the professional tensiometer to read the tension as shown in [1]. If the tension is less than 66Hz , adjust the belt regulator backward to make the tension within the range of $68 \pm 2\text{Hz}$. It should be noted that in order to prevent the leveling belt from moving, the adjusting nut of the left and right belt regulator should be turned the same number of turns at the same time when adjusting the belt tension;

3. Turn the rear wheel forward $1/4$ turn (90°), read the tension as shown in [1]. If the tension is less than 66Hz , adjust the tension to $68 \pm 2\text{Hz}$. If the tension is greater than 66Hz , no adjustment is required, this is the second detection point;

4. Continue to turn the rear wheel $1/4$ turn, repeat step 3, this is the third detection point;

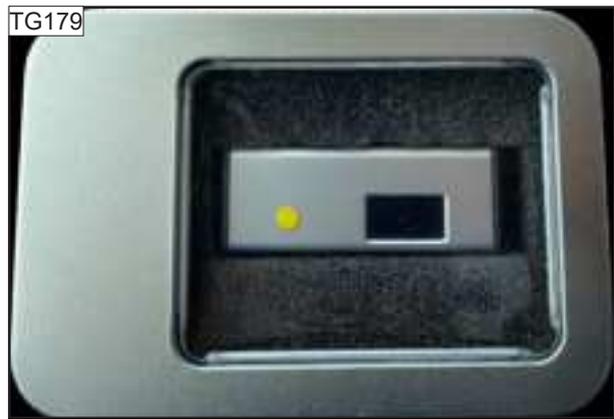
5. Turn the rear wheel again $1/4$ turn, repeat step 3, this is the fourth detection point;

6. Ensure that the tension of the lowest point in all the above 4 detection points is in the range of $68 \pm 2\text{Hz}$;

7. After tension adjustment, tighten the rear axle nut and belt regulator nut in turn.

Read the tension at the middle position of the belt [1], using the rear fork iron bracket as a reference, near the iron bracket $\pm 10\text{mm}$.

Note: If it is a non-contact tension meter, follow the above standards. If it is a contact tension meter, such as the TG179 Tension Meter, it is necessary to add 3Hz to this basis, that is, $71 \pm 2\text{Hz}$.



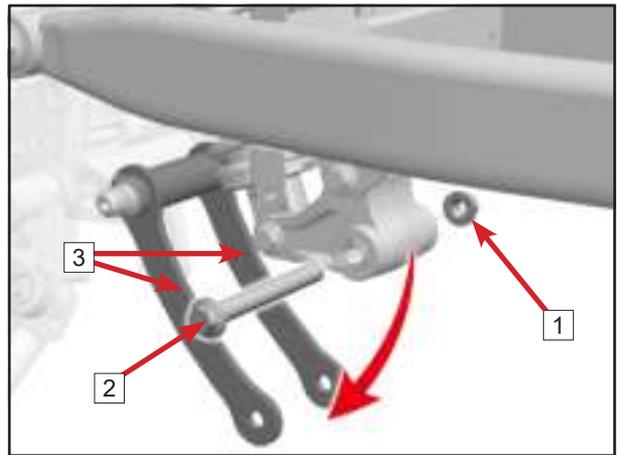
12.3 Rear Fork Assembly

Removal

Remove nut [1].

Remove bolt [2].

Disengage connecting rod assembly [3].



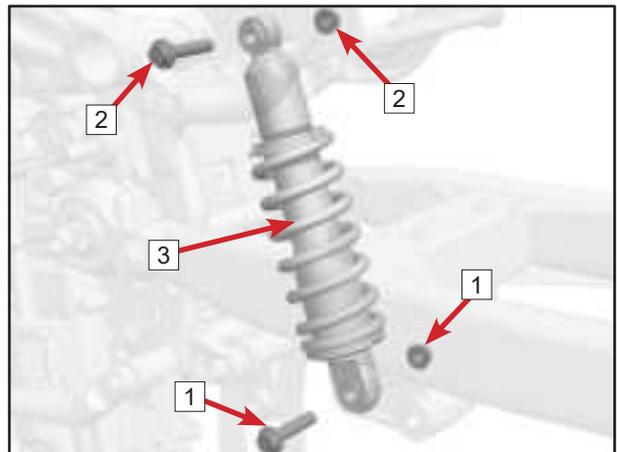
12.3.1 Rear Shock Absorber

Removal

Remove bolt and nut assembly [1].

Remove bolt and nut assembly [2].

Remove rear shock absorber [3].



Installation

Installation is in reverse order of removal.

12.3.2 Rear Fork

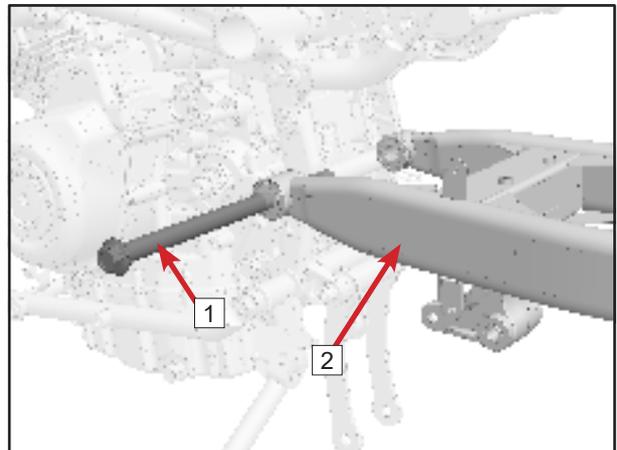
Removal

Pull out rear fork shaft [1].

Remove rear fork [2].

Installation

Installation is in reverse order of removal.



Shock Absorbers and Rear Fork

Rear Shock Absorber Inspection

Inspect the appearance of the rear shock absorber for damage and cracks, etc., and replace parts if any.

Clean the dust and mud on the rear shock absorber.

Press down the seat several times to check if the rear shock absorber compression rebound is normal.

Rear Shock Absorber Adjustment

The rear shock absorber spring preload can be adjusted to suit the rider's weight and riding conditions.

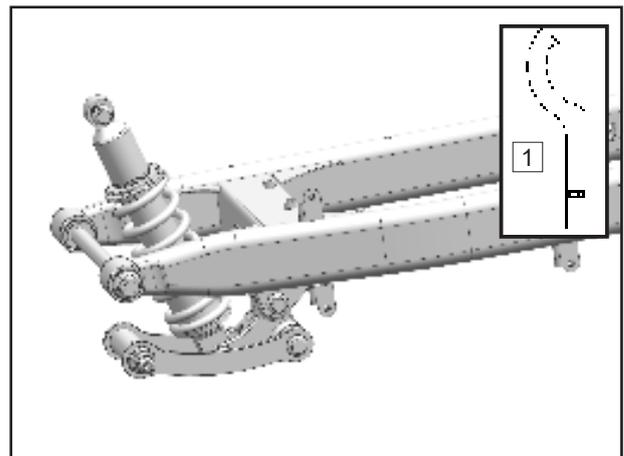
Adjust Spring Preload by following these steps

Use a special tool  to turn counterclockwise in the direction  to reduce the spring preload.

Use a special tool  to turn clockwise in the direction  to increase the spring preload.

NOTE: The rear shock absorber has been adjusted to the best state, which is suitable for most cases when the vehicle leaves the factory.

⚠ DANGER: This part contains high-pressure nitrogen. Improper operation may result in explosion. Read the relevant instructions and do not put it in the fire, open holes or open it.



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13.1 Preparation Instructions

This engine maintenance manual introduces in detail the 272MQ-D engine maintenance adjustment procedures, disassembly and assembly essentials, inspection and maintenance points, troubleshooting methods and maintenance technical data, and with detailed graphic information to guide the operation. Read this manual carefully and perform engine operations according to specifications.

13.1.1 Unit Conversion Table

Item	Unit conversion
pressure	1kgf/cm ² =98.0665kPa 1kPa=1000Pa 1mmHg=133.322Pa=0.133322kPa
torque	1kgf·m=9.80665N·m
volumn	1mL=1cm ³ =1cc 1L=1000cm ³
force	1kgf=9.80665N

13.1.2 Warnings

Whenever you see the following symbols, pay attention to their instructions! Always follow these safe operation and maintenance methods.

 **DANGER**

Indicates that if no measures are taken, the operator or other personnel may die.

 **WARNING**

Indicates that an operator may be injured or parts may be damaged if no measures are taken.

 **CAUTION**

Indicates that precautions need to be taken to avoid parts damage.

NOTE

Represents information that makes the operation process simpler or clearer. No symbol used.

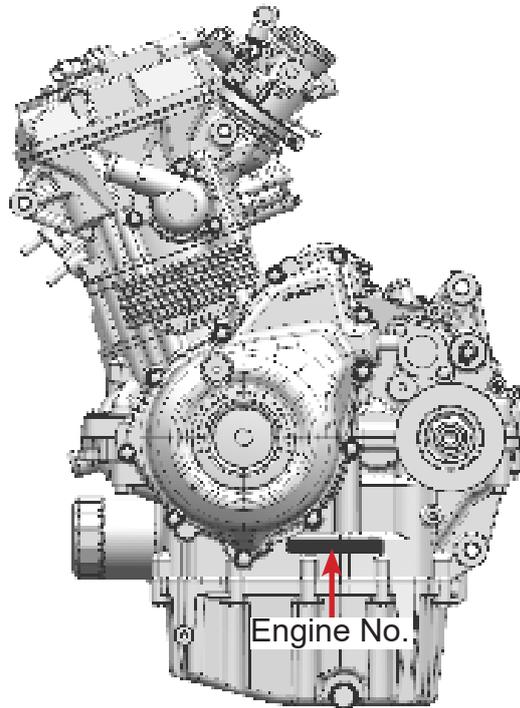
However, please note that the "warning" and "caution" contained in this maintenance manual cannot cover all potential hazards in the use and maintenance of engines. Therefore, in addition to the relevant provisions of "warning" and "caution", maintenance personnel must also have basic mechanical safety knowledge. If you are not sure how to complete the maintenance operation, please consult a more experienced senior mechanic.

The contents in this manual are subject to change without prior notice due to engine improvements. Maintenance should be subject to the actual state of the engine.

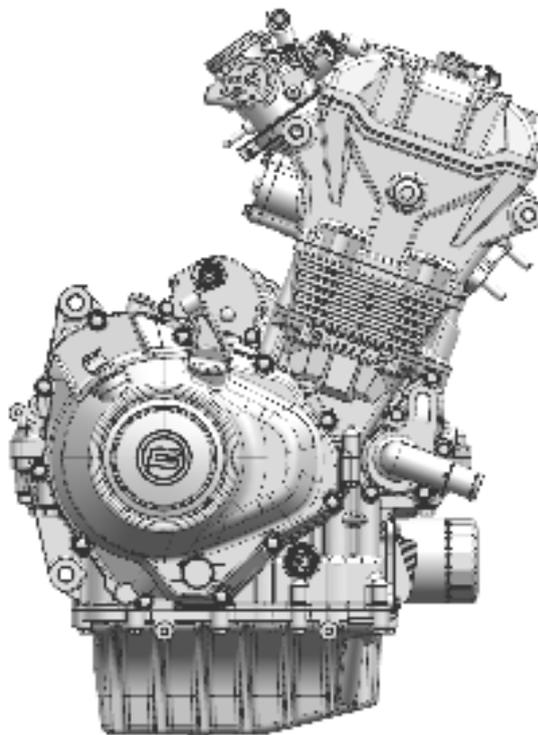
13.2 Maintenance Information

13.2.1 Engine Appearance

Magneto side



Clutch side



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13.2.2 General Precautions

WARNING

Correct maintenance process is very important for the safety of the maintenance personnel and the reliability and safety of the engine.

When two or more people work together, they should pay attention to each other's safety.

When the engine needs to be started indoors, it must be sure to exhaust the exhaust to the outside.

If toxic or flammable materials are used at work, strictly follow the manufacturer's instructions and ensure that the workplace is well ventilated.

Do not use gasoline as a cleaning fluid.

To avoid burns, do not touch uncooled engine, oil and exhaust system parts.

If fuel, lubrication and exhaust systems have been serviced, they must be checked for lines and leaks.

In order to protect the natural environment, do not dispose of oil and unused parts.

CAUTION

During maintenance, if parts need to be replaced, the original pure parts of Zhejiang Chunfeng Power Co., Ltd. or recommended products must be used.

Disassembled parts, need to be used again, keep the habit of placing in order, so that there is no confusion during assembly.

Ensure the use of special tools as specified in the maintenance manual.

Ensure assembly parts are clean and lubricated where necessary.

Use special lubricating oil, binder and sealant.

When tightening bolts, screws and nuts, tighten the large ones first and tighten them with specified torque from inside to outside.

Tighten torque bolts using torque wrenches. Remove grease and oil from threads.

Parts should be inspected after disassembly and cleaned before measurement.

After assembly, check the fastening and operation of the parts.

Do not use dismantled oil seals, gaskets, self-locking nuts, locking gaskets, split pins, elastic rings and other parts, should be replaced with new parts during assembly.

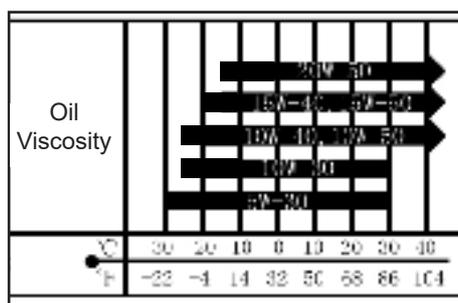
13.2.3 Selection of Fuel and Oil

Fuel

Only 92# or above unleaded gasoline.

Engine oil

First choice SAE 10W-40 SJ JASO-MA2, Depending on temperature second choice SAE 10W-30 SJ / SAE 10W-50 SJ / SAE 20W-40 SJ / SAE 20W-50 SJ JASO-MA2.



13.2.4 Engine Break-in

Engine has a lot of relative motion components, such as piston, piston ring, cylinder block, mutually meshing gear, etc., as a result, in the early days of its use, it is necessary to carry out standard break-in. Break-in can make the moving parts adapt to each other, adjust the clearances, and form a good smooth friction surface that can bear large loads. Only when the engine had been through standardized break-in, can it have excellent performance and reliability.

Recommended break-in period is 1000km, specification as follows:

1. After the engine works, the throttle rotation should be slow, not suddenly moves.
2. Try to drive on the road with better conditions, not for a long time climbing and bumpy road.
3. Keep the lubricating oil pipe unblocked.
4. Avoid sudden acceleration or high-speed engine operation when there is no load.
5. During running-in, maintenance shall be carried out according to daily maintenance and regular regulations, fix problem when being found.
6. After the run-in, it is necessary to replace the oil, filter element, clean the coarse filter screen, check the spark plug electrode and valve clearance, and according to the manual requirements of the machine for a more comprehensive inspection adjustment maintenance, can gradually enter the normal running stage.

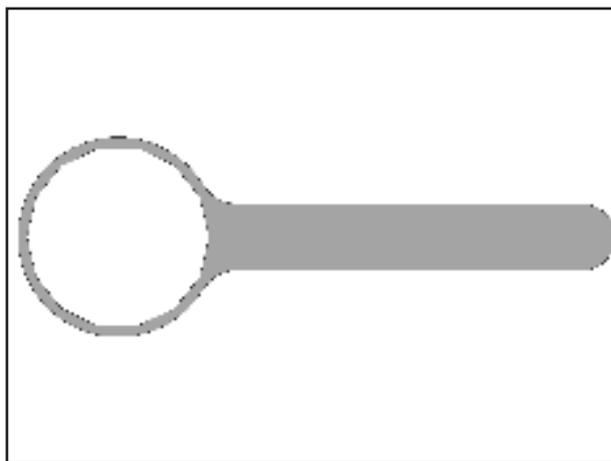
0km ~ 500km: Avoid continuous operation in $\geq 50\%$ throttle state, should constantly change the speed, do not run in a fixed throttle position. Avoid rapid acceleration, throttle transformation should be slow, not suddenly big or small. After every hour of operation, cool the engine for 5 to 10 minutes.

500km ~ 1000km: Avoid running for a long time under the throttle state greater than 3/4.

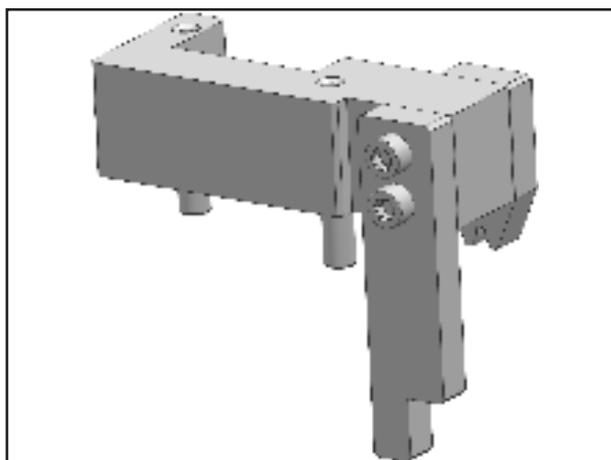
NOTE: During the running-in period, the maintenance shall be carried out according to the daily maintenance regulations. After running in, the whole machine shall be maintained after the running in period of 1000km before entering the normal running stage.

13.2.5 Special Engine Maintenance Tool

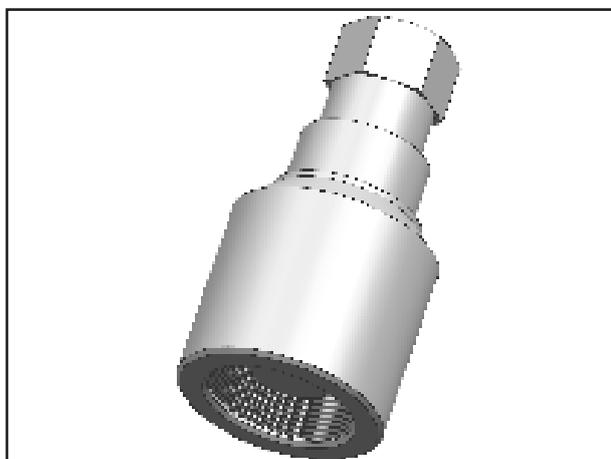
Special wrench for oil filter
0700-070200-922-001



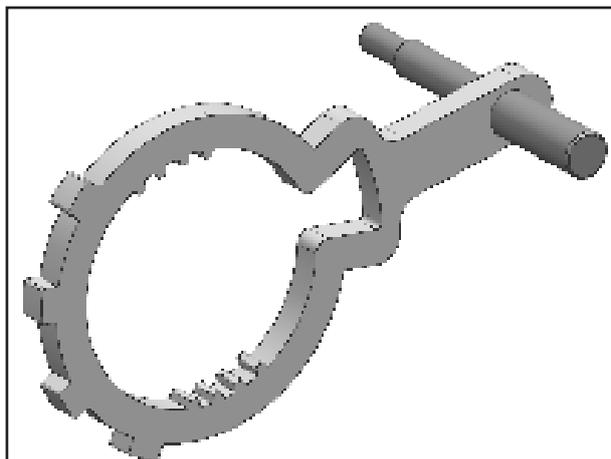
Rear balance shaft positioning stop gear
0SQ0-000000-922-005



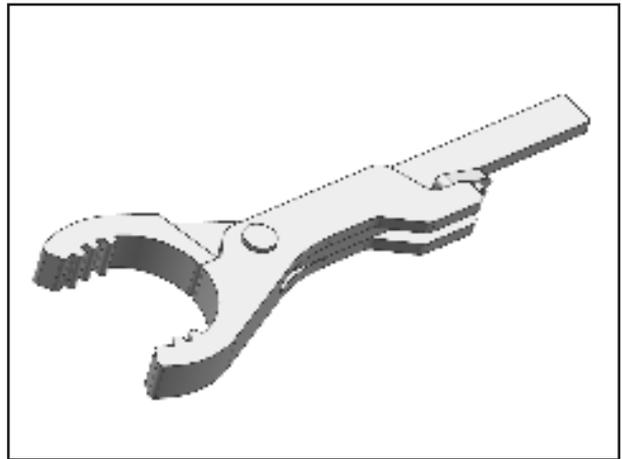
Tool for removing magneto rotor
0SQ0-031000-922-002



Clutch master/slave hub stop gear
0SQ0-050000-922-001



Output pulley stopping tool
0SQD-062040-922-002



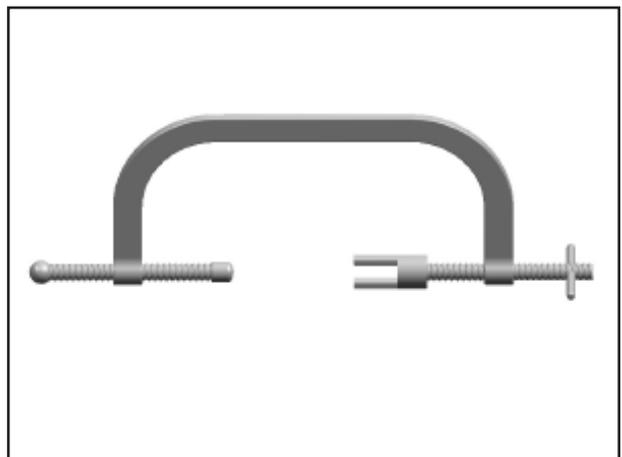
Magneto rotor stop gear
0SQ0-031000-922-001



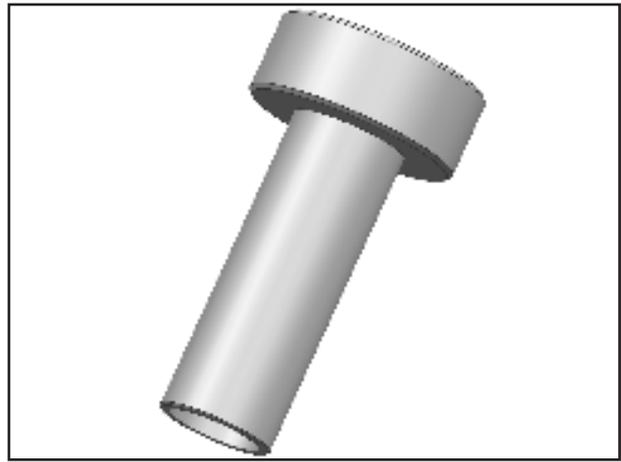
Valve stem seal ring punch
0700-022400-923-002



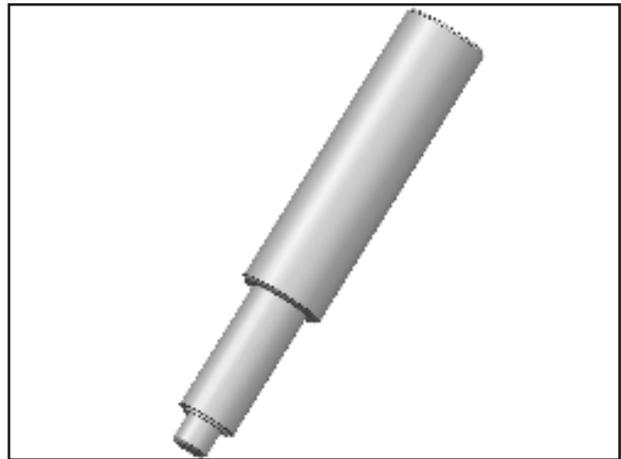
Valve spring compression clamp
0180-022006-922-001



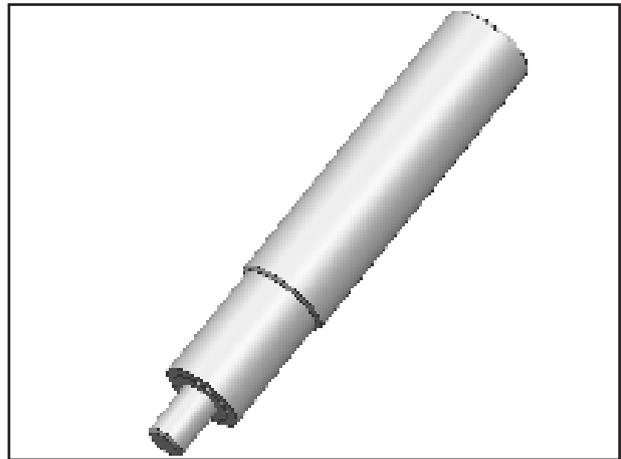
Oil level observation mirror punch
0SQ0-013100-923-001



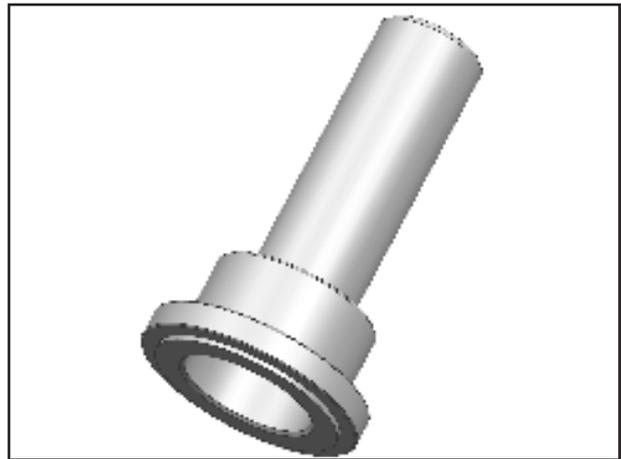
RH cover needle roller bearing punch
0SQ0-013000-923-003



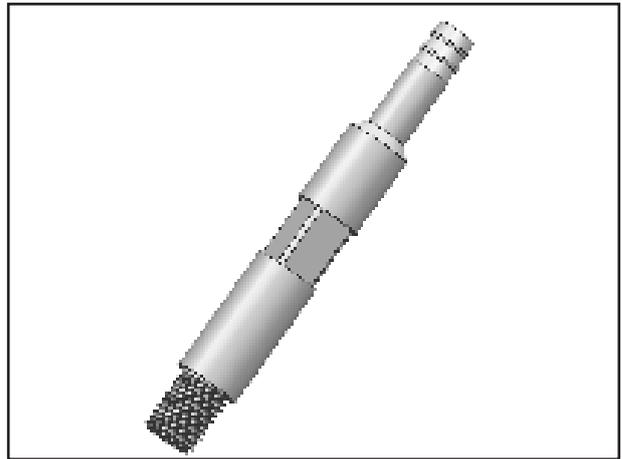
RH cover oil seal punch
0SQ0-013000-923-002



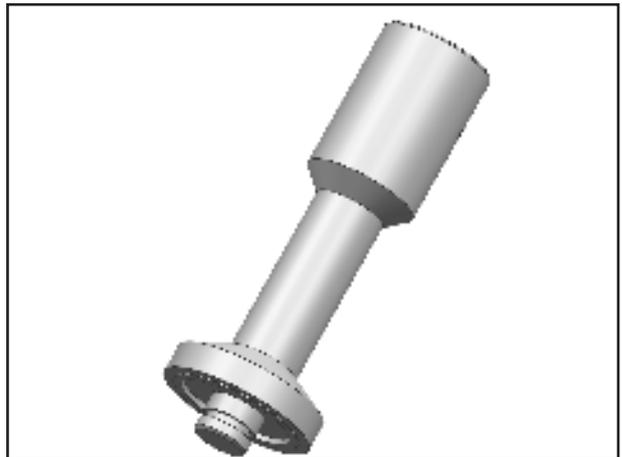
Auxiliary shaft oil seal punch
0SQ0-010001-923-001



Box oil hole connector (used to test oil pressure)
0SQ0-000000-922-014



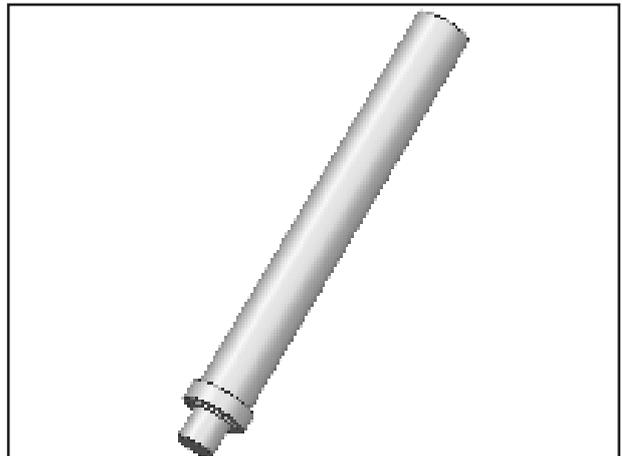
Bearing 6204 head
0SQ0-011101-921-002



14×24×6 Oil seal punch
0SQ0-011101-923-001



HK1412 Needle bearing punch
0SQ0-011101-923-002



13.3 Engine Removal

Pre-work

Remove seat. (refer to Seat section)

Remove fuel tank. (refer to Fuel System section)

Remove relevant body covering parts. (refer to Body Covering Parts section)

Drain coolant.

Main work

The content inside { } is the procedure for EU5 status:

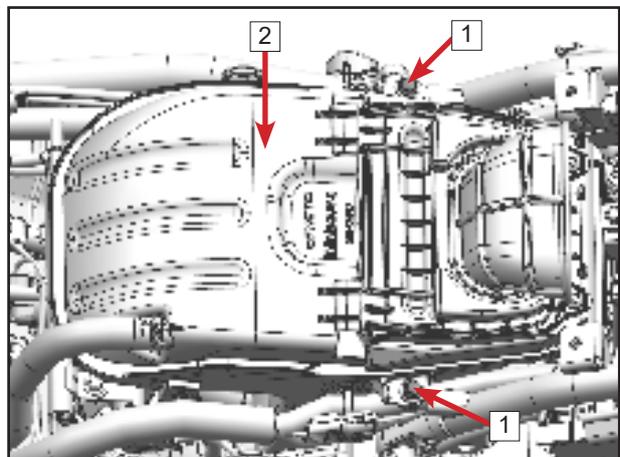
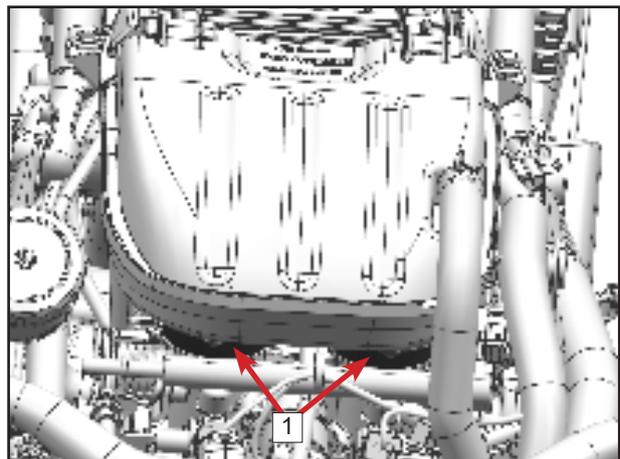
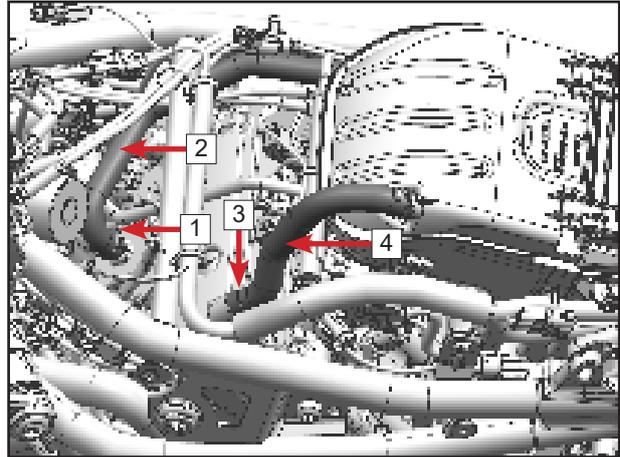
{
Loosen clamp [1], unplug AIS exhaust pipe [2].
}

Loosen clamp [3], unplug crankcase breather hose [4].

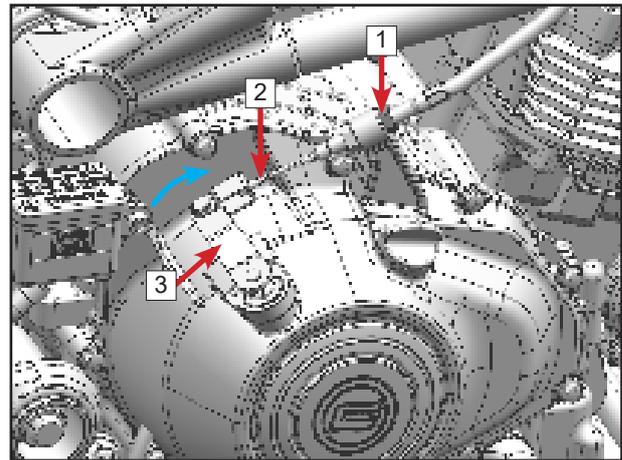
Loosen clamps [1].

Remove bolt [1].

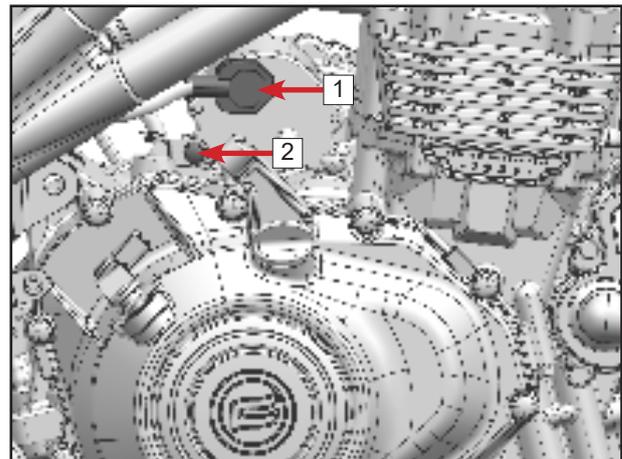
Remove air filter assembly [2].



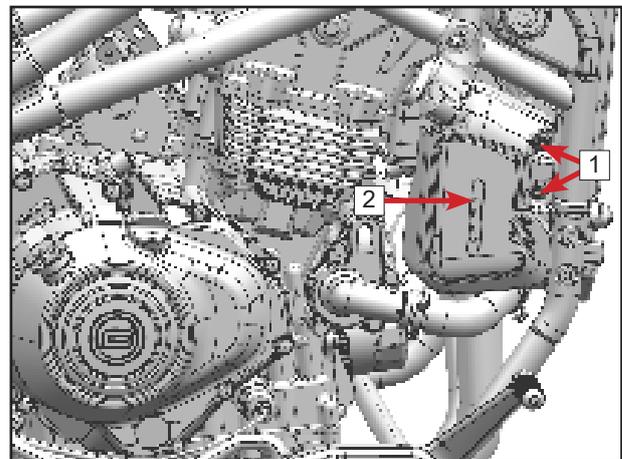
Release nut **1**.
Clockwise rotate clutch release lever **3**,
and detach clutch cable **2**.
Hang clutch cable aside.



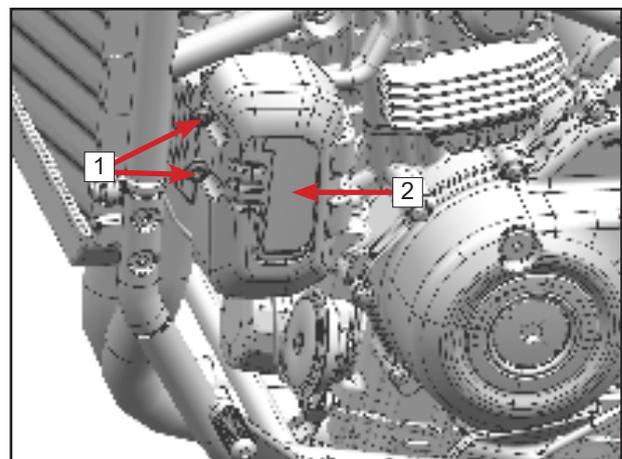
Push back cap **1**, and remove positive
connection cable fixing nut.
Hang positive connection cable aside.
Remove bolt **2**, hang ground cable aside.



Remove bolts **1**.
Remove reservoir **2**.

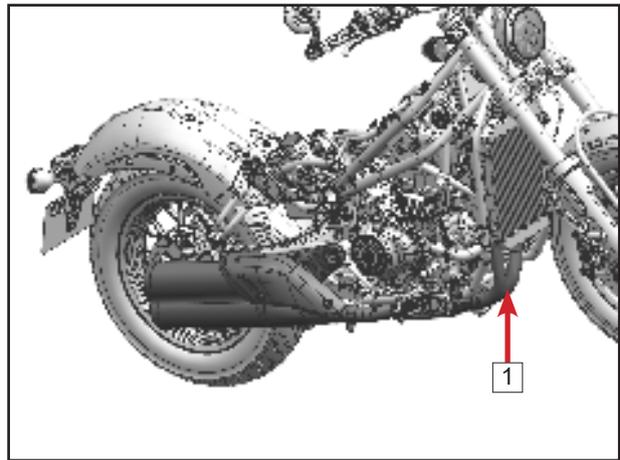


Remove bolts **1**.
Remove canister **2**.

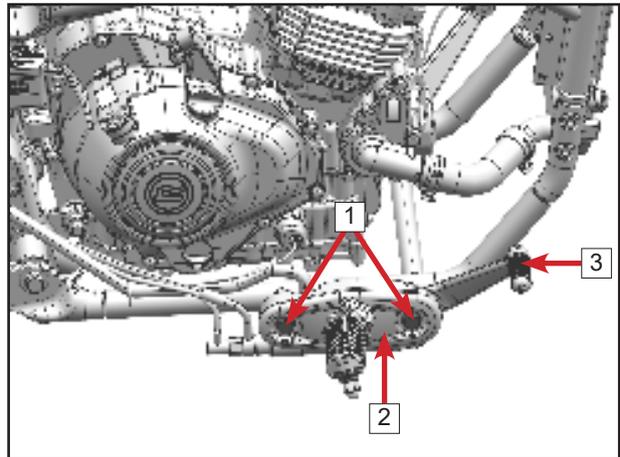


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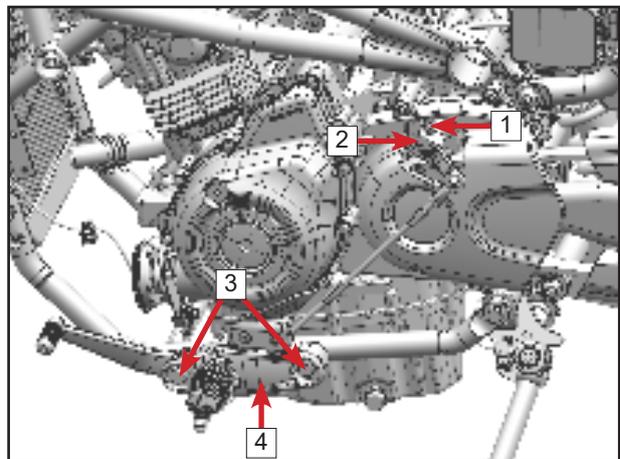
Remove exhaust system **1**. (refer to Exhaust System section)



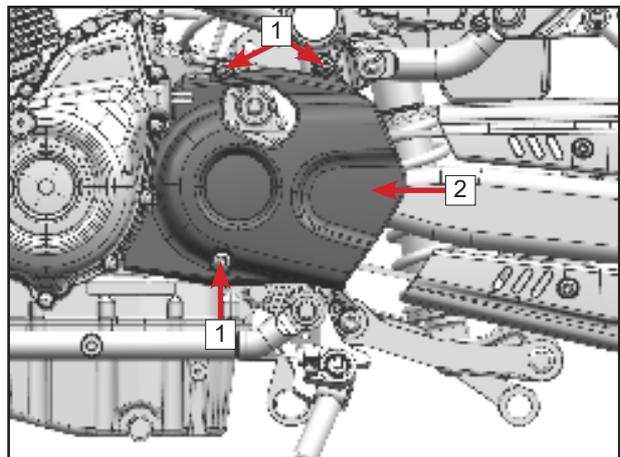
Remove bolts **1**.
Remove RH front footrest bracket assembly **2** and rear brake pedal assembly **3**.



Remove bolt **1**, disconnect gearshift lever assembly **2** and engine.
Remove bolts **3**, remove LH front footrest bracket assembly **4** and gearshift lever assembly **2**.

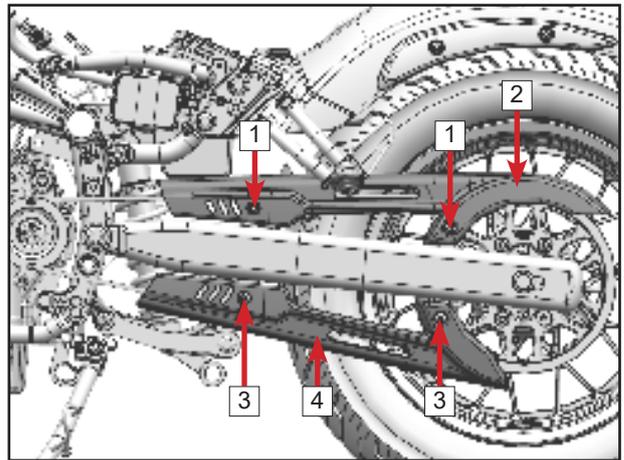


Remove bolts **1**.
Remove sprocket guard **2**.

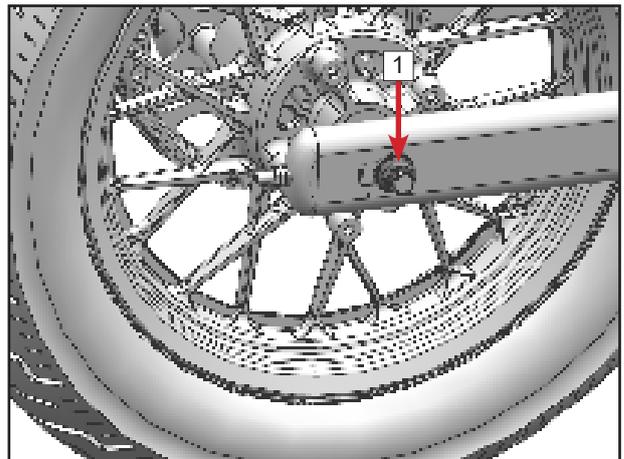


13 Engine

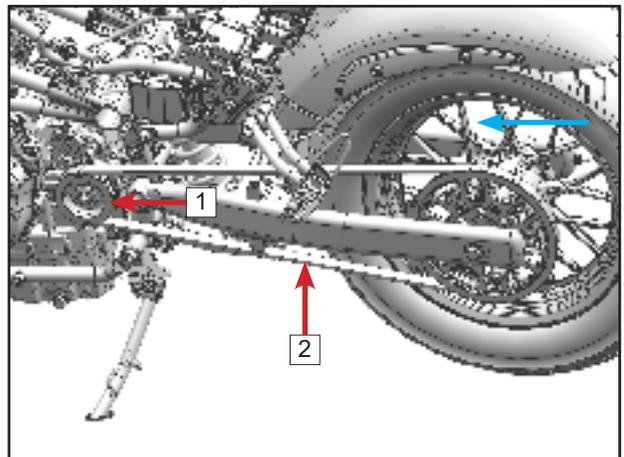
- Remove bolts **1**.
- Remove belt upper guard **2**.
- Remove bolts **3**.
- Remove belt lower guard **4**.



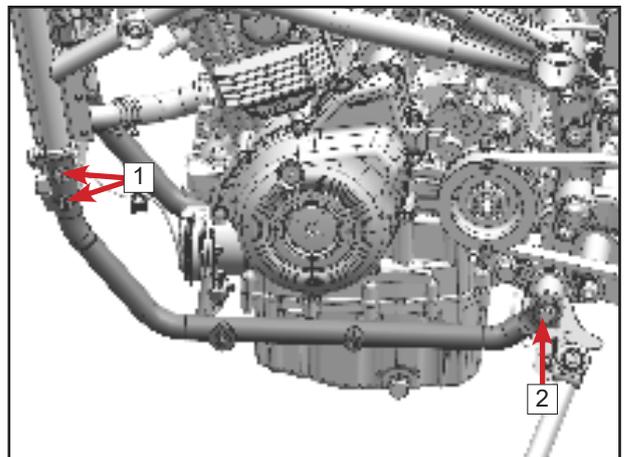
- Remove nut **1** and washer.
- Remove chain adjuster.



- Push rear wheel to the front.
- Remove belt **2** from drive pulley **1**.

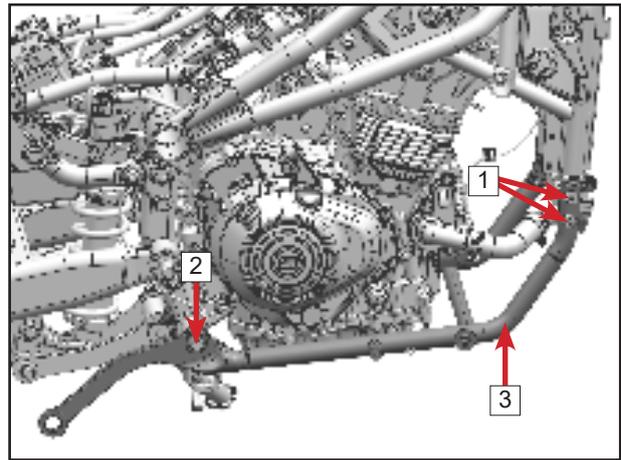


- Remove screws **1**.
- Remove bolt **2**.

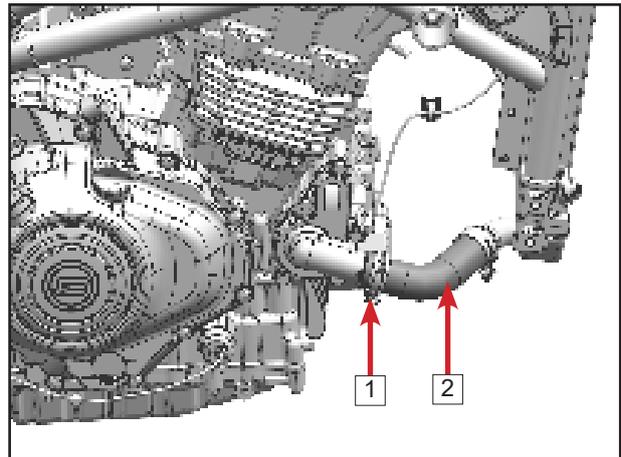


CFMOTO

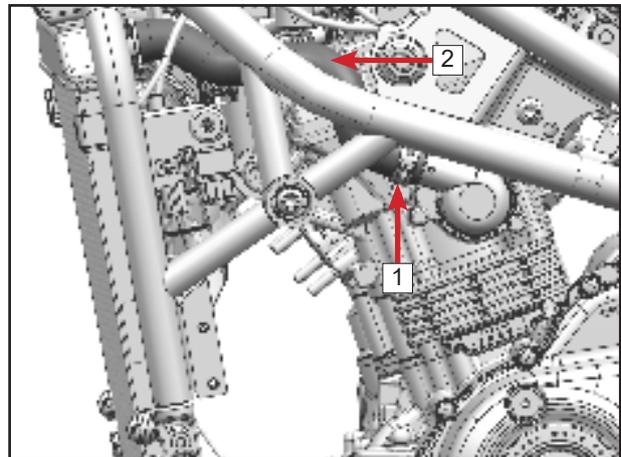
- Remove screws [1].
- Remove bolt [2].
- Remove bracket [3].



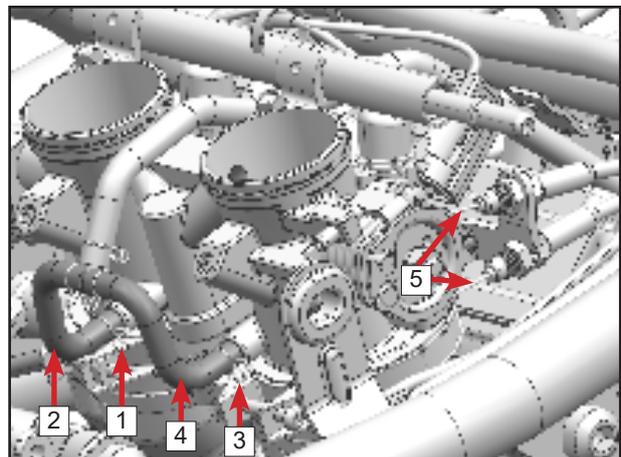
- Loosen clamp [1].
- Unplug radiator outlet pipe [2].



- Loosen clamp [1].
- Unplug radiator intake pipe [2].

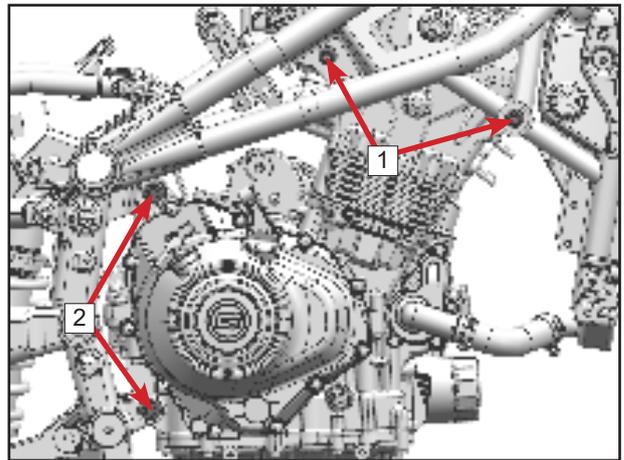


- Loosen clamp [1], unplug pipe [2].
- Loosen clamp [3], unplug pipe [4].
- Remove throttle cable [5] from engine.
- Disconnect all electrical connectors to the engine.



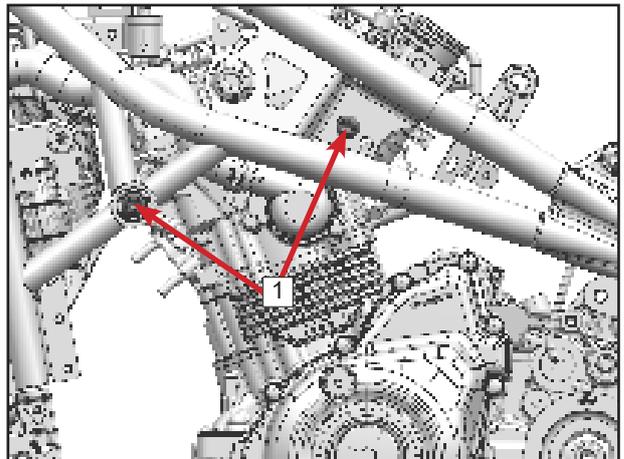
Remove bolts **1**.

Remove bolts and nuts **2**.



Remove bolts **1**.

Carefully remove the engine and transfer it to a work bench.



Engine Installation

Install the engine to the vehicle in reverse order of removal.

13.4 Intake System

13.4.1 Air Filter Assembly

Air Filter Assembly Removal

Remove seat. (refer to Seat section)

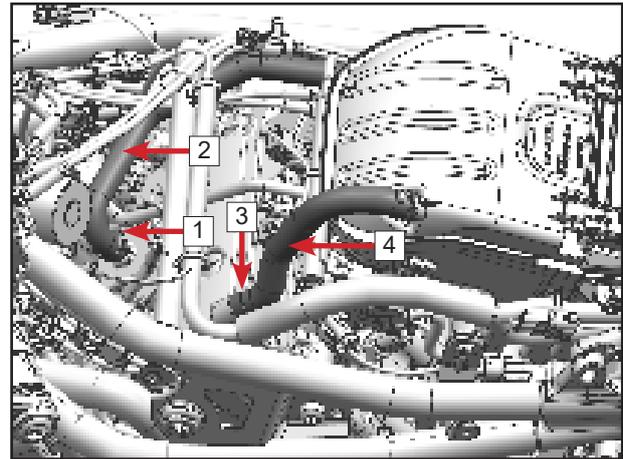
Remove fuel tank. (refer to Fuel System section)

Remove relevant body covering parts. (refer to Body Covering Parts section)

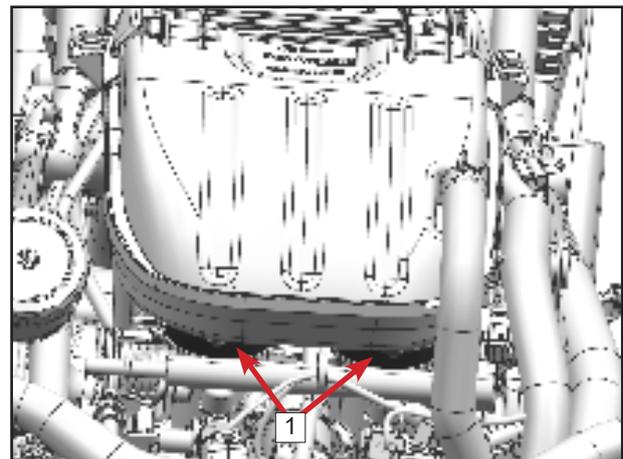
The content inside { } is the procedure for EU5 status:

{
Loosen clamp [1], unplug AIS exhaust pipe [2].
}

Loosen clamp [3], unplug crankcase breather hose [4].

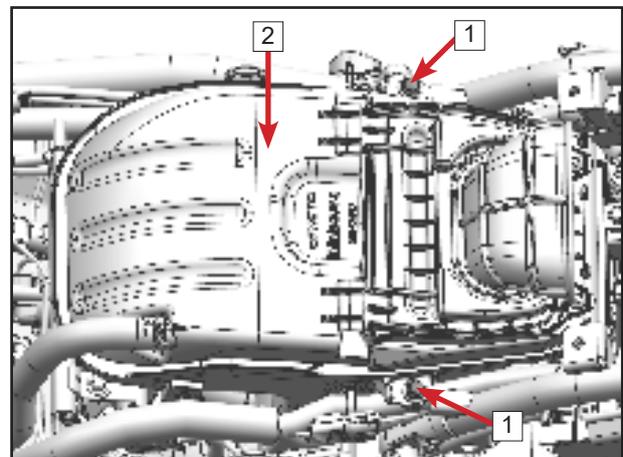


Loosen clamps [1].



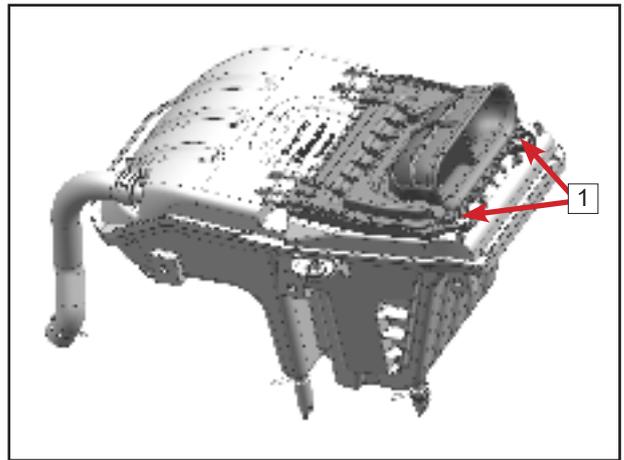
Remove bolts [1].

Remove air filter assembly [2].

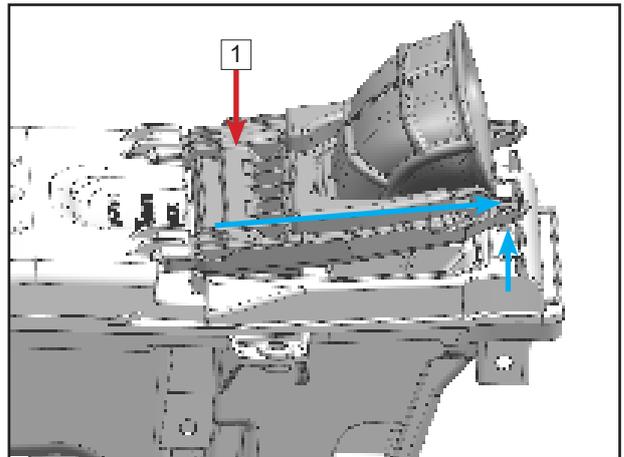


Filter Element Removal

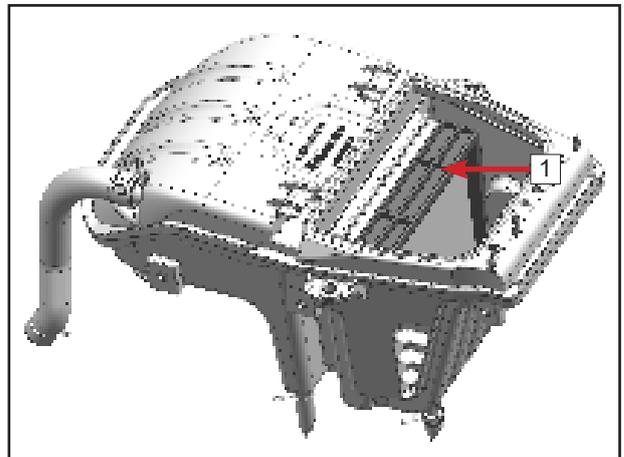
Remove screws **1**.



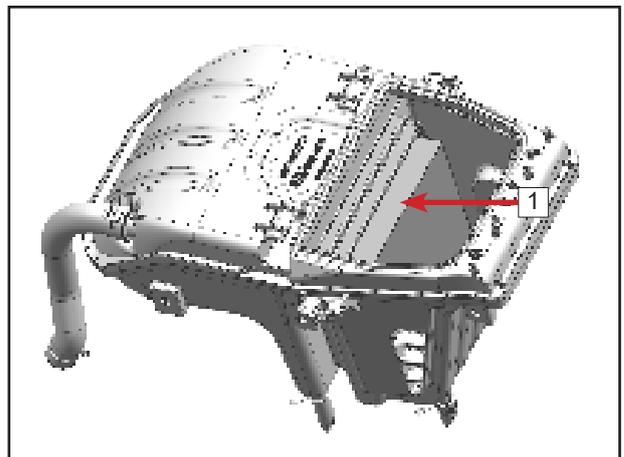
Remove air filter cover **1**.



Take out filter element wedge **1**.



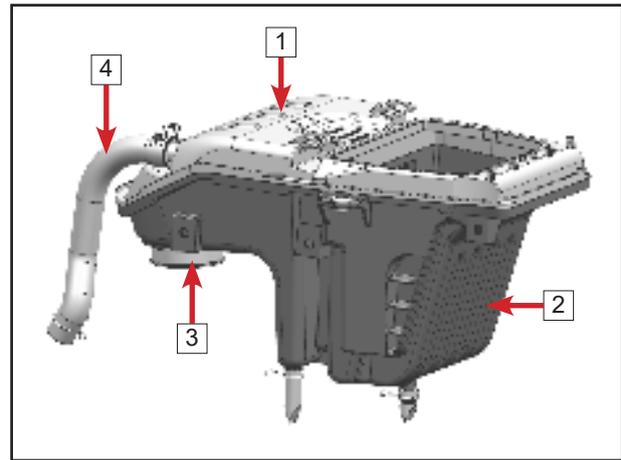
Take out filter element **1**.
Clean air filter housing.



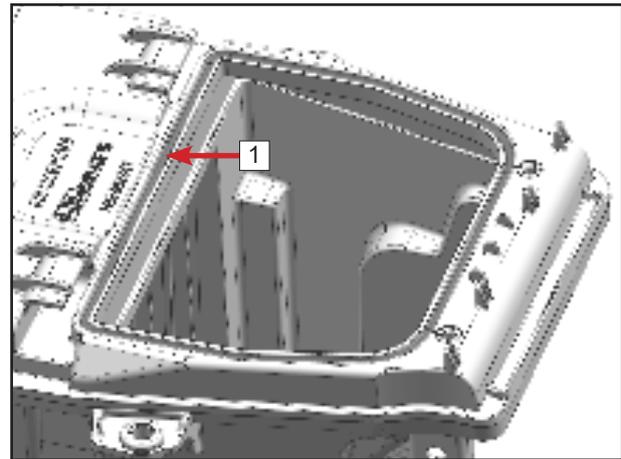
Air Filter Housing Inspection

Inspect upper housing [1], lower housing [2] and exhaust pipe [3] for breakage or other damages. If any of them is faulty, replace the whole.

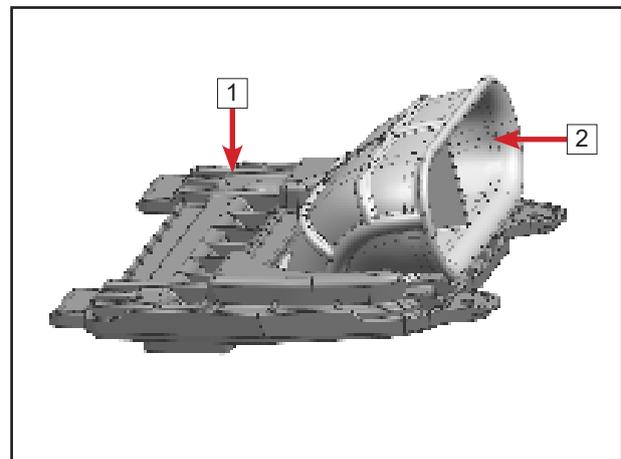
Inspect crankcase breather hose [4] for aging or other damages. Replace if any.



Inspect seal ring [1] for hardening or other damages. Replace if any.



Inspect air filter cover [1] and intake pipe [2] for breakage or other damages. Replace if any.



Filter Element Inspection and Cleaning

Check and determine if the filter element can continue to be used.

Judge according to the following criteria:

1. Filter element not deformed.
2. Filter element not contaminated by moisture or oil. (If a certain amount of oil or moisture is found inside the air filter, stop the air filter element replacement immediately, replace the entire air filter and check the engine for any abnormalities.)
3. Filter element not broken.
4. Filter element not showing other abnormalities visible to the naked eye.

If the filter element can no longer be used, replace it with a new one and perform the installation procedure.

If can continue to be used, perform the cleaning procedure:

Use a soft brush to remove dust from the inlet side of the element.

Use compressed air to blow dirt outward from the outlet end of the element.

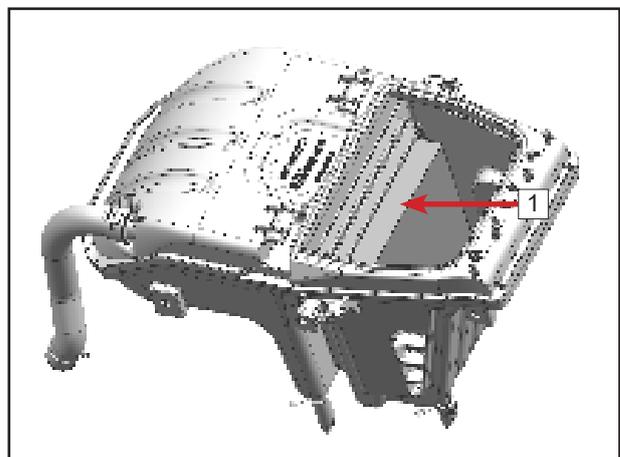
Using compressed air to blow on the inlet end of the element from the side.

CAUTION

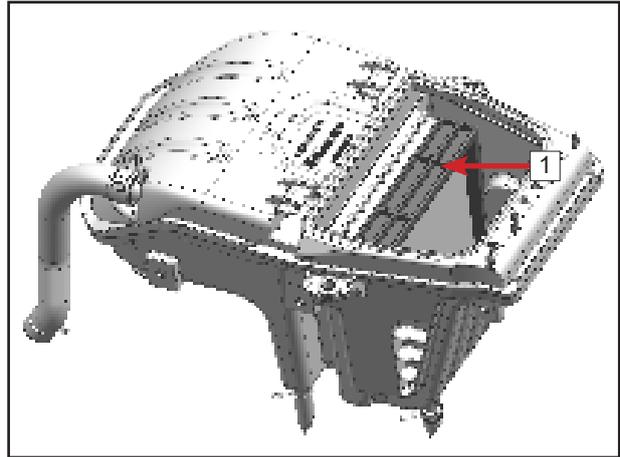
The vertical use of compressed air from the inlet end of the filter element will blow dust into the filter microholes of the paper filter element, resulting in blockage of the filter element and affecting the intake efficiency.

Filter Element Installation

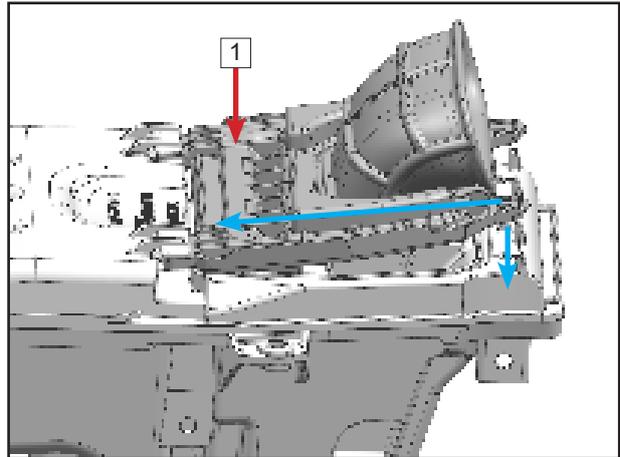
Install clean filter element or new filter element  into the air filter housing.



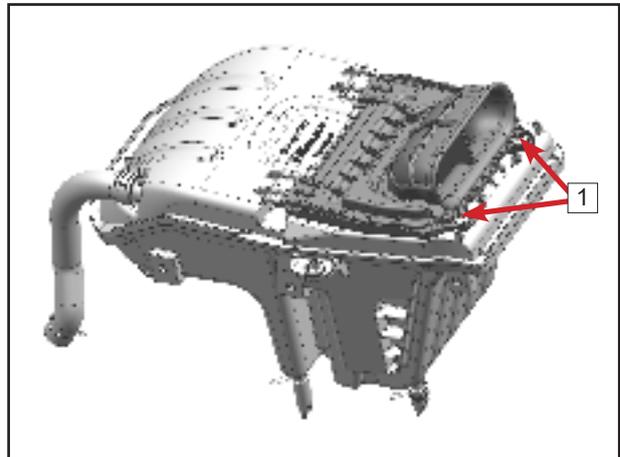
Install filter element wedge **1**.



Install air filter cover **1**.



Install screws **1**.



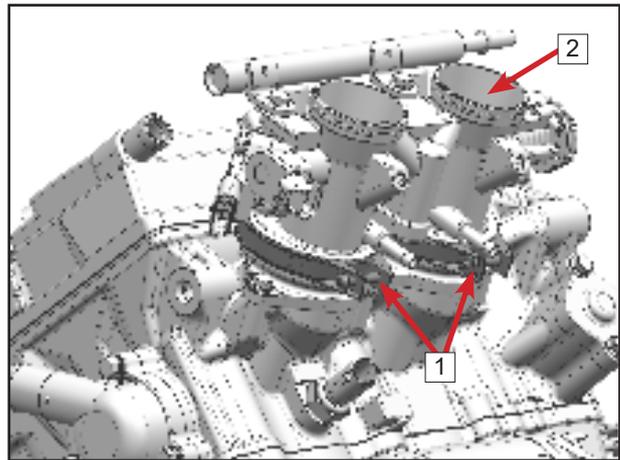
Air Filter Assembly Installation

Install air filter assembly in reverse order of removal.

13.4.2 Throttle Valve Body Assembly Throttle Valve Body Assembly Removal

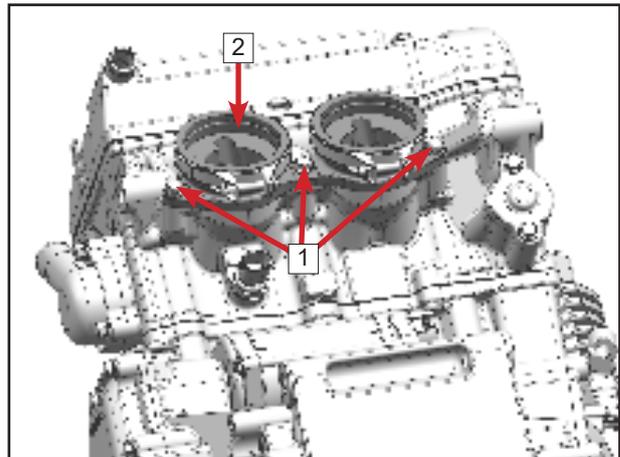
Loosen clamps **1**.

Take off throttle valve body assembly **2**.



Remove bolts **1**.

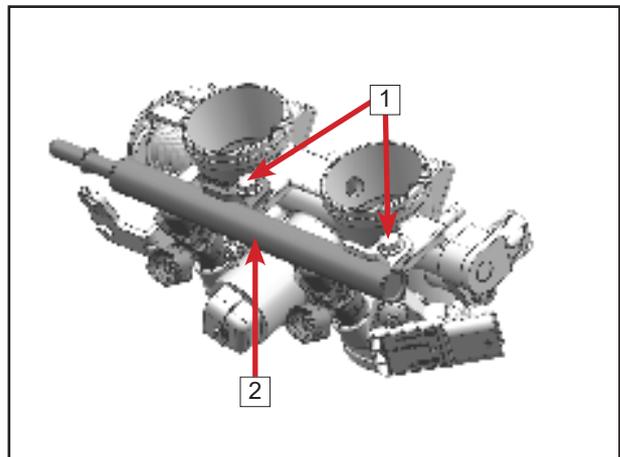
Remove throttle valve body connecting pipe assembly **2**.



Throttle Valve Body Assembly Disassembly

Remove bolts **1**.

Remove fuel pipe assembly **2**.



Remove screw **1**.

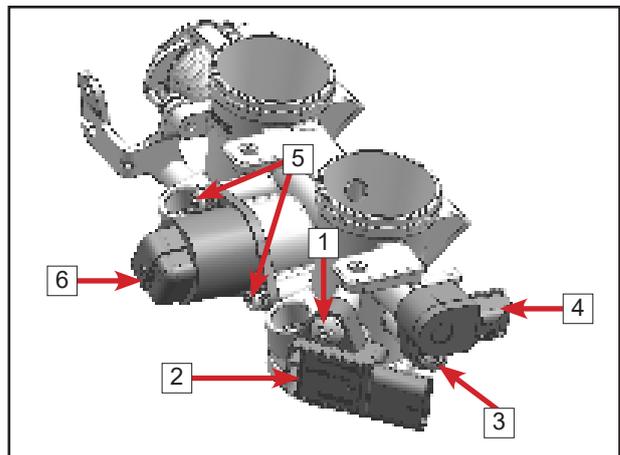
Remove air intake temperature pressure sensor **2**.

Remove screw **3**.

Remove TPS **4**.

Remove screws **5**.

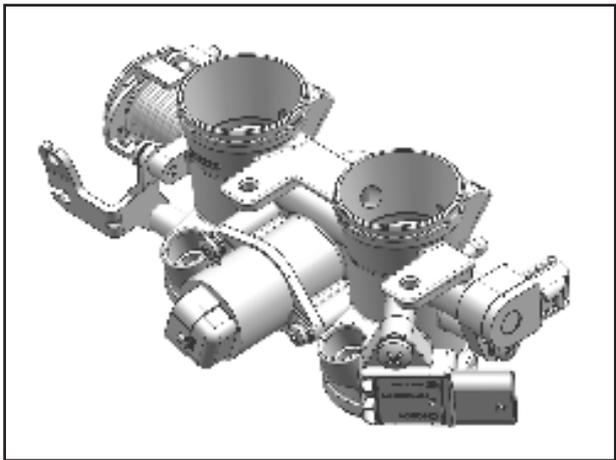
Remove idle stepper motor **6**.



Throttle Valve Body Assembly

Inspection

Inspect throttle valve body for breakage and other damages, replace if any.
Inspection of idle stepper motor, TPS and air intake temperature pressure sensor, see Electricals section.



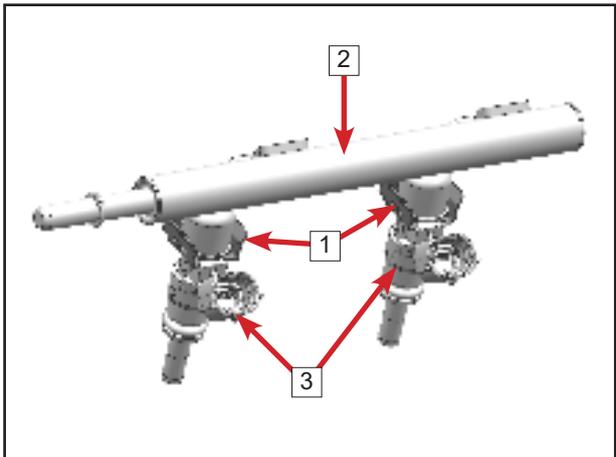
Fuel Pipe Assembly

Disassembly

Use both thumbs to separately push both sides of circlips **1**, then remove **1**.
Remove fuel injector **3** from fuel pipe **2**.
Inspection of fuel injector, see Electricals section.

Installation

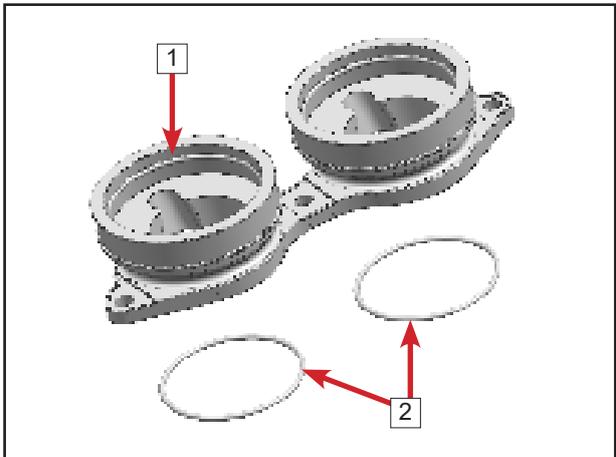
Install fuel injector **3** onto fuel pipe **2**, then install circlip **1**. The boss of the fuel pipe must be clamped into the groove of the circlip **1**.



Throttle Valve Body Connecting Pipe

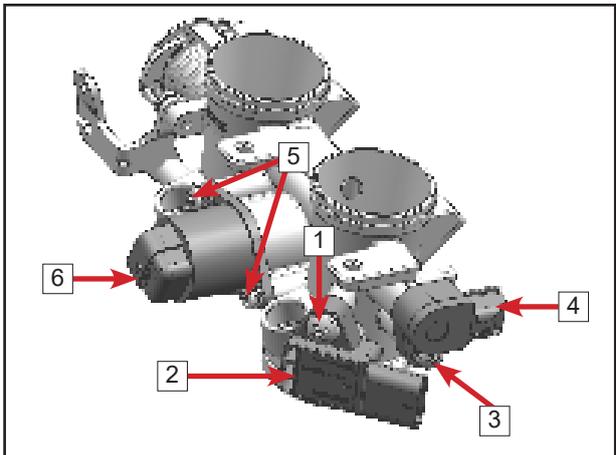
Inspect throttle valve body connecting pipe **1** for breakage and other damages, replace if any.

Inspect O-ring **2** for breakage, hardening and other damages, replace if any.

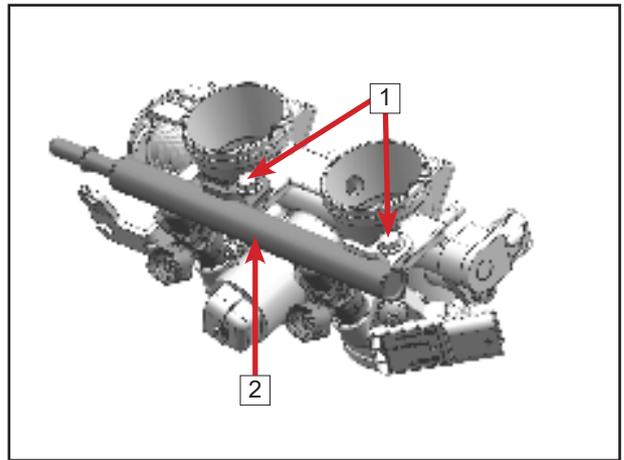


Throttle Valve Body Assembly Assembling

Install idle stepper motor **6**.
Install screws **5**. (torque: 2N•m ~ 3N•m)
Install TPS **4**.
Install screw **3**. (torque: 3N•m ~ 4N•m)
Install air intake temperature pressure sensor **2**.
Install screw **1**. (torque: 3.5N•m ~ 4.5N•m)

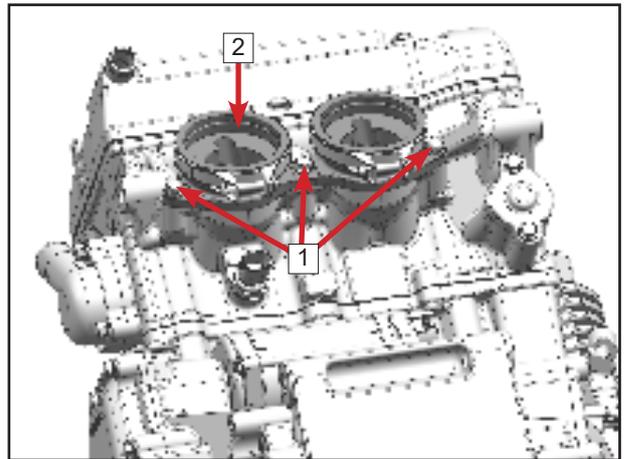


Install fuel pipe assembly **2**.
Install bolts **1**. (torque: 10N•m)

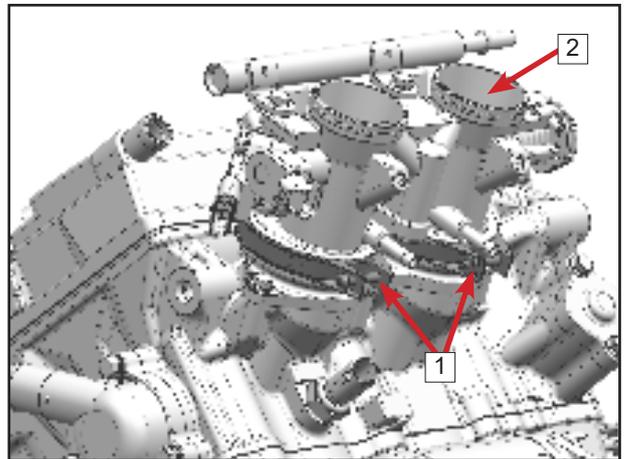


Throttle Valve Body Assembly Installation

Install throttle valve body connecting pipe assembly **2**.
Install bolts **1**. (torque: 10N•m)



Install throttle valve body assembly **2**.
Tighten clamps **1**.



13.5 Engine Disassembly

13.5.1 Fix the Engine

Fix the engine firmly on the removal table.

WARNING

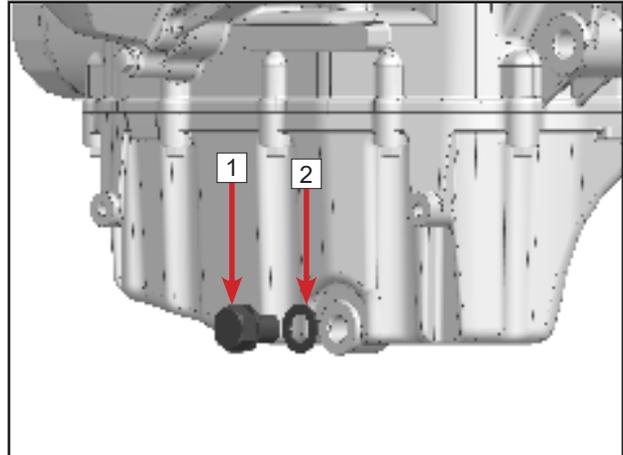
The engine must be firmly fixed on the disassembly table to prevent the engine from falling, injuring workers or causing engine damage. The engine must be completely cooled, or special protective clothing must be worn before disassembly and maintenance can be carried out to avoid burns.

13.5.2 Engine Oil Releasing

Put a container under the disassembly table to receive oil.

Remove the M12 magnetic drain bolt  and washer .

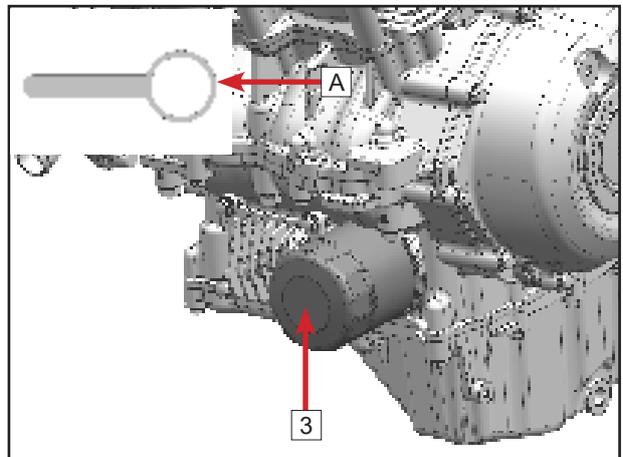
Completely drain the oil.



Use special wrench for oil filter  (0700-070200-922-001) to remove the oil filter .

CAUTION

When disassembling, a layer of buffer, such as a rag, needs to be added between the special wrench and the oil filter to prevent damage to the oil filter.



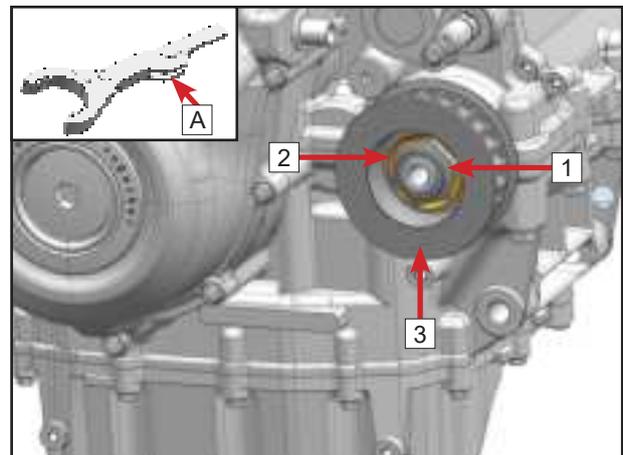
13.5.3 Drive Pulley Removal

Use output pulley stopping tool  (0SQD-062040-922-002) to secure drive pulley .

Remove M20×1.5 nut .

Remove lock retainer .

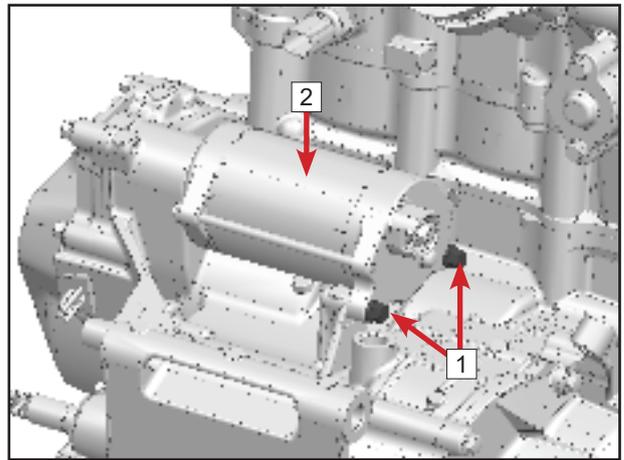
Remove drive pulley .



13.5.4 Starter Motor Removal

Remove M6×25 bolt [1].

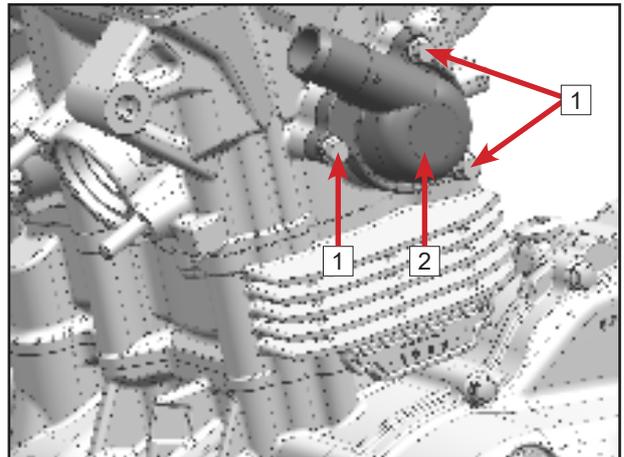
Remove the starter motor [2].



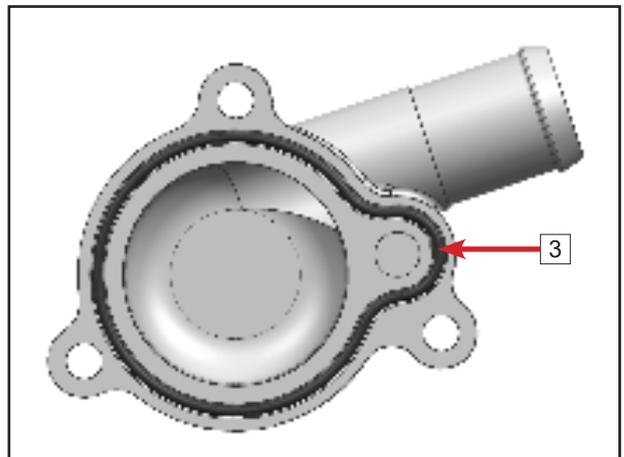
13.5.5 Thermostat Removal

Remove M6×22 bolt [1].

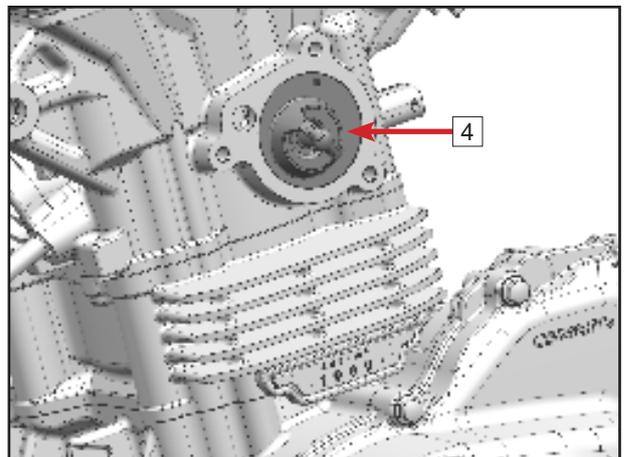
Remove thermostat cover [2].



Remove the thermostat cover seal [3].

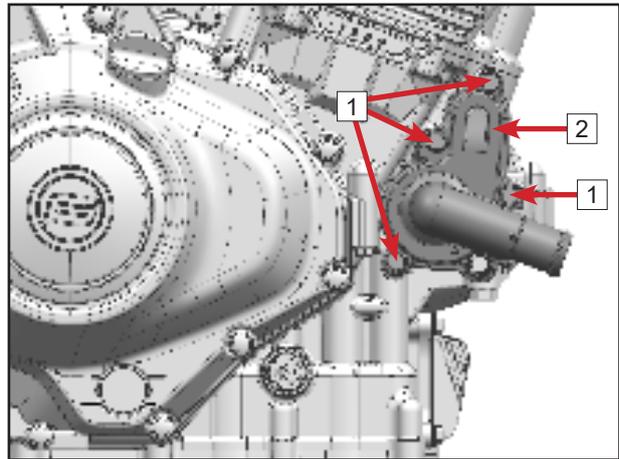


Remove thermostat [4].



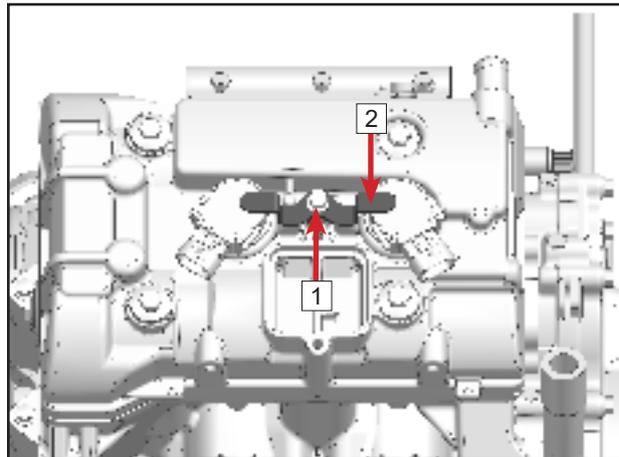
13.5.6 Pump Removal

Diagonal cross remove M6×42 bolt [1].
Remove the pump [2].

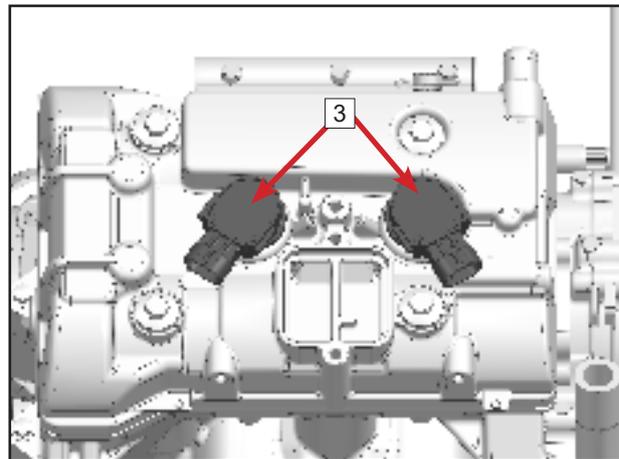


13.5.7 Cylinder Head Cover Removal

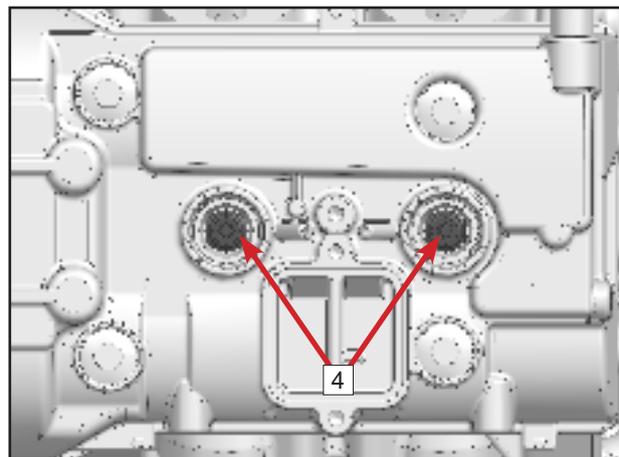
Remove M6×12 bolt [1].
Remove the clamp [2].



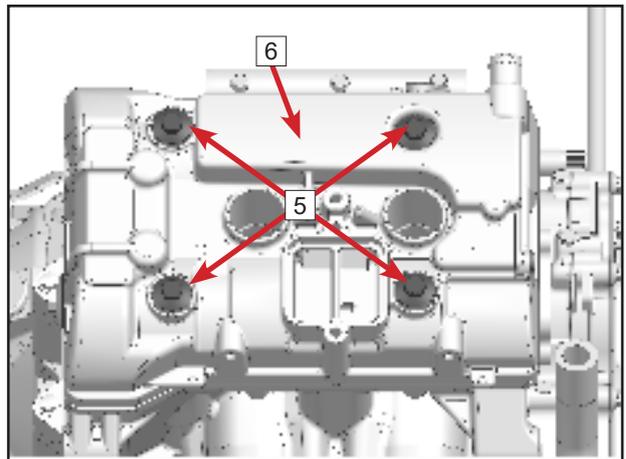
Remove ignition coil [3].



Remove spark plug [4].

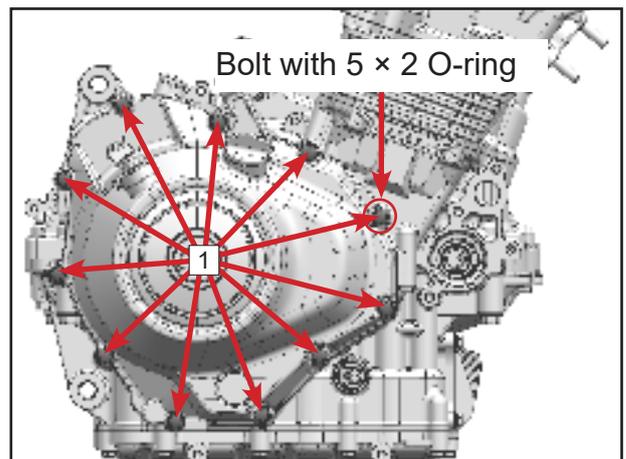


Diagonal cross remove M6 cylinder head cover bolt [5] and seal ring.
Remove the cylinder head cover [6].

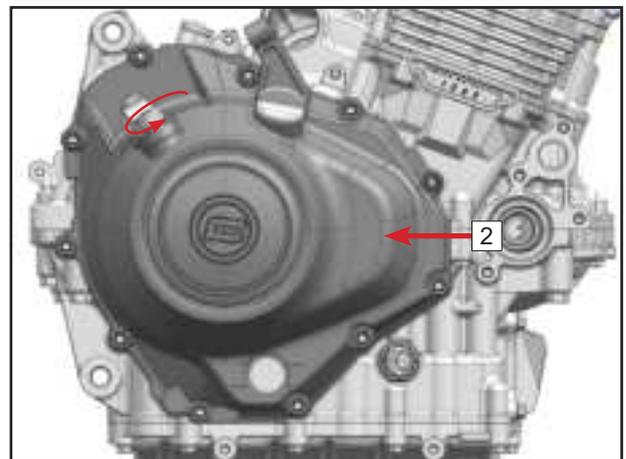


13.5.8 RH Cover Removal

Diagonal cross remove M6×25 bolt [1].

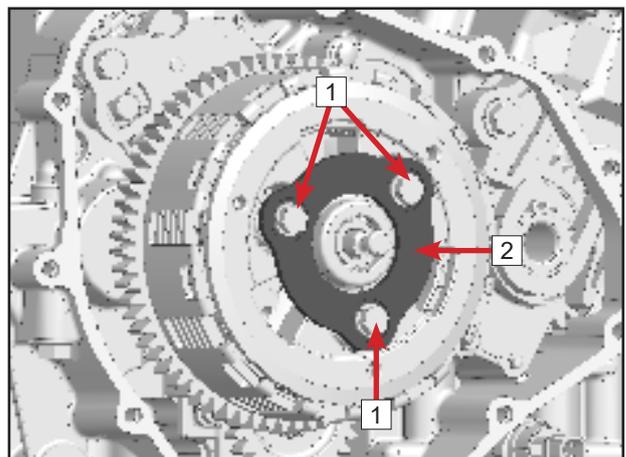


Rotate the clutch control shaft counterclockwise to disengage the clutch pull rod.
Remove RH side cover [2].

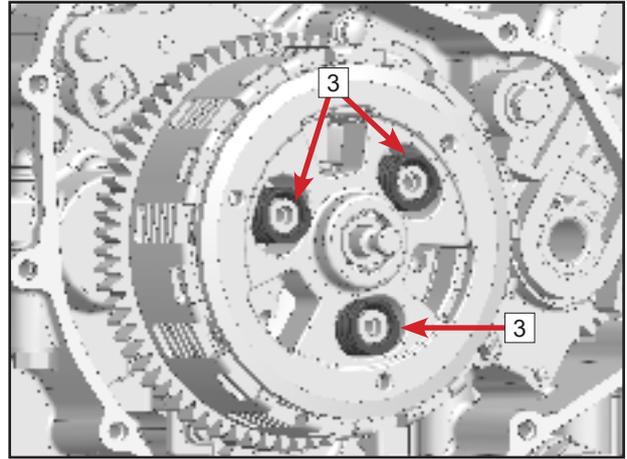


13.5.9 Clutch Removal

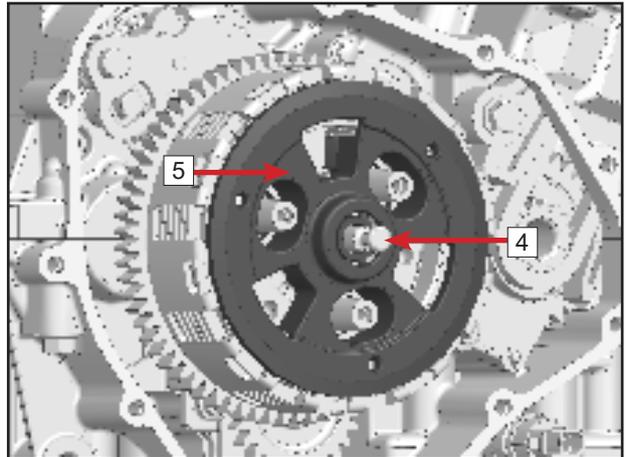
Remove M6×35 bolt [1].
Remove the clutch spring pressure plate [2].



Remove clutch spring **3**.



Pull the pull rod **4** to pull out the pressure plate **5**.

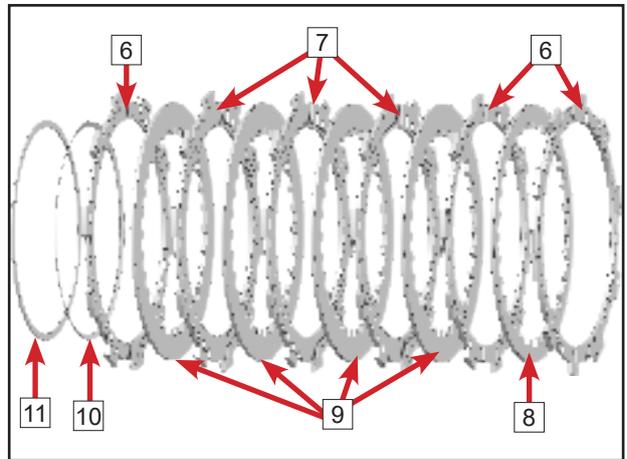


Remove friction disc/driven plate combination.

Check the combination sequence of friction disc/driven plate, which is as follows:

Friction disc assembly II **6** - driven disc I **8** - friction disc assembly II **6** - Driven disc II **9** - friction disc assembly I **7** - driven disc II **9** - friction disc assembly I **7** - driven disc II **9** - friction disc assembly II **6** - disc spring **10** - Disc spring seat **11**.

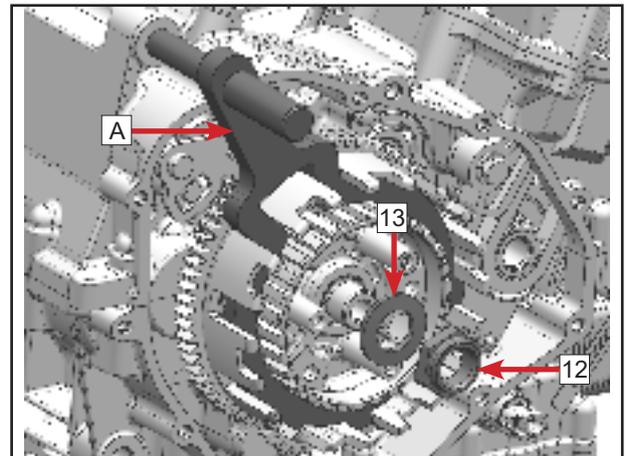
Use tie bands to bind the friction/driven plate assy.



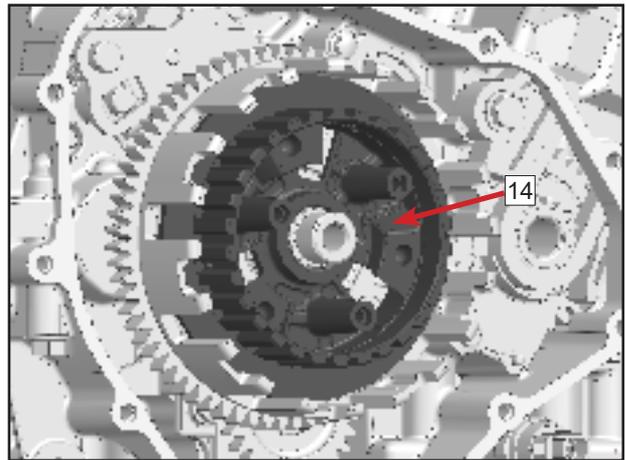
Use the clutch master/slave hub stop gear **A** (0SQ0-050000-922-001) to fix central sleeve.

Remove M20×1.5 nut **12**.

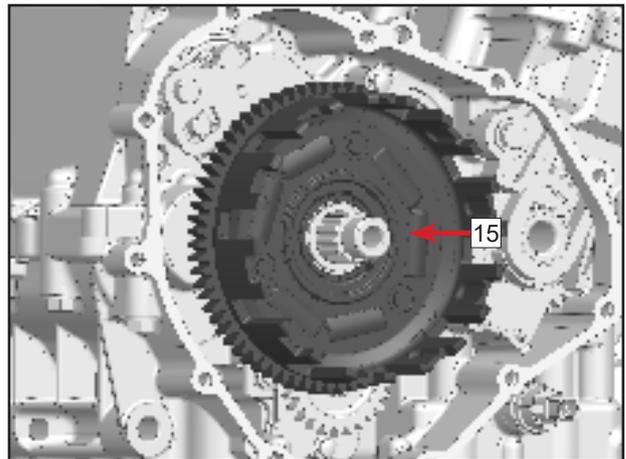
Remove elastic circlip 20 **13**.



Remove the center sleeve **14** and the 25.2×39×2 washer below.



Remove the primary driven gear combination **15**.

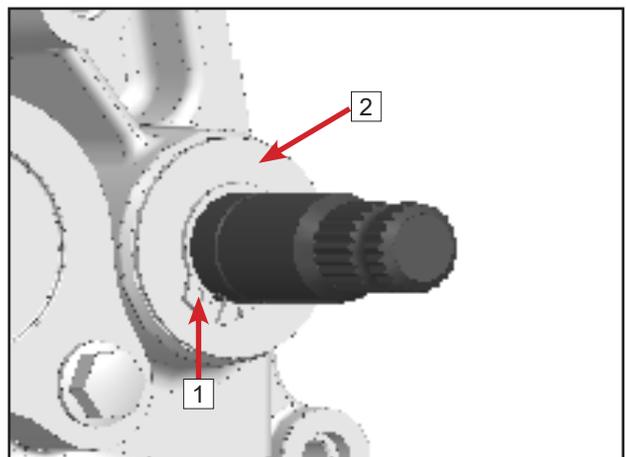


Remove the clutch sleeve **16**.
Remove the 25.2 x 46 x 5.8 gasket **17**.

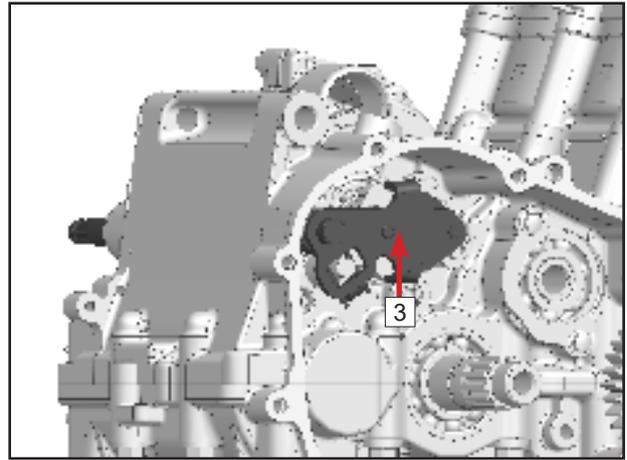


13.5.10 Shift Lever Assembly, Shift Positioning Component and Positioning Star Wheel Removal

Remove the $\Phi 14$ circlip for shaft **1** and 14×28×1 washer **2**.

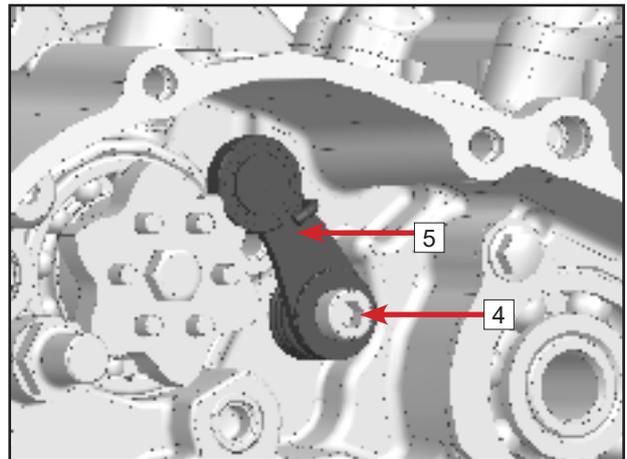


Remove the shift lever assembly [3].



Remove M6×16 hex socket cap screw [4].

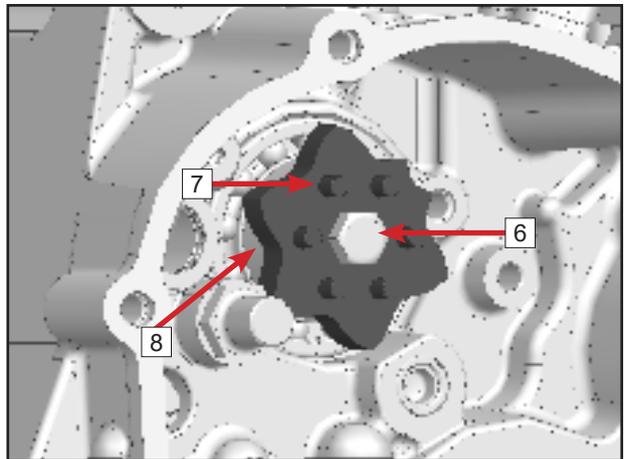
Remove the gear shift locating unit [5].



Remove M6×16 bolt [6].

Remove the locator wheel [7].

Remove gear hub bushing [8].

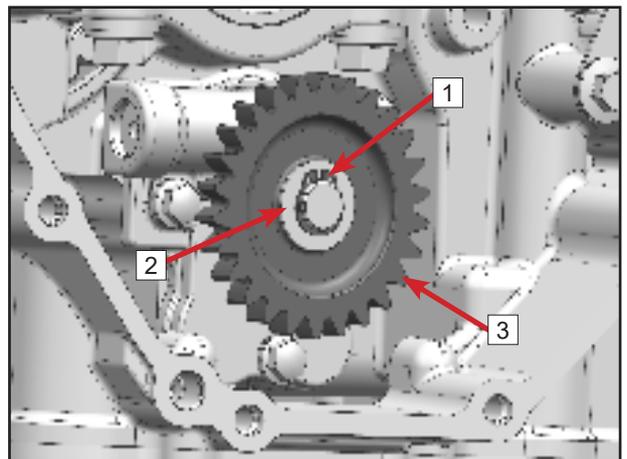


13.5.11 Oil Pump Removal

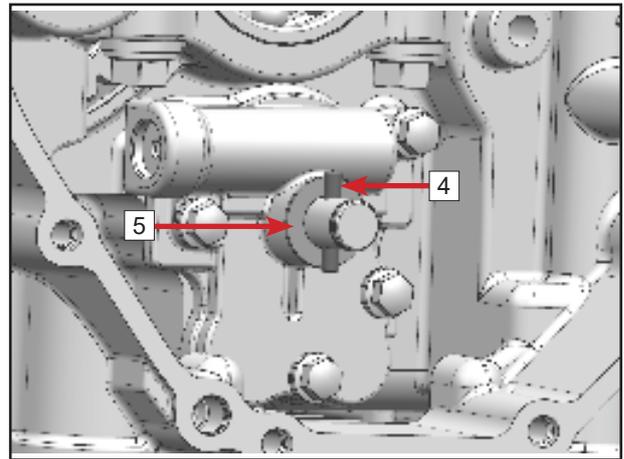
Remove $\Phi 11$ shaft ring [1].

Remove 11×20×1 washer [2].

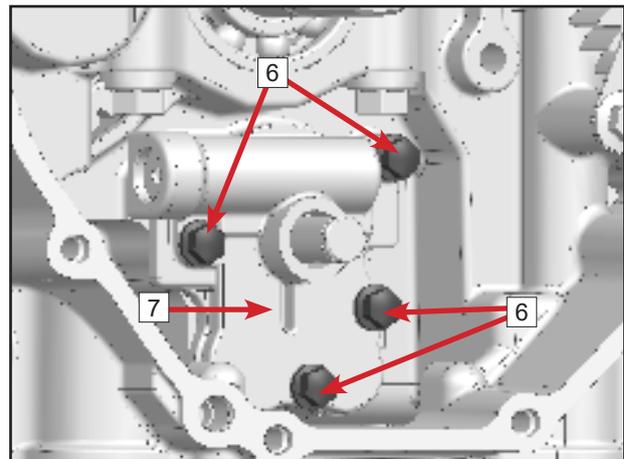
Remove the oil pump gear [3].



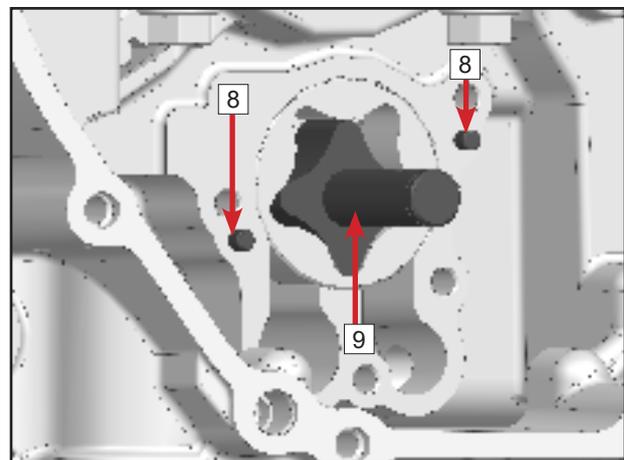
Remove P4×21.8 needle roller **4** and 11×20×1 washer **5**.



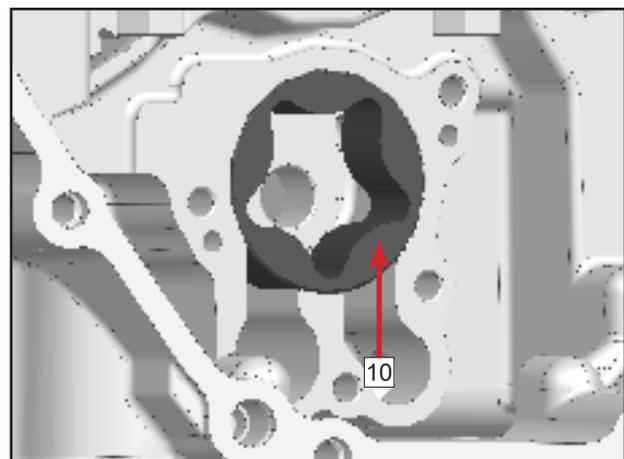
Remove diagonal cross M6×22 bolt **6**.
Remove the oil pump cover **7**.



Remove P4×7.8 needle roller **8**.
Remove inner rotor of oil pump, oil pump shaft and P4×15.8 needle roller assembly **9**.



Remove the outer rotor of oil pump **10**.

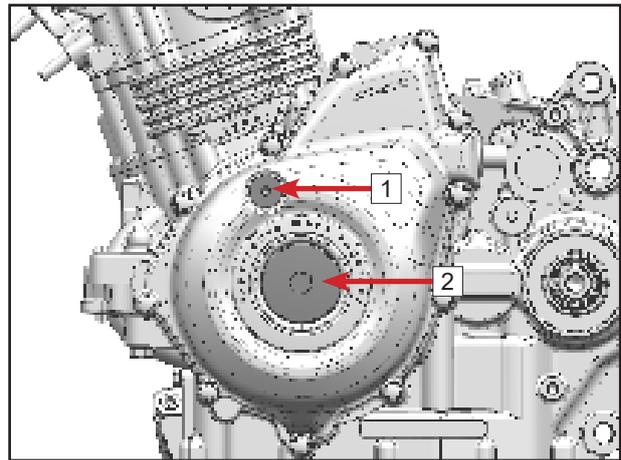


13.5.12 Cylinder Head Removal

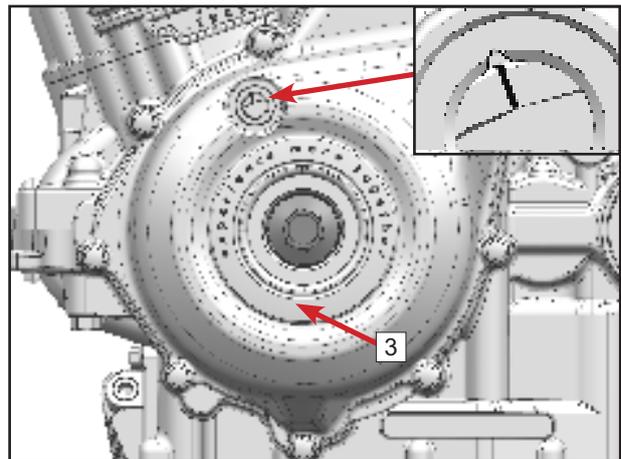
Remove the timing observation hole cover

1.

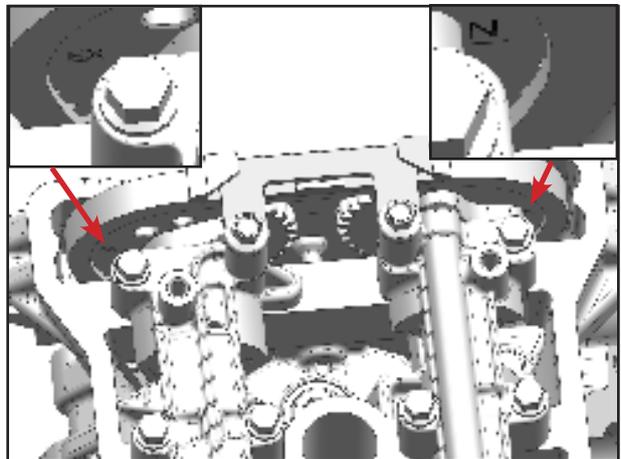
Remove strainer cover 2.



Rotate the crankshaft 3 counterclockwise to align the mark "I" on the magneto rotor with the notch center of the timing observation hole on the left cover.

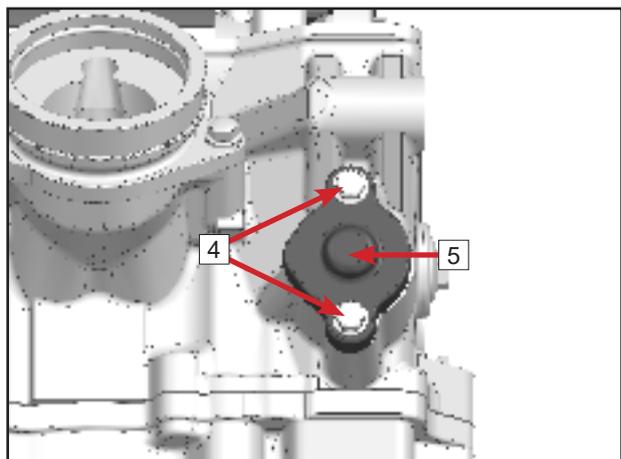


At the same time, the "IN" line on the intake timing sprocket is parallel to the plane on the cylinder head, and the "EX" line on the exhaust timing sprocket is parallel to the plane on the cylinder head, as shown in the figure on the right.

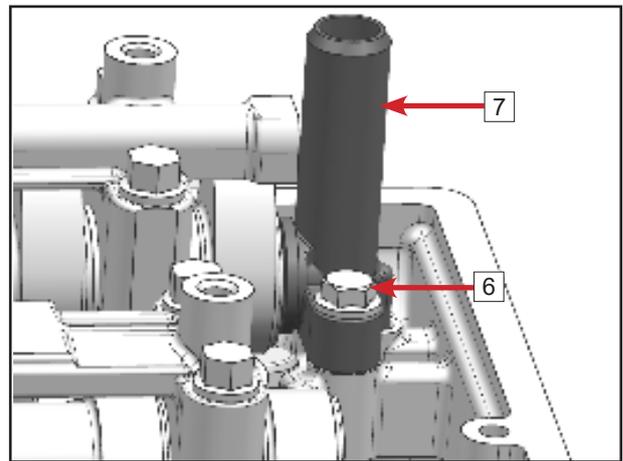


Remove M6×20 bolt 4.

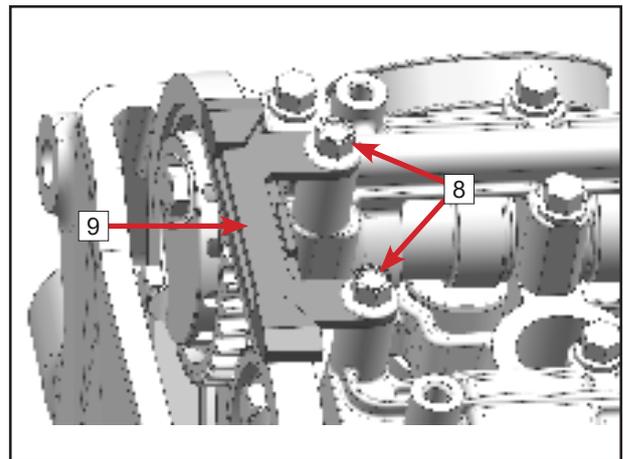
Remove hydraulic tensioner assembly 5.



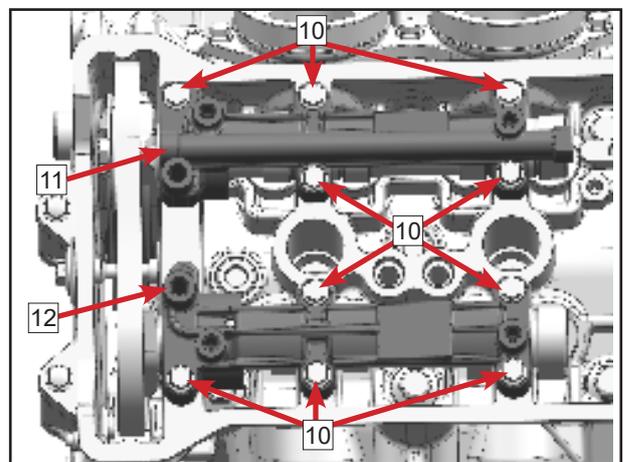
Remove M6×22 bolt [6].
Remove the transition connector assembly [7].



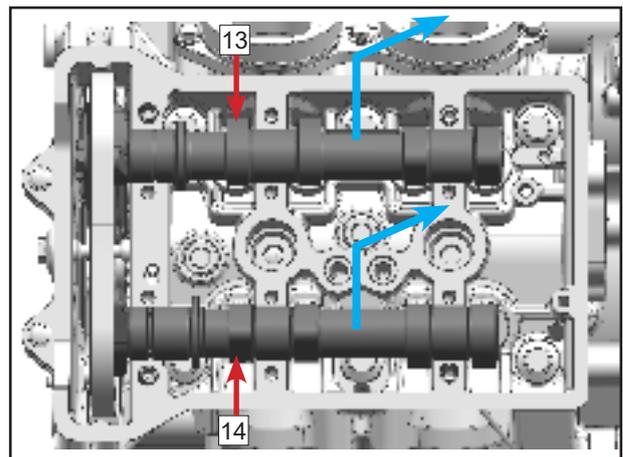
Remove M6×65 bolt [8].
Remove guide chain block [9].



Remove diagonal cross M6×45 bolt [10].
Remove intake camshaft seat assembly [11].
Remove exhaust camshaft seat [12].



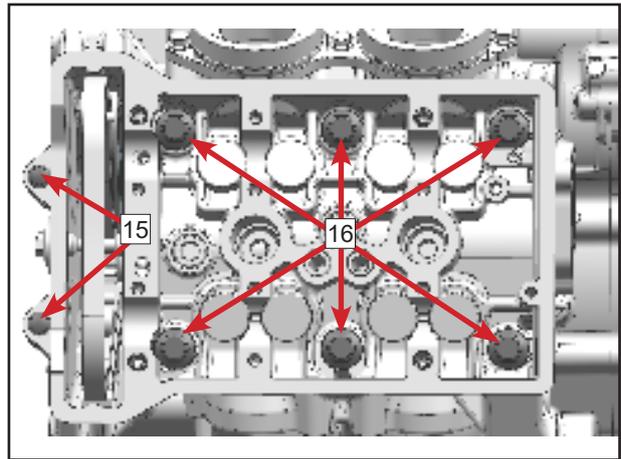
Remove intake camshaft assembly [13].
Remove exhaust camshaft assembly [14].



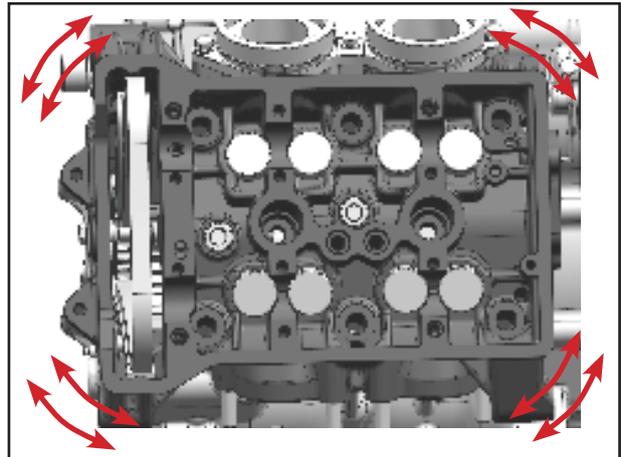
CFMOTO

Remove M6×90 bolt **15**.

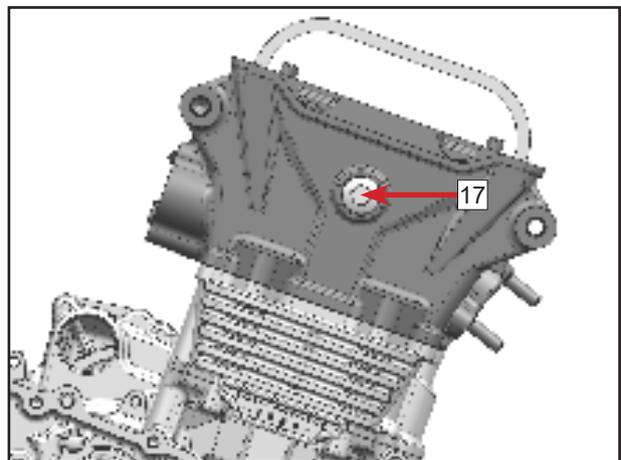
Diagonally cross remove M10×150 cylinder head bolt **16** and washer.



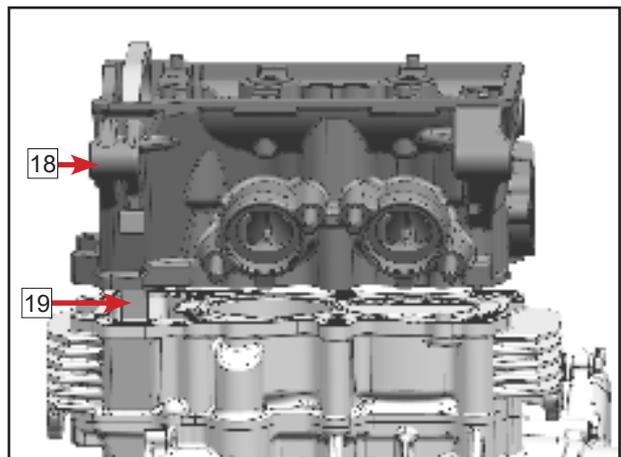
Shake the cylinder head from side to side to make it easier to disassemble, pay attention to the shaking range should not be too large, otherwise it will lead to the positioning pin fall off.



Hook the timing chain to prevent it from falling.
Remove shock absorbing bolt **17** and its gasket.



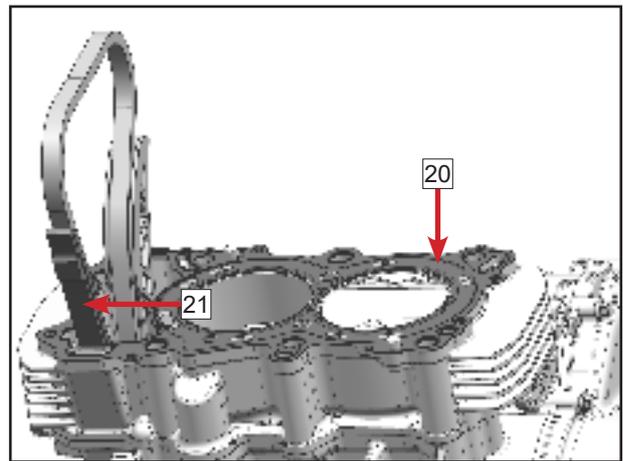
Lift the cylinder head **18**, and hook the timing chain **19** from the gap to prevent falling.
Remove cylinder head **18**.



Remove and discard cylinder head gasket

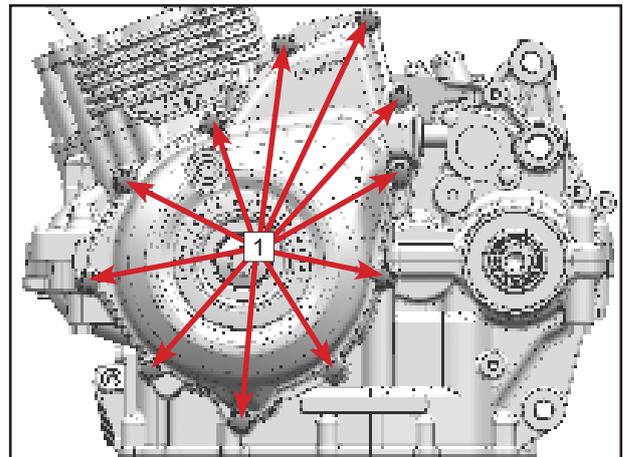
20.

Remove chain guide plate 21.

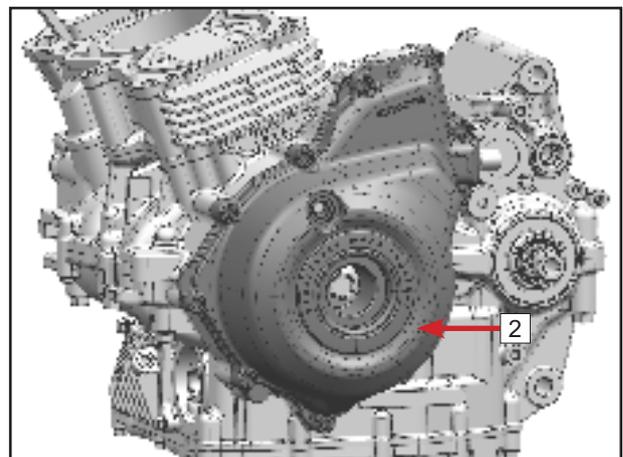


13.5.13 Magneto and Double Gear Removal

Remove diagonal cross M6×30 bolt 1.



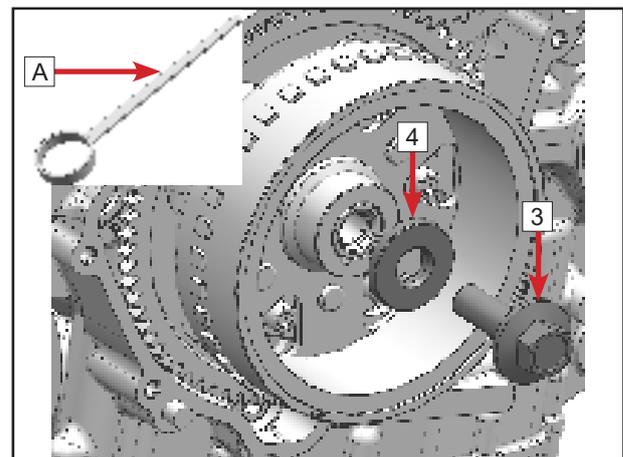
Remove LH side cover 2.



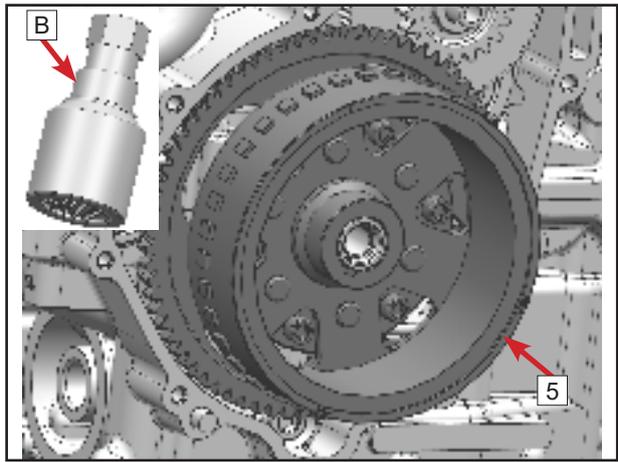
Use magneto rotor stop gear A (0SQ0-031000-922-001) to fix magneto rotor.

Remove M12×40 bolt 3.

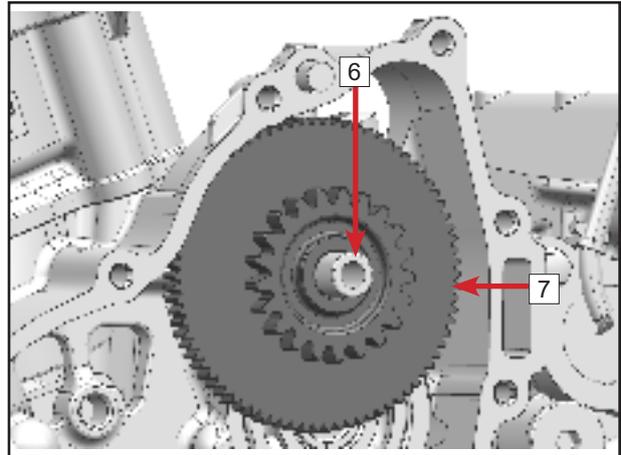
Remove 12.5×33×5 washer 4.



Use the magneto rotor removal tool **[B]** (0SQ0-031000-922-002) to eject magneto rotor and starting large gear assembly **[5]**.



Remove the intermediate gear shaft **[6]**.
Remove the double gear **[7]**.

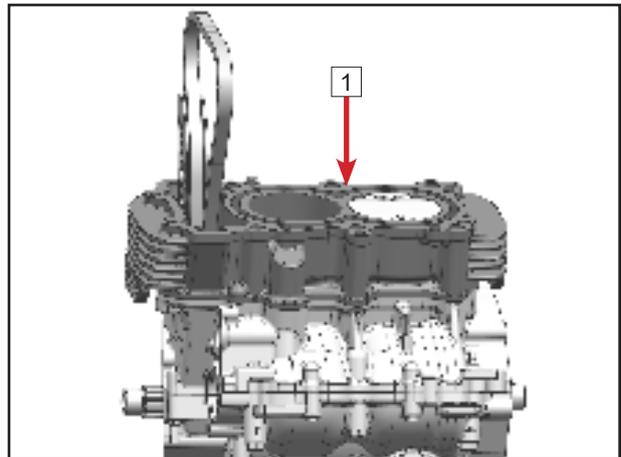


13.5.14 Cylinder Body Removal

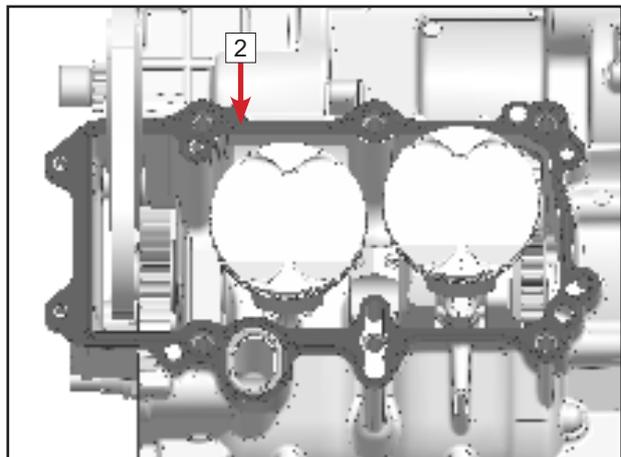
Gently shake the cylinder block **[1]** to loosen and pull it up.

⚠ CAUTION

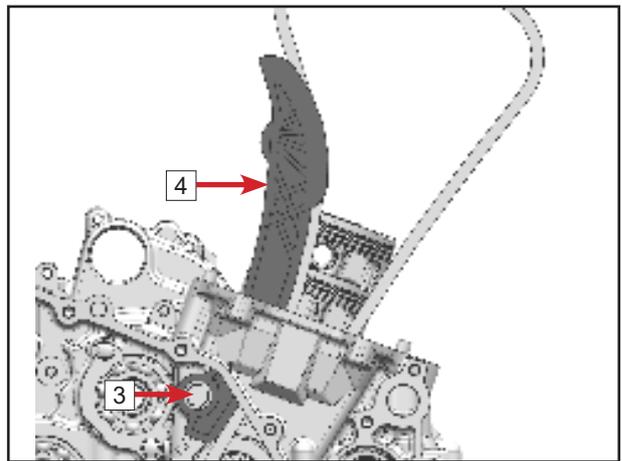
When the piston is about to break away from the cylinder block, hold the piston by hand to prevent it from colliding with the casing. If necessary, use dust-free paper to separate the piston from the crankcase.



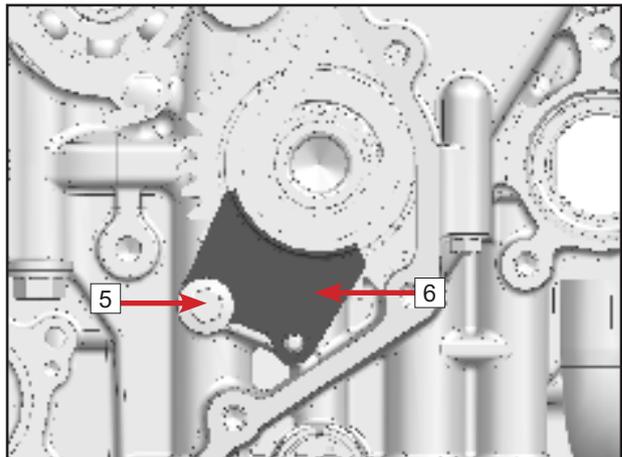
Remove and discard cylinder block gasket **[2]**.



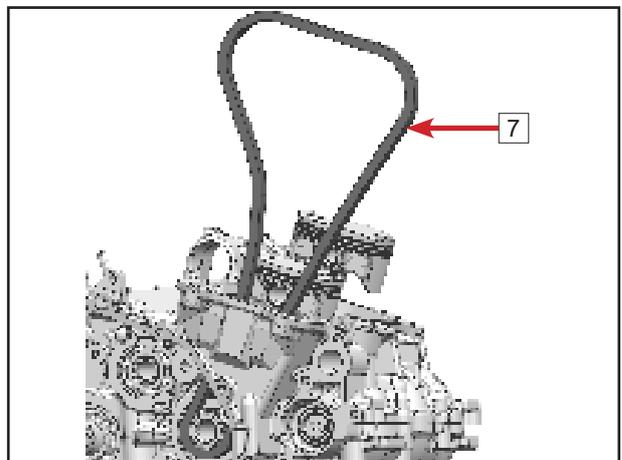
Remove threaded pin shaft **3**.
Remove the tensioning plate **4**.



Remove M6×12 bolt **5**.
Remove timing chain tray **6**.



Remove timing chain **7**.



13.5.15 Piston Removal

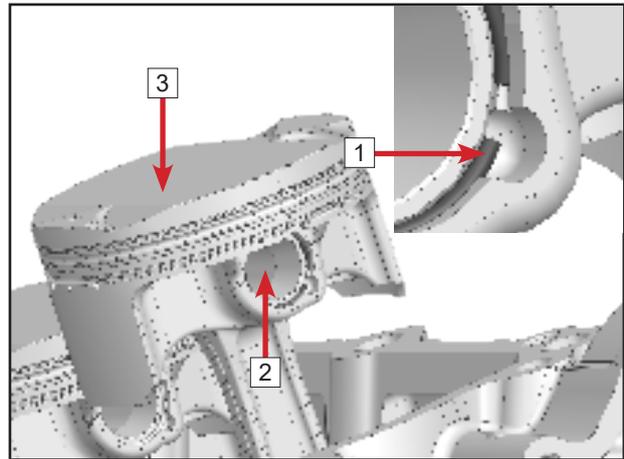
Turn the crankshaft and adjust the piston to a position suitable for disassembly.

Adjust the piston pin retaining ring opening to the piston notch position.

Use needle-nosed pliers to remove the piston pin retaining ring **1** and discard it.

Push the piston pin **2** from the other side.

Remove the piston **3**.

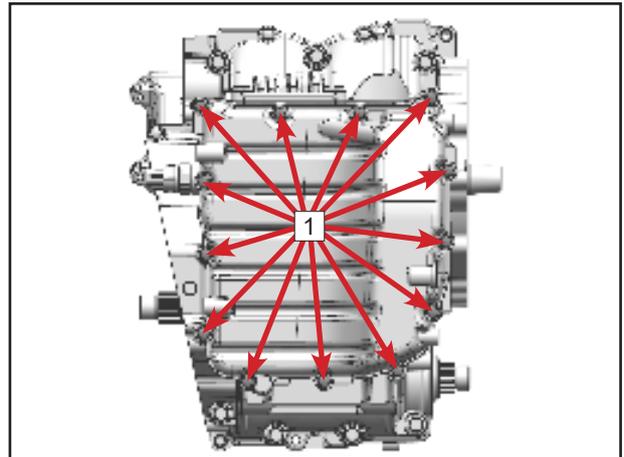


The two pistons are removed in the same way.

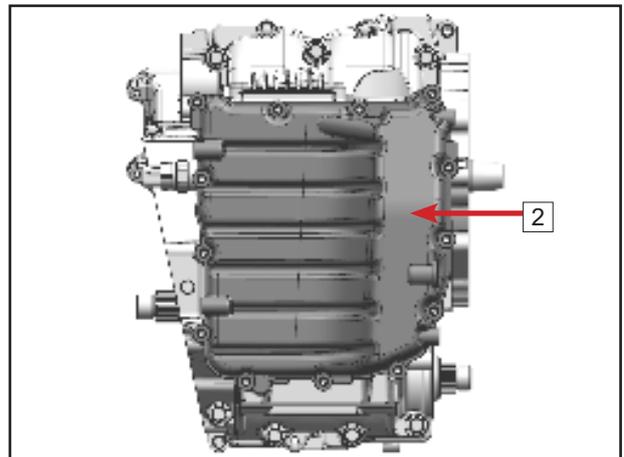
13.5.16 Oil Pan Removal

Flip engine.

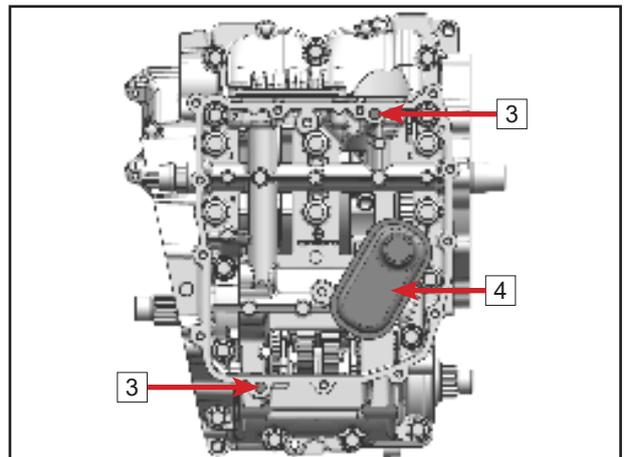
Remove diagonal cross M6×25 bolt **1**.



Remove oil pan **2**.

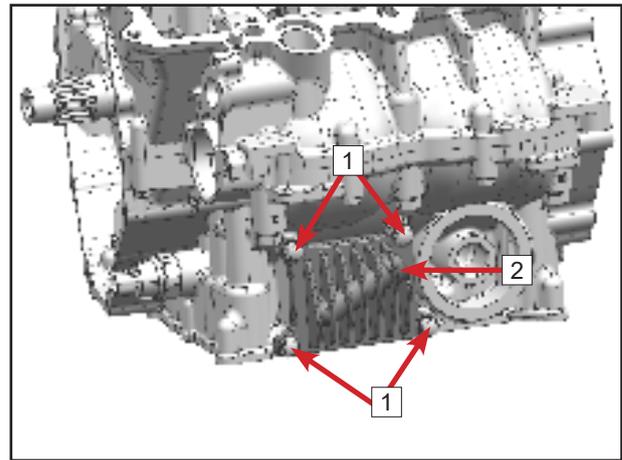


Remove $\Phi 8 \times 12$ cylindrical roller **3**.
Remove the set filter assembly **4**.



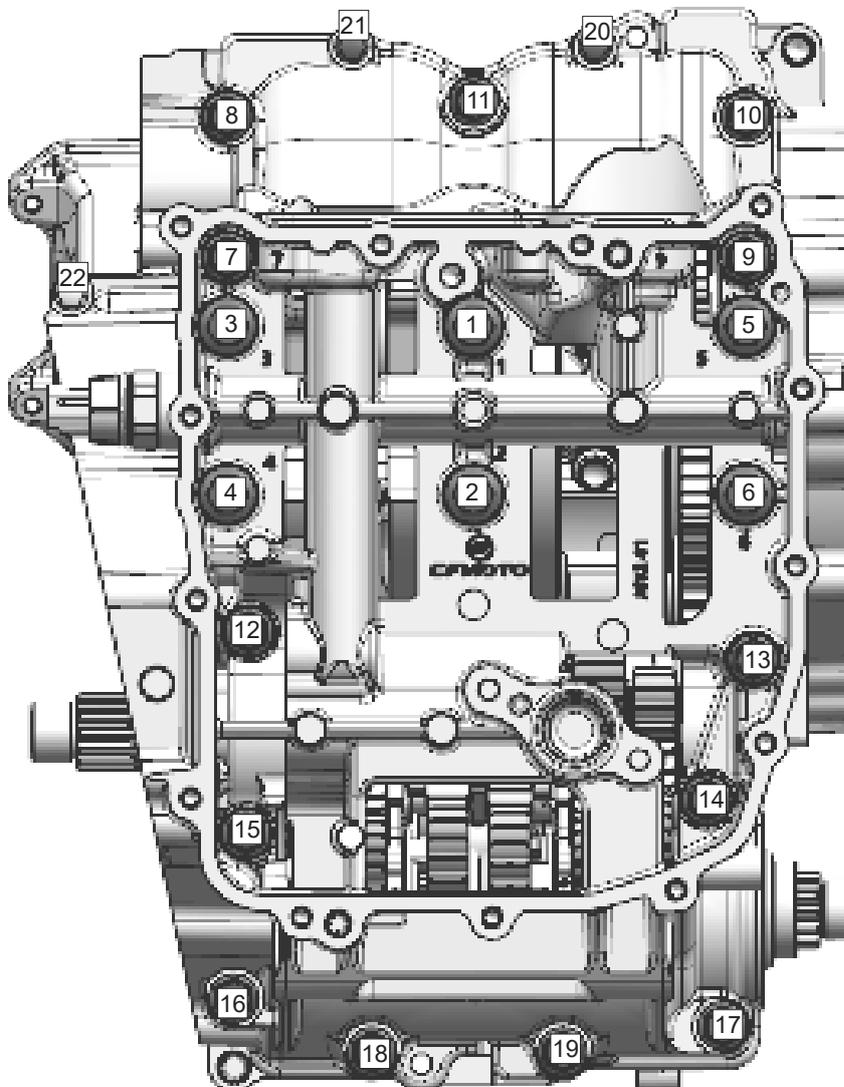
13.5.17 Oil Rail Cover Plate Assembly Removal

Diagonally remove M6×18 bolts **1**.
Remove oil rail cover plate assembly **2**.



13.5.18 Compartment

In turn remove bolt **1** ~ bolt **22**.



1 ~ **6**:
M9×108 bolt assy

7, **9**, **13**:
M8×105 bolt assy

8, **10**, **16**, **17**:
M8×55 bolt

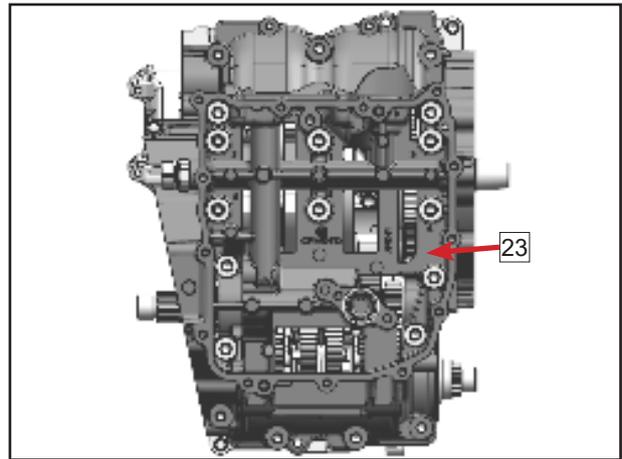
11, **18**, **19**:
M8×45 bolt

12, **15**:
M8×45 bolt assy

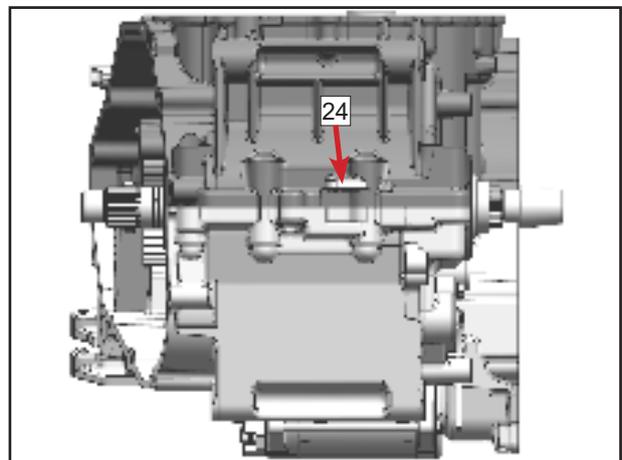
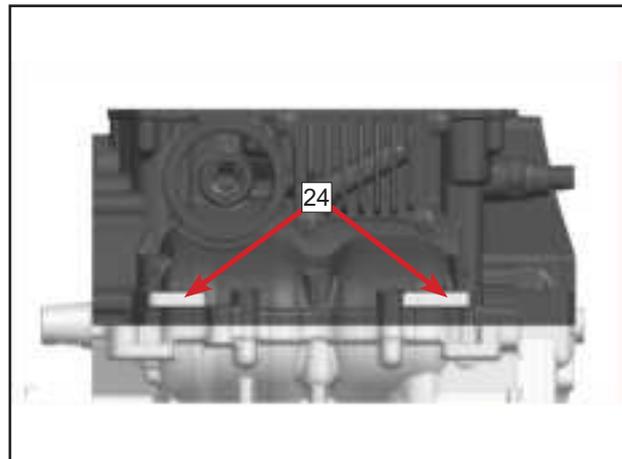
14:
M8×55 bolt assy

20, **21**, **22**:
M6×30 bolt

Remove lower crankcase 23.

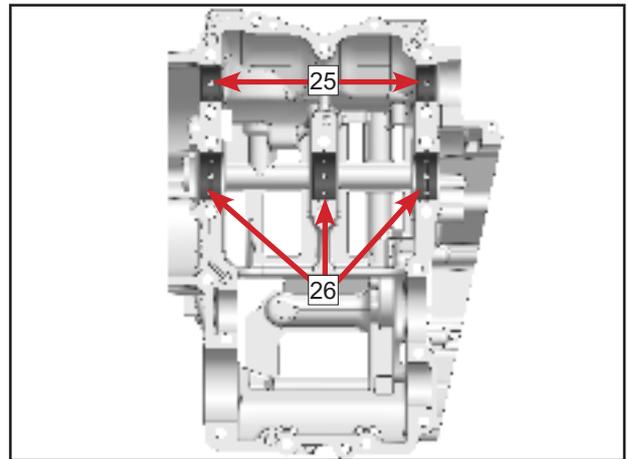


During disassembly, use rubber hammer to hit the crankcase convex 24 gently so that the upper and lower crankcase is easier to separate.

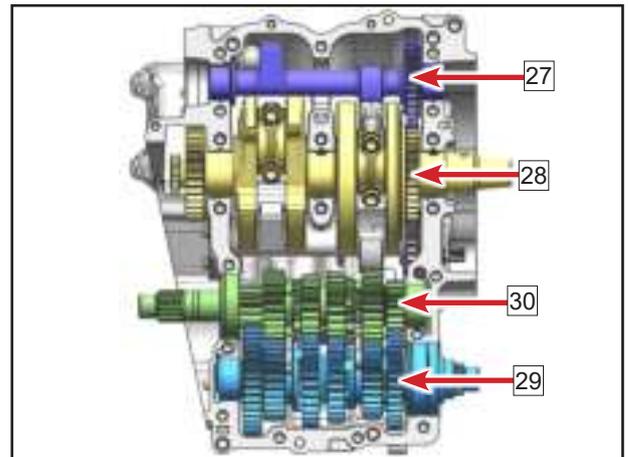


13 Engine

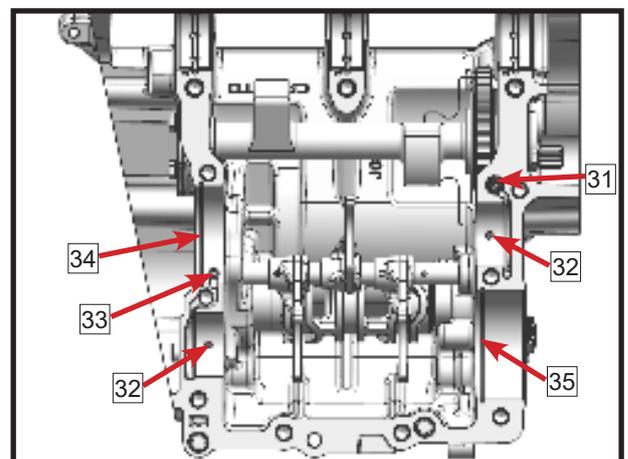
Ensure that the balance bearing **25** and spindle bearing **26** are left in the lower crankcase.



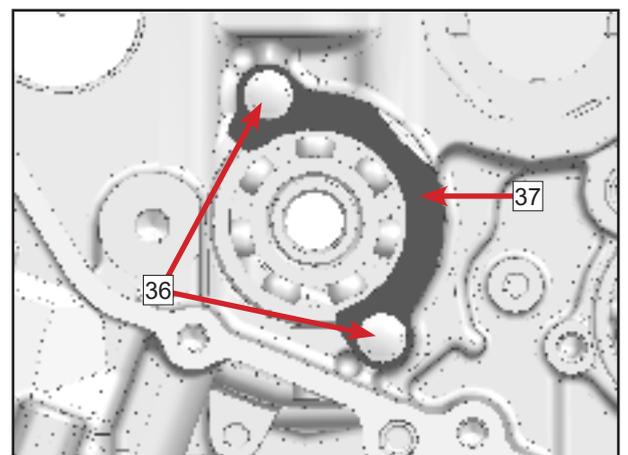
Remove front balancing shaft assembly **27**, crankshaft connecting rod assembly **28**, countershaft **29** and main shaft **30**.



Remove the throttle plug **31**.
Remove P4×7.8 roller pin **32**.
Remove 6×16.2 locating pin **33**.
Remove 6205 Bearing stop ring **34**.
Remove 62-28 Bearing stop ring **35**.



Remove M6×16 bolt **36**.
Remove the RH bearing baffle **37** (clutch side).

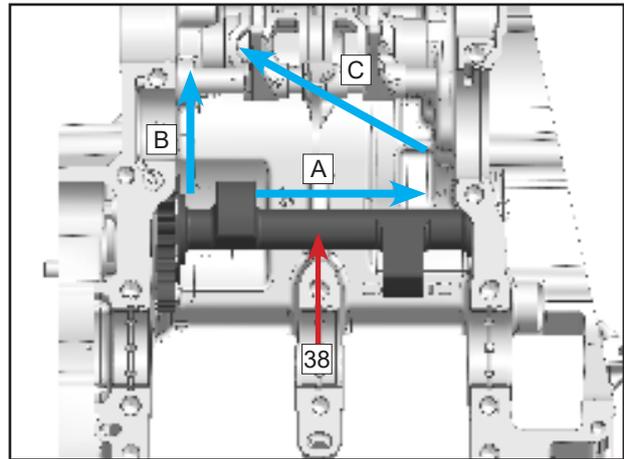


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[A]: Push the rear balance shaft assembly to the clutch side, remove the bearing 6204 of the rear balance shaft (clutch side).

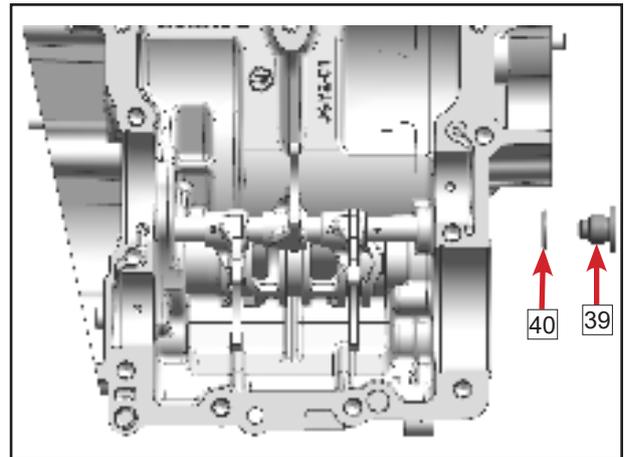
[B]: Lift the rear balance shaft gear end.

[C]: Remove the rear balance shaft assembly [38].



Remove the fork shaft cover [39].

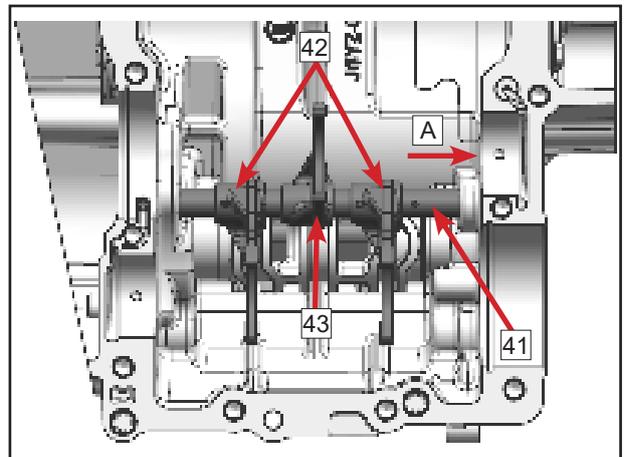
Remove 15×1.9 O-seal [40].



Push the fork shaft assembly [41] along the direction [A].

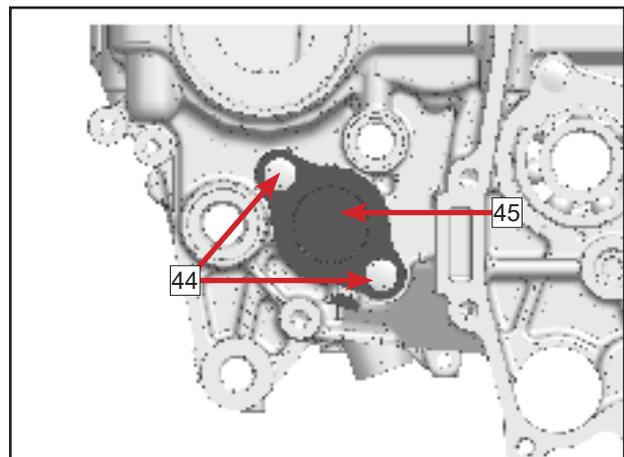
Remove shift forks (left and right) [42] and shift fork (middle) [43].

Remove the dial fork shaft assembly [41].

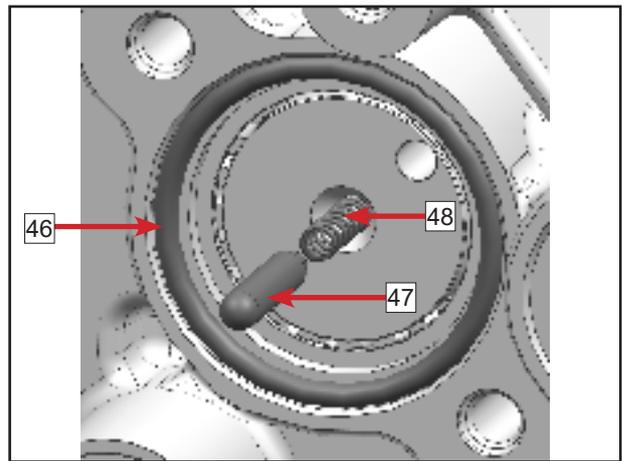


Remove M6×25 bolt [44].

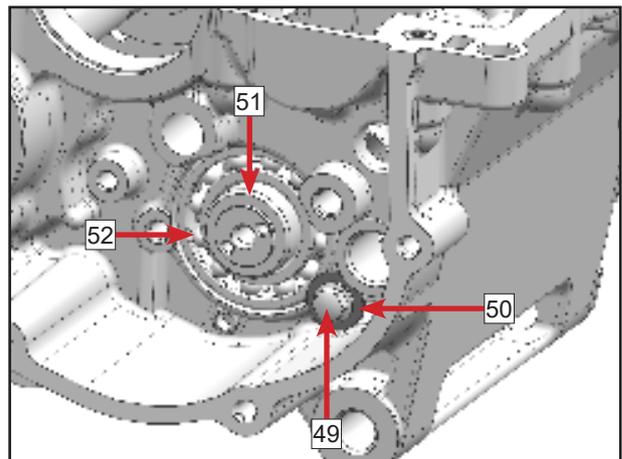
Remove the gear sensor assembly [45].



Remove 31.5×2.5 O-ring **46**.
Remove the ball contact **47** and contact spring **48** from the gear hub.



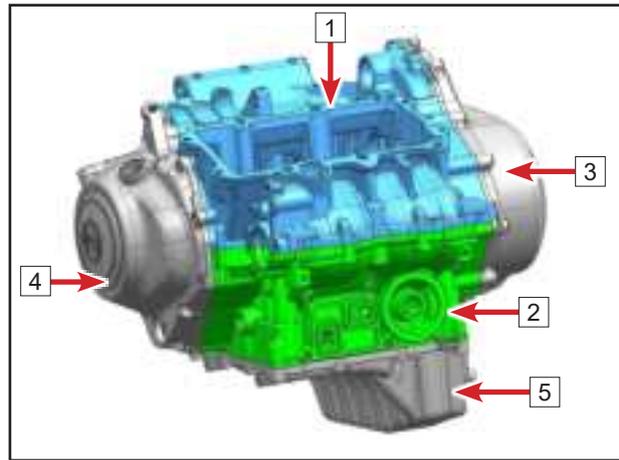
Remove M6×16 bolt **49** and 6.3×16.3×1.2 washer **50**.
Remove the gear hub **51** and 16005 rolling bearing **52** from the clutch side.



13.6 Engine Inspection

13.6.1 Crankcase

- 1: Upper crankcase
- 2: Lower crankcase
- 3: LH side cover
- 4: RH side cover
- 5: Oil pan

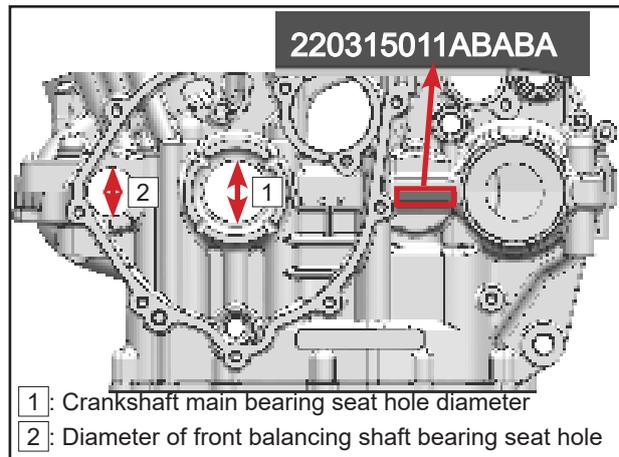


13.6.1.1 Selecting Plain Bearing Crankshaft main bearing seat hole/front balancing shaft bearing seat hole

Crankshaft main bearing seat holes and front balancing shaft bearing seat holes are grouped according to the following table, and group marks are engraved on the lower crankcase, as shown in the example on the right.

Crankshaft Main Bearing Seat Hole (New Part)	
Mark	Diameter 1
A	37 mm ~ 37.008 mm
B	37.009 mm~37.016 mm

Front Balancing Shaft Bearing Seat Hole (New Part)	
Mark	Diameter 2
A	29 mm ~ 29.006 mm
B	29.007 mm ~29.013 mm



For example “220315011ABABA”:

From LH to RH:

First character A: indicates LH (magenta side) The grouping of the bearing seat hole of the balance shaft is marked as A.

Second character B: indicates RH (clutch side) The grouping of the bearing seat hole of the balance shaft is marked as B.

Third character A: indicates LH (magneto side) The grouping of crankshaft main bearing seat hole is marked as A.

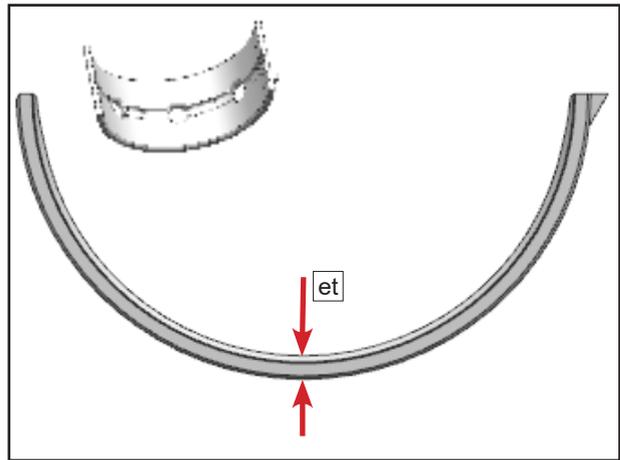
Fourth character B: The grouping mark of the crankshaft main bearing seat hole in the middle position is B.

Fifth character A: indicates RH (clutch side) The grouping of crankshaft main bearing seat hole is marked as A.

Main plain bearing

Main plain bearing wall thickness

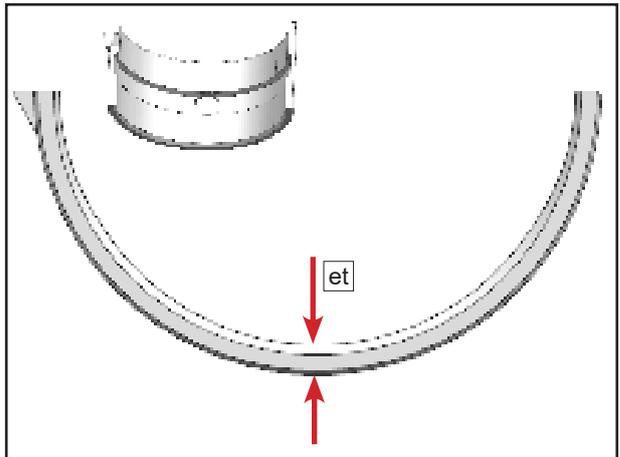
Main Plain Bearing (New Part)	
Color Mark	Wall Thickness <input type="text" value="et"/>
Red	1.486 mm ~ 1.490 mm
Black	1.491 mm ~ 1.494 mm
Blue	1.495 mm ~ 1.498 mm



Balance shaft plain bearing

Balance shaft plain bearing wall thickness

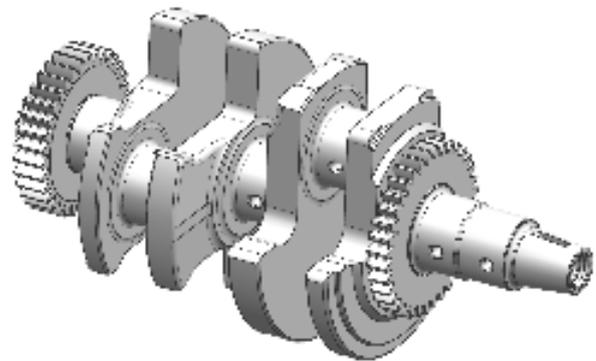
Balance Shaft Plain Bearing (New Part)	
Color Mark	Wall Thickness <input type="text" value="et"/>
Red	1.484 mm ~ 1.488 mm
Black	1.489 mm ~ 1.492 mm
Blue	1.493 mm ~ 1.496 mm



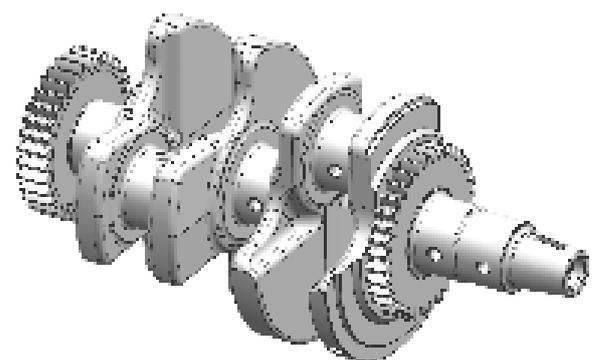
Crankshaft main journal

The state of the crankshaft is shown on the right.

Crankshaft: status 1



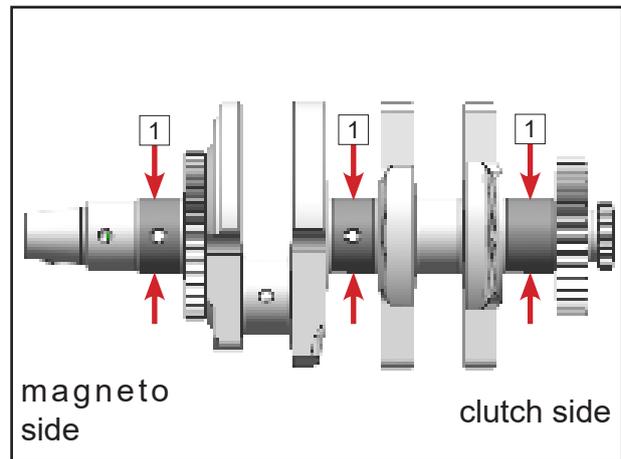
Crankshaft: status 2



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Crankshaft journal diameter 1

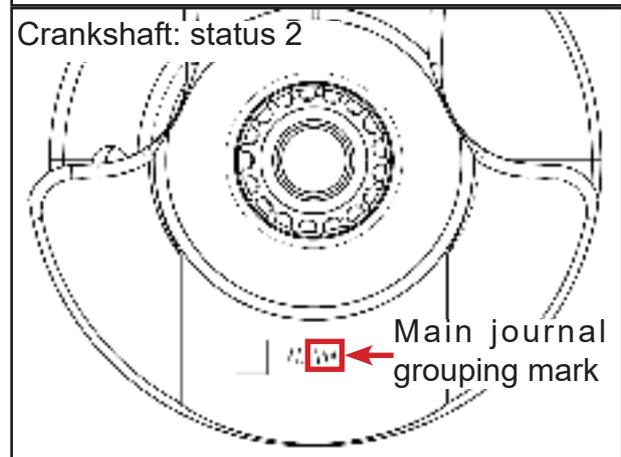
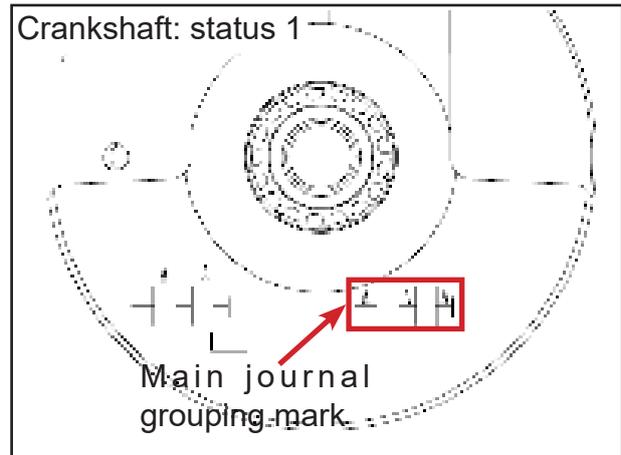
Crankshaft Main Journal (New Part)	
Mark	Diameter 1
B	33.985 mm ~ 33.992 mm
A	33.993 mm ~ 34.000 mm



Group marking positions are shown in the example on the right, from left to right are the magnetic motor side, the middle, and the clutch side of the main neck group marking.

Measure crankshaft journal diameter, if less than repair limit, replace with a new piece.

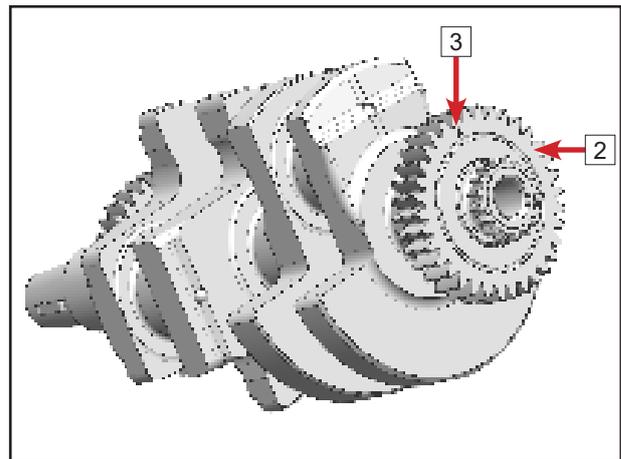
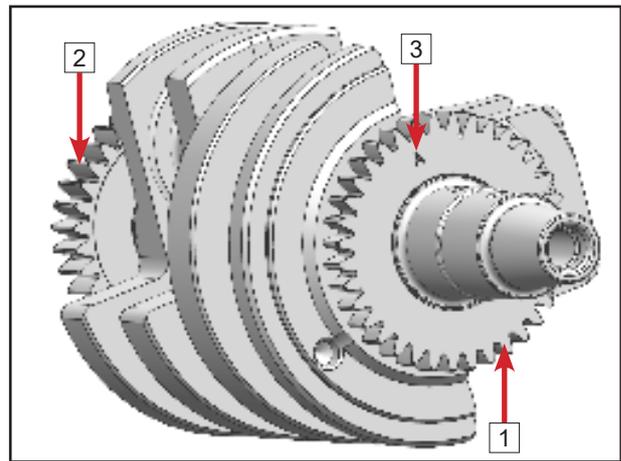
Crankshaft Journal Diameter	
Service Limit	33.965 mm



Crankshaft grouping

Inspect the tooth surface of balance shaft drive gear **1** and output gear **2** for severe wear or other damage. Replace it if it does.

The crankshaft is divided into group A and group B according to its balance shaft drive gear **1** and output gear **2**. A grouping mark **3** is stamped into each gear.



The crankshaft must be paired with the correct primary driven gear on the clutch and the correct driven gears on the balance shafts. These gears are also divided into group A and group B and stamped with a grouping mark. The table below shows the correct pairings.

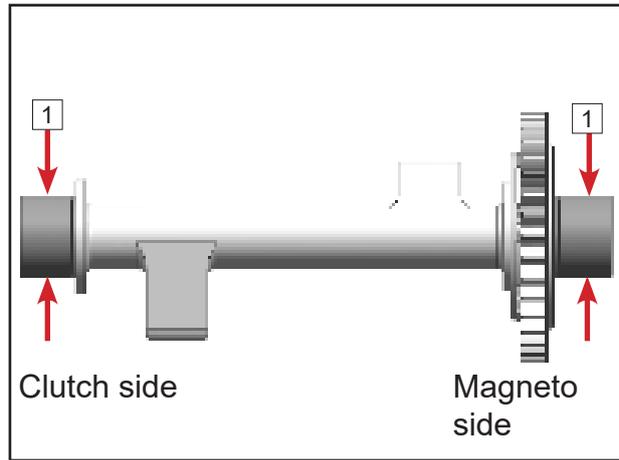
Crankshaft Gears	Clutch Primary Driven Gear	Front Balance Shaft Driven Gear	Rear Balance Shaft Driven Gear
A	B	B	B
B	A	A	A

CFMOTO

Front balance shaft journal

Front balance shaft journal diameter 1

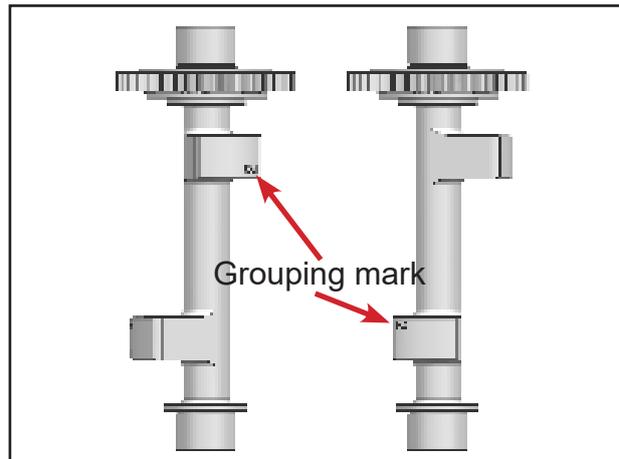
Front Balance Shaft Journal (New Part)	
Mark	Diameter 1
1	25.987 mm ~ 25.993 mm
2	25.994 mm ~ 26.000 mm



Location of grouping markers as shown in the example on the right, the grouping markers on both sides of the journal are engraved on close balance blocks.

Measure front balance shaft journal diameter 1 , if it is less than the service limit, replace with new part.

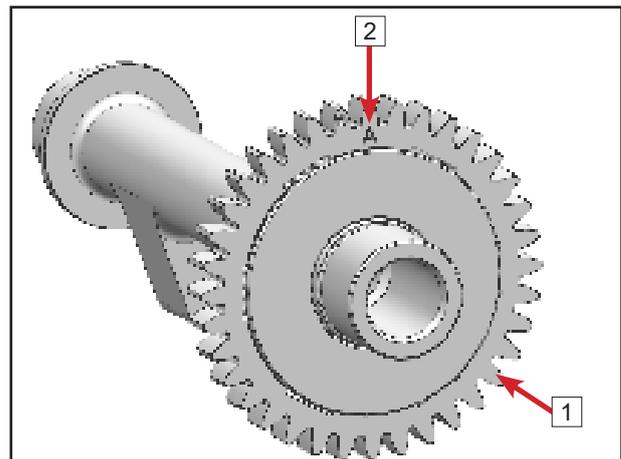
Front Balance Shaft Journal Diameter	
Service Limit	25.967 mm



Front balance shaft grouping

Inspect the tooth surface of balance shaft driven gear **1** for severe wear or other damage. Replace it if it does.

The front balance shaft is divided into group A and group B according to its driven gear **1**. A grouping mark **2** is stamped into the driven gear.



Assemble crankshaft and front balance shaft in pairs

Assemble crankshaft and front balance shaft in pairs according to the following:

Crankshaft Grouping Mark	Front Balance Shaft Grouping Mark
A	B
B	A

Matching

NOTE

Ensure that the assembly of crankshaft and front balance shaft meet the above requirements before matching plain bearing.

Crankcase and main plain bearing matching as below:

Crankshaft Main Bearing Seat Hole Mark	Crankshaft Main Journal Mark	Main Plain Bearing Color
A	A	Red
A	B	Black
B	A	Black
B	B	Blue

Assemble crankcase and balance shaft plain bearing in pairs according to the following:

Front Balancing Shaft Bearing Seat Hole Mark	Front Balance Shaft Journal Mark	Balance Shaft Plain Bearing Color
A	1	Black
A	2	Red
B	1	Blue
B	2	Black

13.6.1.2 Crankcase

Crankcase cleaning

⚠ WARNING

Use protection for eyes to prevent harming.

Use cleaning tools to clean the crankcase. Blow dry the crankcase with compressed air.

Clean the oil duct with compressed air.

Crankcase inspection

Check whether the upper crankcase, lower crankcase, left cover, right cover, oil pan are cracked or otherwise damaged. If yes, replace it.

Check whether there are scratches, wear and tear, or other damage to main plain bearing and balance shaft plain bearing. If yes, replace it.

Bearing/oil seal

Inspection

Check 6204 bearing [1] whether the rotation is flexible, if there is damage, replace it.

Check if 14×24×6 oil seal [2] and HK1412 needle bearing [3] has any damages, replace if it does.

Removal

NOTE

If the bearing or oil seal is not damaged, the following disassembly steps are not necessary.

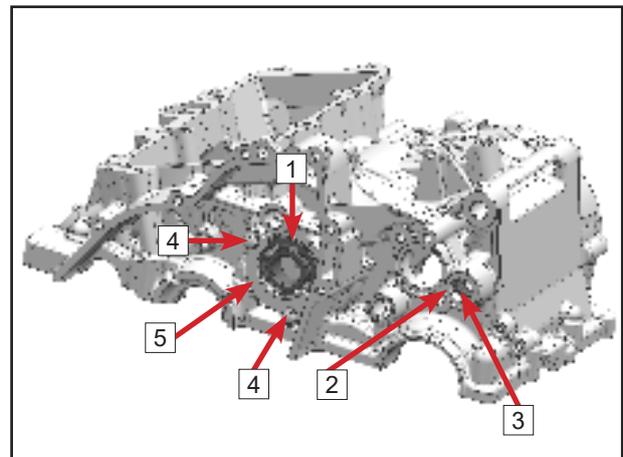
Remove M6×16 bolt [4].

Remove LH bearing baffle [5].

Pull out 6204 bearing [1] from crankcase with bearing puller.

Use screwdriver to pry up 14×24×6 oil seal [2] and discard.

Pull out HK1412 needle bearing [3] from crankcase with bearing puller.



Assembly

Reverse the removal procedures for installation.

When assembling bearings, appropriate supporting tools should be put on the bearing holes of the box body, as shown in the right picture.

Use needle bearing punch (0SQ0-011101-923-002) to load HK1412 needle bearing [3] into the corresponding hole of crankcase, and install it in place.

Use the oil seal punch (0SQ0-011101-923-001) to put the 14×24×6 oil seal [2] (marked face outward) into the corresponding hole of the crankcase, and smear appropriate amount of grease on the lip of the oil seal after installation in place.

Use the bearing head (0SQ0-011101-921-002) to load the 6204 rolling bearing [1] (marked face outward) into the corresponding hole of the crankcase, and install it in place.

Fasten the LH bearing baffle plate [5] to the crankcase with M6x16 bolts [4] (the thread part is coated with 243 thread locking glue), and press the rolling bearing 6204 [1].

Crankshaft main bearing hole, front balance shaft bearing hole diameter inspection

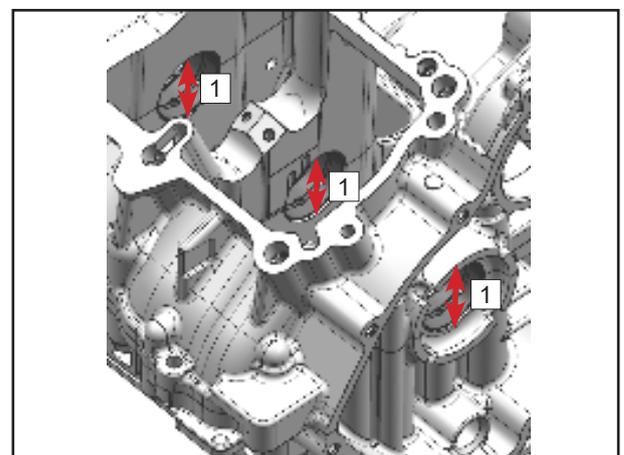
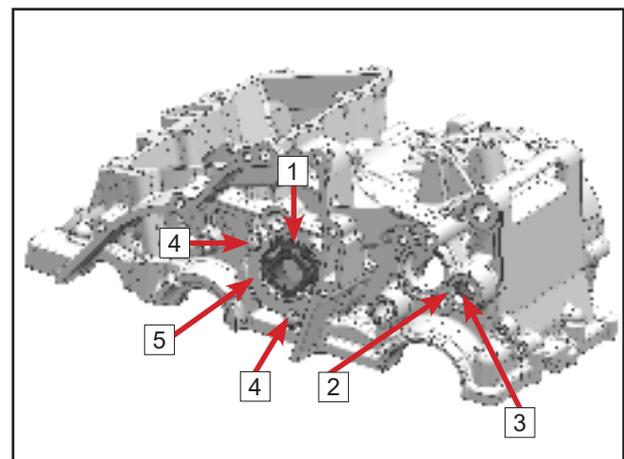
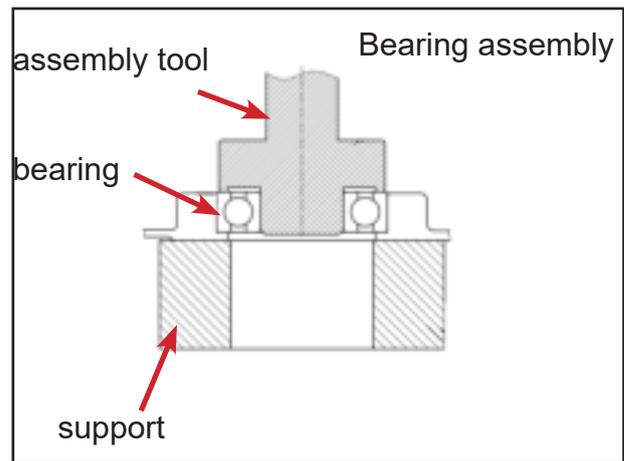
Close the upper and lower crankcases together. (Install the main plain bearing and balance shaft plain bearing, and tighten the box closing bolts according to the specified torque. Refer to the section of "Engine Assembly - Crankcase Closing")

Use lever micrometer to measure the inner diameter [1] of crankshaft main bearing at 3 places on the vertical direction of crankcase sub-box surface, and compare the diameter of crankshaft main journal at the corresponding position.

Inner diameter [1] of crankshaft main bearing	
service limit	34.055 mm

Radial clearance of crankshaft spindle journal	
standard	0.028 mm ~ 0.060 mm
service limit	0.070 mm

If the service limit is exceeded, replace the main plain bearing, or even replace the crankcase.



Use a lever dial meter to measure the inner diameter [2] of the bearing of the two front balancing shafts in the vertical direction of the sub-surface of the crankcase, and compare the diameters of the journal of the front balancing shafts at the corresponding positions.

Inner Diameter of Front Balancing Shaft Bearing [2]	
Service Limit	26.050 mm
Radial Clearance of Front Balance Shaft Journal	
Standard	0.040 mm ~ 0.060 mm
Service Limit	0.070 mm

If the service limit is exceeded, replace the balance shaft bearing or even the crankcase.

NOTE

The upper crankcase and the lower crankcase must be replaced in sets.

13.6.1.3 RH Side Cover

Inspection

Check whether the RH side cover [3] is broken or damaged, if so, replace it with a new one.

Check whether the oil level observation mirror [2] is damaged or leaking oil, if so, replace it with a new one.

Check whether the 12×20×5 oil seal [5] is damaged, if so, replace it with a new one.

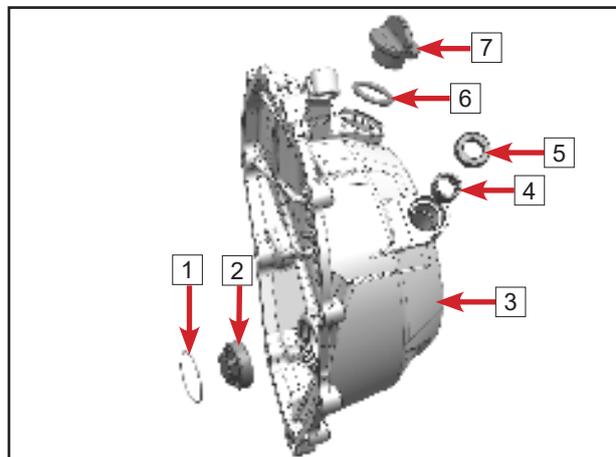
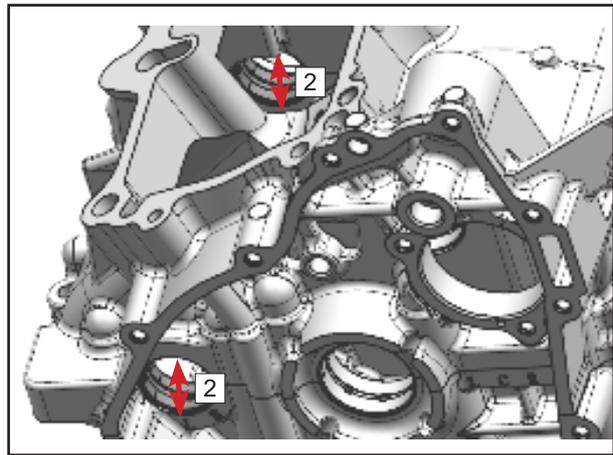
New RH side cover installation

Use special tool (0SQ0-013100-923-001) to put oil level observation mirror [2] into RH side cover [3] into corresponding hole. Put circlip [1] into RH side cover [3] into circlip groove completely.

On HK1210 needle bearing [4] surface, put some oil, use special tool (0SQ0-013000-923-003) to put needle bearing [4] (marked side should face outward) into RH side cover [3] into corresponding hole.

Use special tool (0SQ0-013000-923-002) to put 12×20×5 oil seal [5] into RH side cover [3] corresponding hole. Then smear proper amount of grease on the lip of the oil seal. Put 18×3.55 O-ring [6] onto filler plug [7].

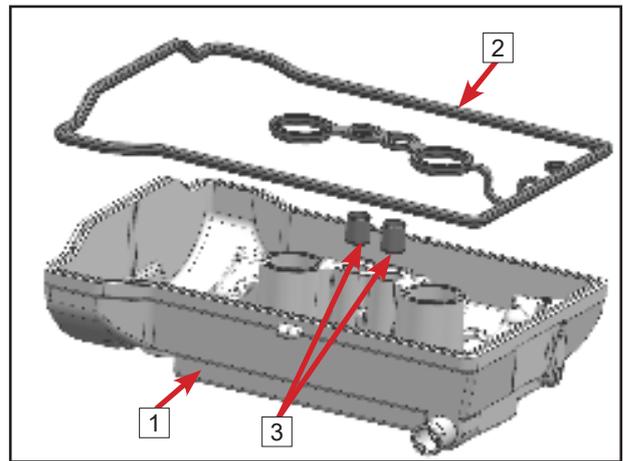
Put filler plug [7] on RH side cover [3] and tighten.



13.6.2 Cylinder Head Cover Assembly Disassembly

From cylinder head cover **1** remove cylinder head cover seal washer **2**.

From cylinder head cover **1** remove gulf pin **3**.

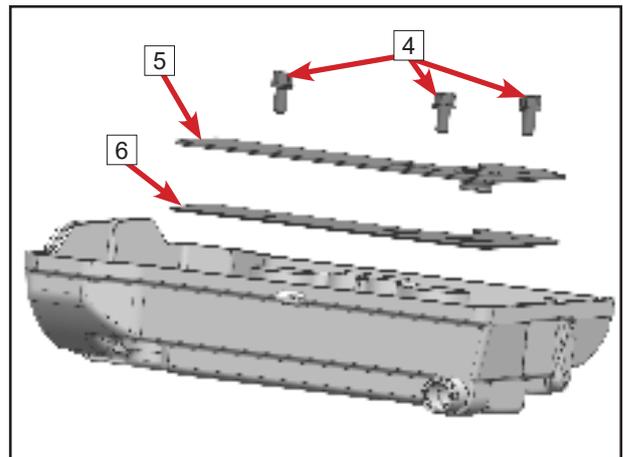


NOTE: If maze cover plate **5** has no damage, following steps may not be carried out.

Remove M6×12 bolt **4**.

Remove maze cover plate **5**.

Remove and discard maze cover plate washer **6**.

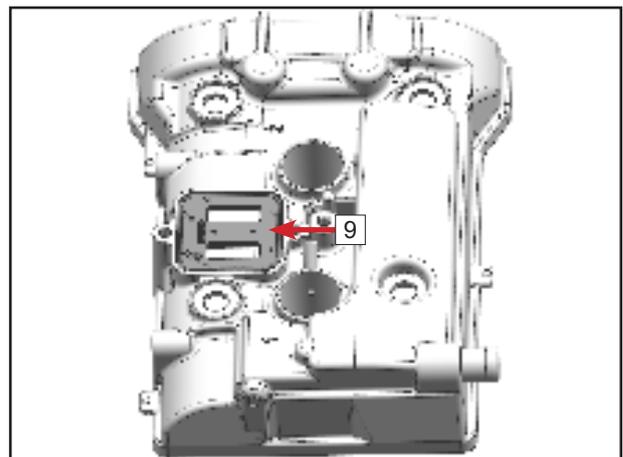
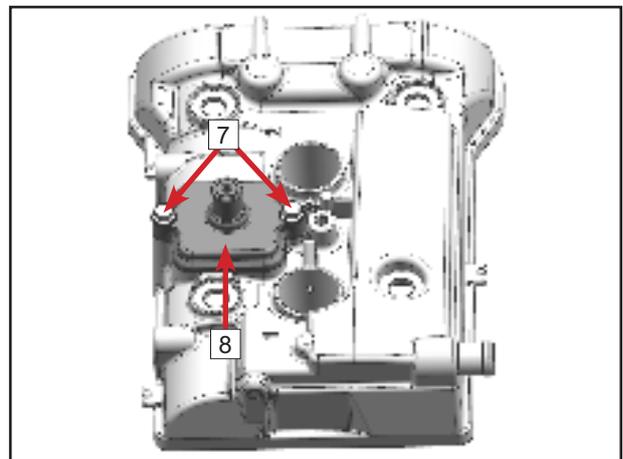


Within the range of "{ }" are the steps of the operation for EU5:

{ Remove the M6 x 20 bolts **7**.

Remove one-way valve cap assembly **8**.

Remove the spring valve assembly **9**. }



CFMOTO

Inspection

Check cylinder head cover seal gasket [2] for breakage, hardening, or other damage, replace if necessary.

Check cylinder head cover [1] for breakage, hardening, or other damage, replace if necessary.

Check maze cover plate assembly [5] for breakage or other damage, replace if necessary.

Check one-way valve cap assembly [8] for breakage or other damage, replace if necessary.

Check spring valve assembly [9] for damage, replace if necessary.

Assembly

Assemble in reverse order of disassembly.

NOTE

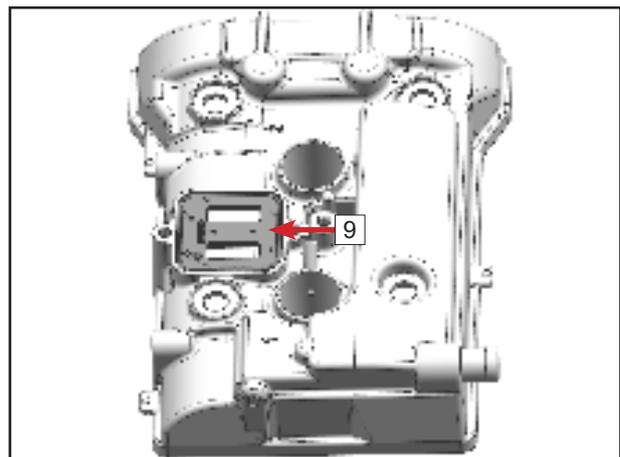
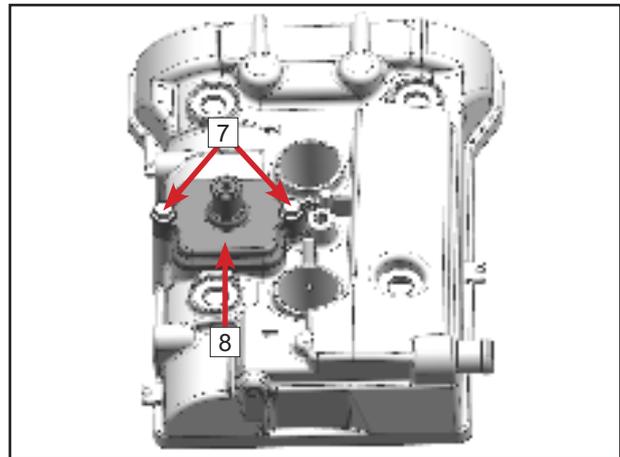
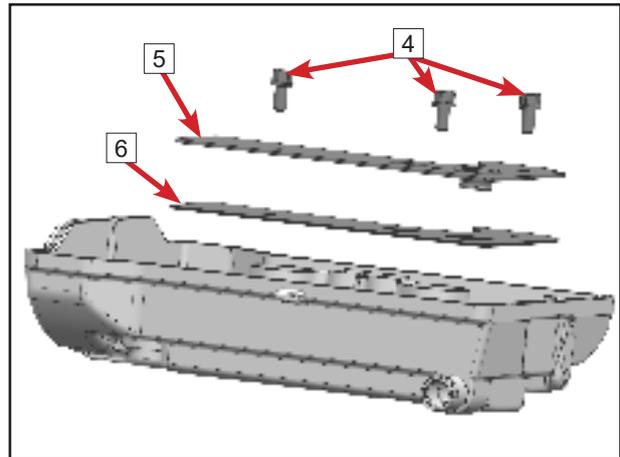
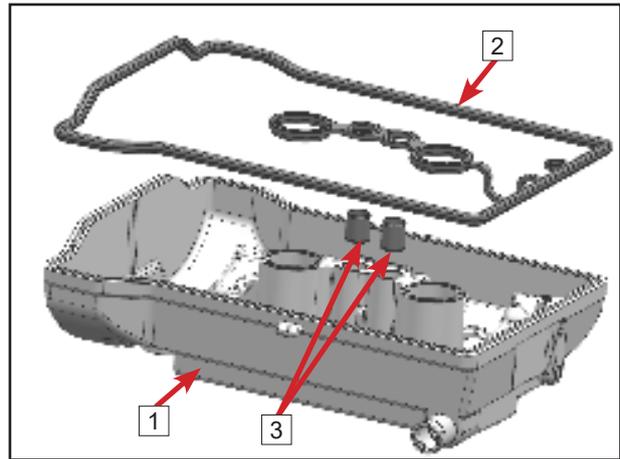
The maze cover plate gasket shall not be used again and must be replaced with a new one. Note the mounting direction of the spring valve assembly.

Maze Cover Plate Bolt [4] Torque

10N•m

One-way Valve Cap Bolt [7] Torque

10N•m



13.6.3 Cylinder Head Assembly Valve Clearance Inspection

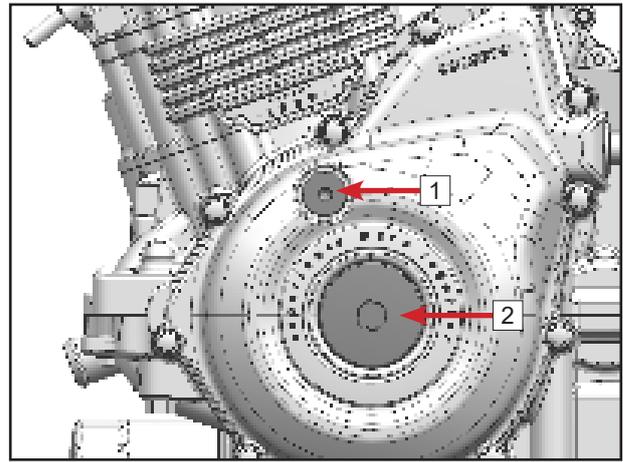
NOTE

NOTE: Inspect and adjust valve clearances on a cold engine.

Remove the timing observation hole cover

1.

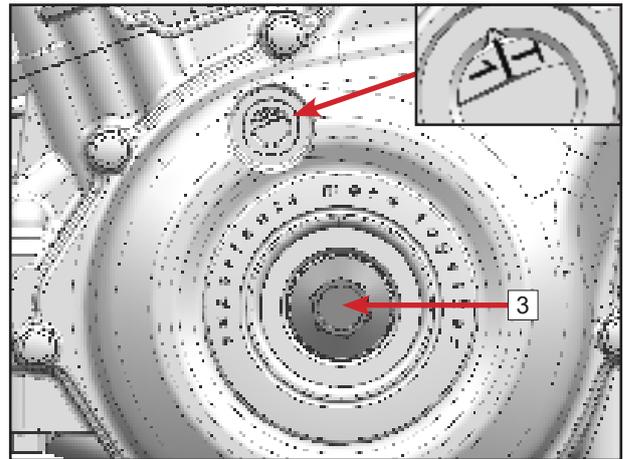
Remove strainer cover 2.



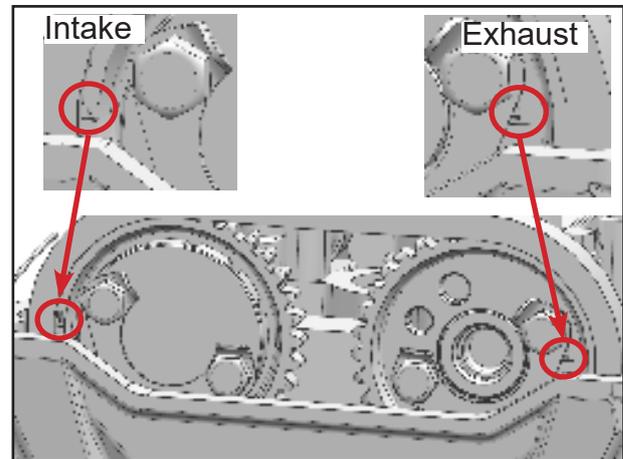
Cylinder 1 valve clearance

Turn the crankshaft 3 counterclockwise, make cylinder 1 piston at ignition top dead center.

At this point, the "I" marked "T1 I" on the magneto rotor is aligned with the notch center of the timing observation hole on the left cover.



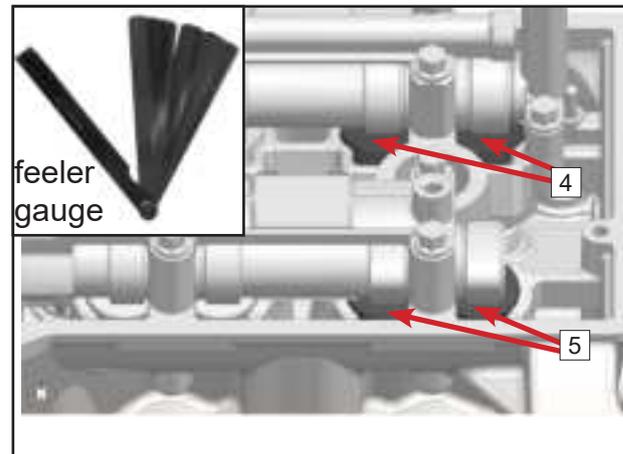
At the same time, the line on the intake timing sprocket is parallel to the plane on the cylinder head, and the line on the exhaust timing sprocket is parallel to the plane on the cylinder head, as shown on the right.



Use feeler gauge to measure intake valve 4 and exhaust valve 5 clearance of cylinder 1 (magneto side) respectively.

Record the measurement data, compare with the "cold engine valve clearance" table, if not meet the standard, then replace the valve tappet of different thickness. After replacing the valve tappet, measure the clearance again until it meets the standard.

Cold Engine Valve Clearance	
Valve	Clearance
Intake	0.10 mm ~ 0.15 mm
Exhaust	0.25 mm ~ 0.31 mm

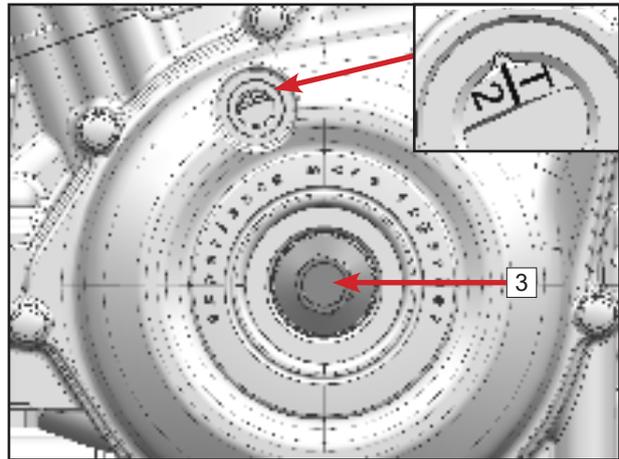


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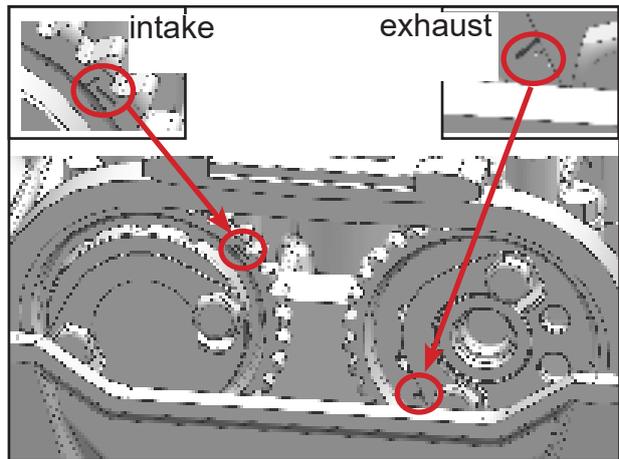
Cylinder 2 valve clearance

Turn the crankshaft **3** counterclockwise 270°, make cylinder 2 piston at ignition top dead center.

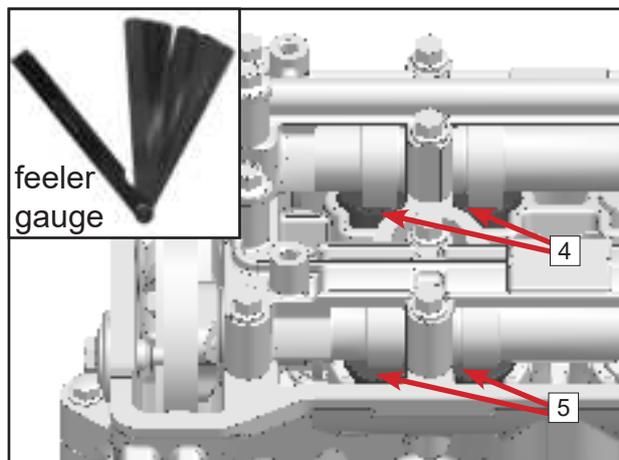
At this point, the "I" marked "T2 I" on the magneto rotor is aligned with the notch center of the timing observation hole on the left cover.



At the same time, the line on the intake timing sprocket is at a 45° angle with the plane on the cylinder head, and the line on the exhaust timing sprocket is at a 45° angle with the plane on the cylinder head, as shown on the right.



Use feeler gauge to measure inlet valve **4** and exhaust valve **5** clearance of cylinder 2 (clutch side) respectively.

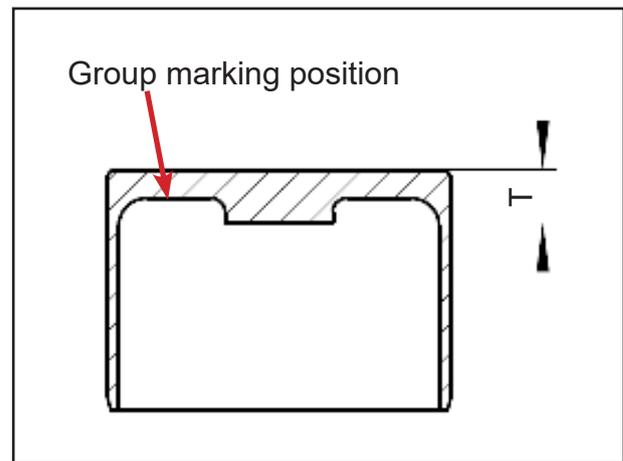


Record the measurement data, compare with the "cold engine valve clearance" table, if not meet the standard, then replace the valve tappet of different thickness. After replacing the valve tappet, measure the clearance again until it meets the standard.

Cold Engine Valve Clearance	
Valve	Clearance
Intake	0.10 mm ~ 0.15 mm
Exhaust	0.25 mm ~ 0.31 mm

Valve tappets are grouped according to thickness T as follows:

Valve Tappet T Grouping Table			
Mark	T (mm)	Mark	T (mm)
320	3.20	370	3.70
322	3.22	372	3.72
324	3.24	374	3.74
326	3.26	376	3.76
328	3.28	378	3.78
330	3.30	380	3.80
332	3.32	382	3.82
334	3.34	384	3.84
336	3.36	386	3.86
338	3.38	388	3.88
340	3.40	390	3.90
342	3.42	392	3.92
344	3.44	394	3.94
346	3.46	396	3.96
348	3.48	398	3.98
350	3.50	400	4.00
352	3.52	402	4.02
354	3.54	404	4.04
356	3.56	406	4.06
358	3.58	408	4.08
360	3.60	410	4.10
362	3.62	412	4.12
364	3.64	414	4.14
366	3.66	416	4.16
368	3.68	418	4.18



Cylinder head disassembly

Remove valve tappet **1**.

NOTE

Record the position of the tappets so that they can be quickly reassembled to the original position.

Install valve spring compression clamp (0180-022006-922-001).

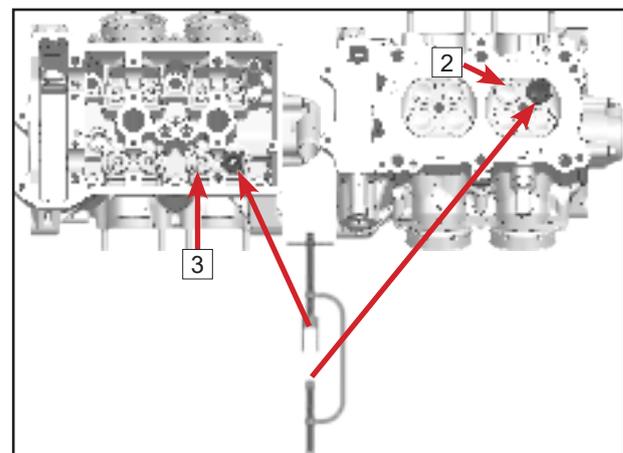
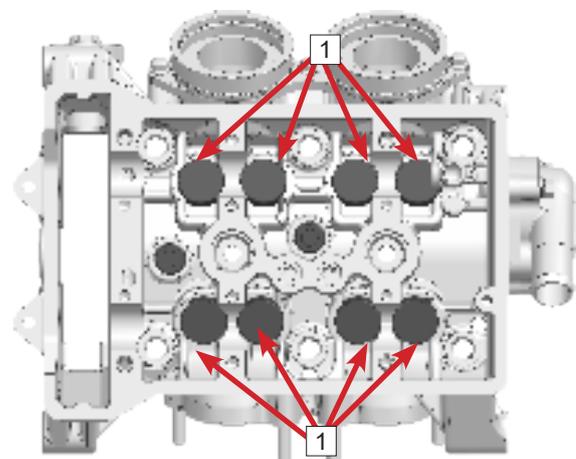
Install the valve spring compression clamp and place the lower part of the valve spring compression clamp against the valve disc **2**.

The upper part is pressured on the valve spring seat **3**.

Slowly rotate the rotating rod at the top of the valve spring compression fixture to compress the valve spring until the valve lock clamp is fully exposed.

⚠ WARNING

Wear goggles when compressing the valve spring. Improper operation may cause the valve spring to fly out and injure people under strong pre-pressure.



CFMOTO

Use the valve lock tweezers to remove the valve lock clamp [4].

NOTE

Add grease to the valve lock tweezers to prevent them from falling off.

Slowly rotate the rotating rod at the top of the valve spring compression fixture, so that the valve spring back to the relaxation state.

Remove valve spring upper seat [5].
Remove valve spring [6].
Remove valve [7].

Gently clamp the valve stem seal ring [8] with pliers and remove.

Remove valve spring lower seat [9].
To remove other 7 is the same way.

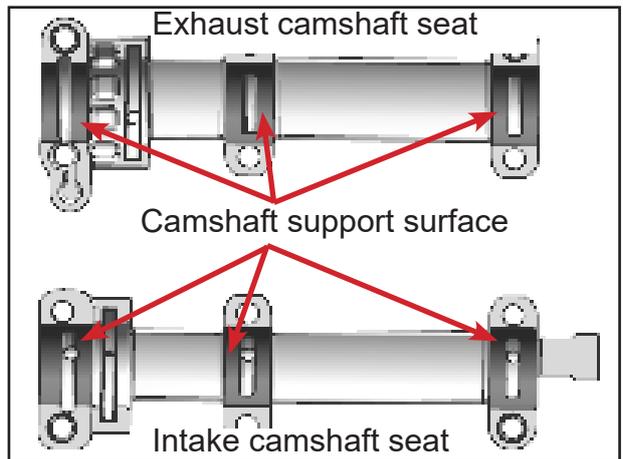
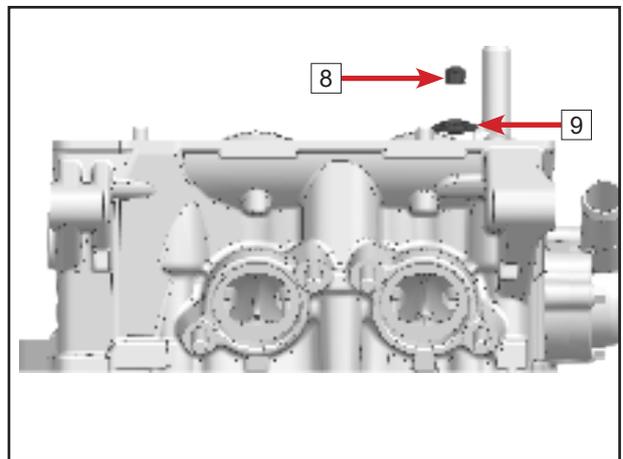
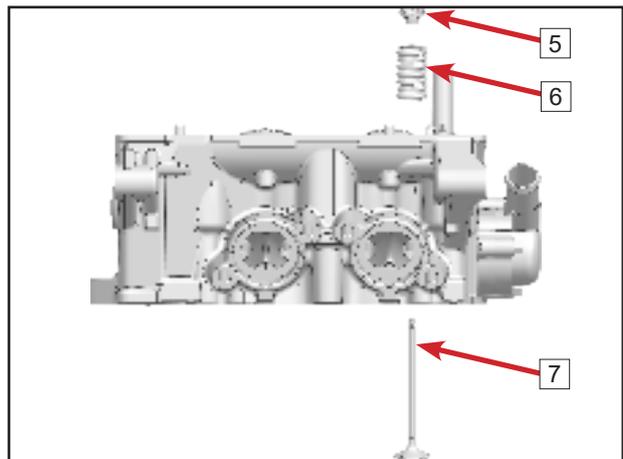
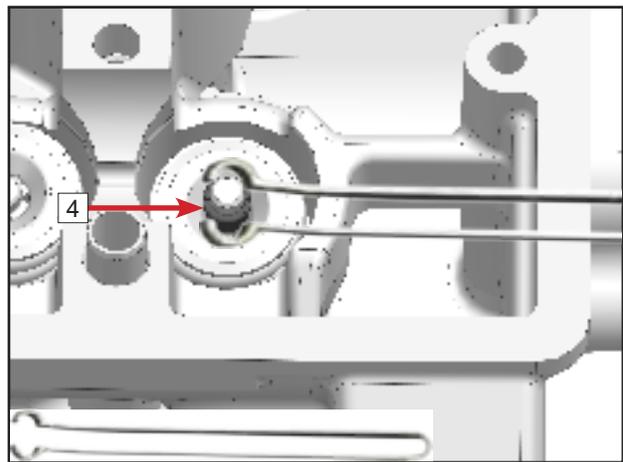
NOTE

Each time the valve is removed, a new valve stem seal ring needs to be replaced. Removed valves and related parts should be placed one by one so that they can be quickly installed to the original position during reassembly.

Cylinder head inspection

Check whether there are cracks between the cylinder head valve seat, if so, replace. Check whether the camshaft bearing holes on the cylinder head are bruised, severely worn or otherwise damaged. If so, replace.

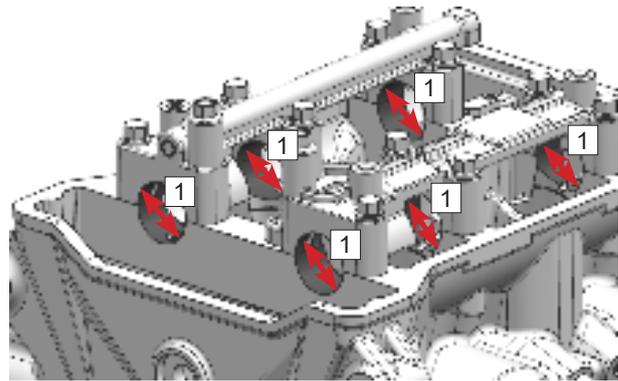
Check whether the surface of the camshaft supported by the camshaft seat is bruised, severely worn or otherwise damaged. If so, replace it.



Clean the cylinder head and camshaft seat.

Assemble the cylinder head and camshaft seat together with camshaft seat bolts (diagonal cross tightening, divided into 3 times: $5\text{N}\cdot\text{m} \rightarrow 8\text{N}\cdot\text{m} \rightarrow 12\text{N}\cdot\text{m}$).

Use lever micrometer to measure inlet and exhaust camshaft bearing hole diameter 1 separately. Replace cylinder head and camshaft seat if the hole diameter exceeds service limit.



Camshaft Bearing Hole Diameter (Intake and Exhaust)	
New Part	24.000 mm ~ 24.021 mm
Service Limit	24.050 mm

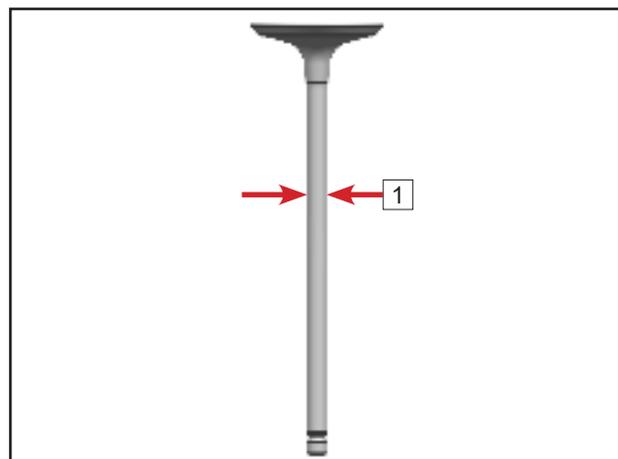
NOTE
Cylinder head, intake camshaft seat and exhaust camshaft seat need to be replaced in a complete set.

Valve

Check valve stem for abnormal wear and bending, if any, replace.

Measure valve stem diameter 1 with micrometer, replace if exceed service limit.

Valve Stem Diameter	
Intake Valve	
New Part	4.475 mm ~ 4.490 mm
Service Limit	4.465 mm
Exhaust Valve	
New Part	4.455 mm ~ 4.470 mm
Service Limit	4.445 mm

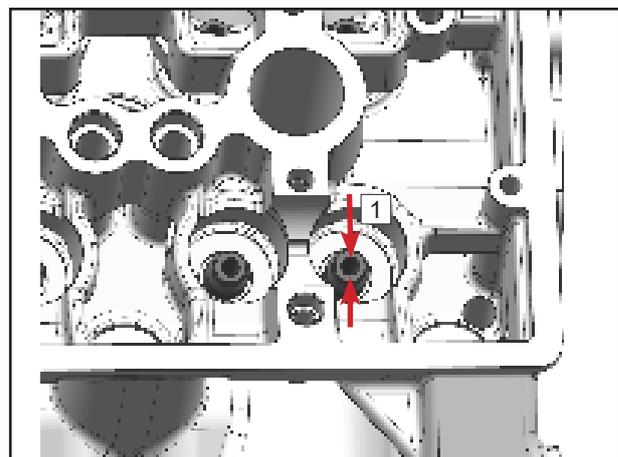


Valve guide

Check valve guide for severe wear or other damage, if so, replace the cylinder head.

Measure valve guide diameter 1 with a small bore gauge and replace the cylinder head if service limit is exceeded.

NOTE
Clean valve guide before measurement to remove carbon deposition.



Valve Guide Aperture (Intake and Exhaust)	
New Part	4.500 mm ~ 4.512 mm
Service Limit	4.540 mm

Valve stem and valve guide clearance

Check valve stem and valve guide clearance. Replace valve or cylinder head if it exceeds service limit.

Valve Stem and Valve Guide Clearance	
Intake Valve	
New Part	0.01 mm ~ 0.037 mm
Service Limit	0.075 mm
Exhaust Valve	
New Part	0.03 mm ~ 0.057 mm
Service Limit	0.095 mm

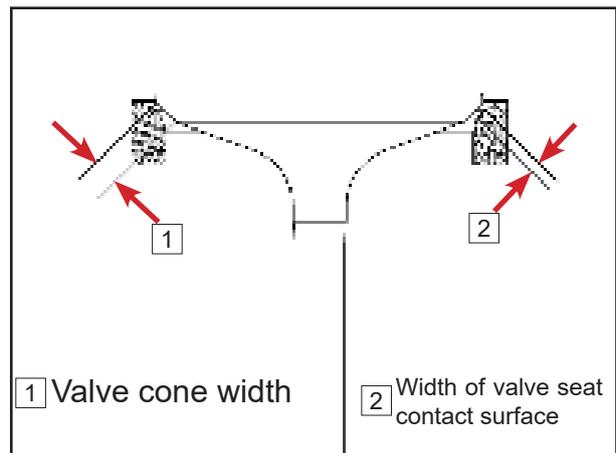
Valve cone and valve seat

Check whether the valve cone or valve seat is corroded or dented. If so, replace the valve or cylinder head.

Measure valve seat contact width 2 with caliper.

Width of Valve Seat Contact Surface (Intake and Exhaust)	
New Part	0.9 mm ~ 1.1mm
Service Limit	1.4 mm

Replace the cylinder head if the measured value exceeds the service limit.



Valve spring

The valve spring ensures the sealing of the valve and valve seat, and the reduction of spring elasticity will lead to the reduction of engine power output, and make the valve produce large mechanical noise.

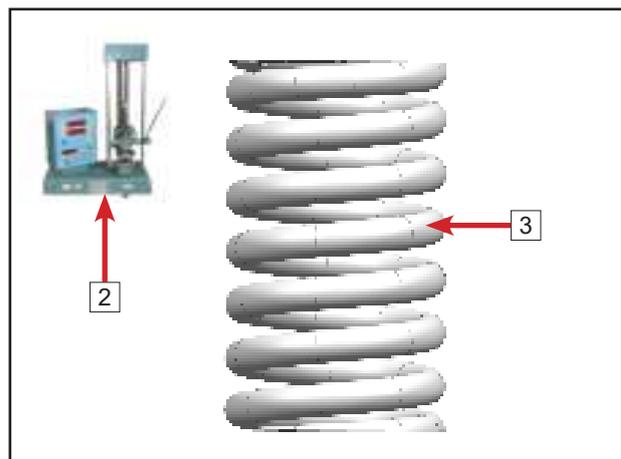
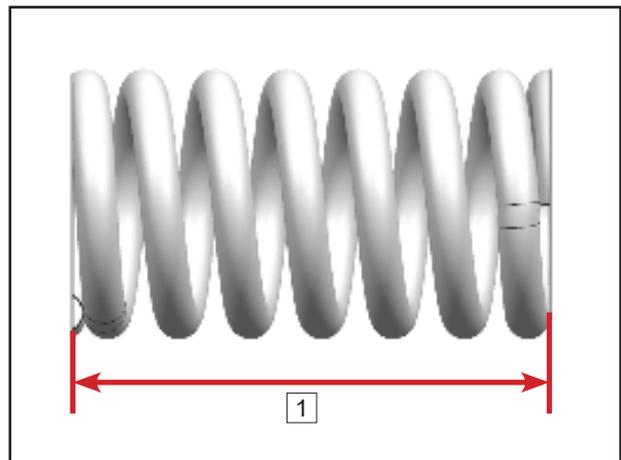
Measure the free length of spring [1].

Valve Spring Free Length	
New Part	36.8 mm
Service Limit	35 mm

Use spring elasticity tester [2] to measure the spring [3] force when the valve spring is compressed to the specified length.

Compare "valve spring force value standard", if the force value is not within the specified range, replace the valve spring.

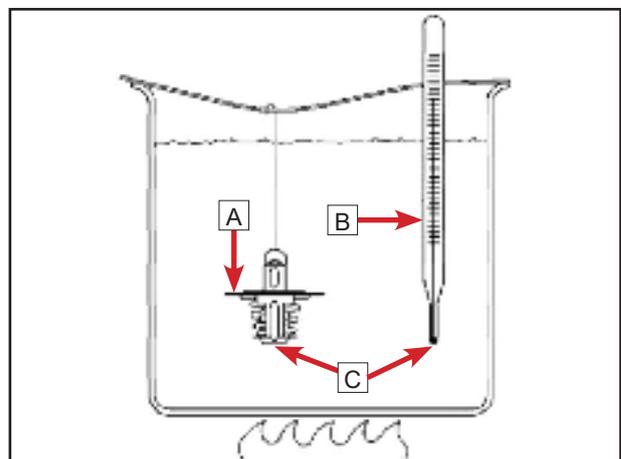
Valve Spring Force Standard
When the valve spring compressed to the length of 33mm, the spring force value is 106N ~ 124N. When the valve spring is compressed to 25mm in length, the spring force value is 423N ~ 467N.



Thermostat

Check thermostat valve at room temperature. If valve is open, replace thermostat.

To check the valve opening temperature, suspend the thermostat [A] in a water container. The thermostat must be completely submerged in water and must not touch the side or bottom of the container. Also suspend a standard thermometer [B] in the water, again out of contact with the container. Lock the thermosensitive position [C] of the thermostat and thermometer at the same depth and heat the bottom of the container.



Thermostat Opening Temperature and Full Opening Lift	
First Open Temperature	80°C ~ 84°C
Full Open Temperature	95°C
Fully Open Lift	≥8 mm

If the measurement results are outside the specified range, replace the thermostat.

New cylinder head assembly

Cylinder head and camshaft seat shall be used together, check whether the two codes are corresponding to the same, replace any one of them should be replaced in a complete set.

Check each plane of cylinder head for obvious aluminum chips, knock, scratch, sand holes, etc. If found, it should be cleaned or replaced with a new piece.

Use an air gun to blow air into the blow hole 1 to detect whether the oil passage is smooth. Feel whether the air is out from the air outlet 2, if not, replace the cylinder head.

Remove diagonal cross M6×45 bolt 3 and M6×65 bolt 4.

Remove intake camshaft seat assembly 5.

Remove exhaust camshaft seat 6.

NOTE

Do not drop the dowel pins. The removed camshaft seat and bolts should be placed in a set.

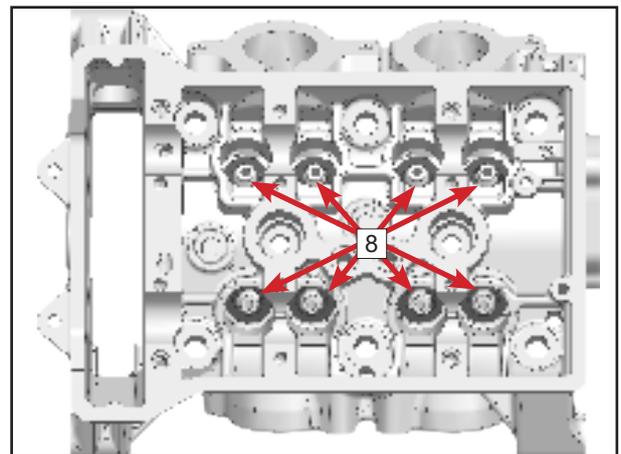
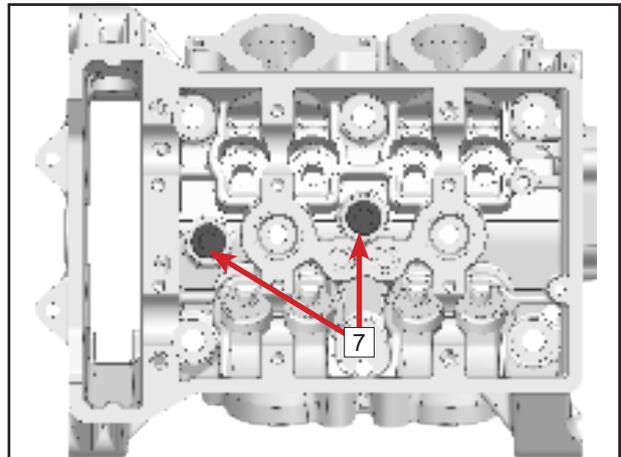
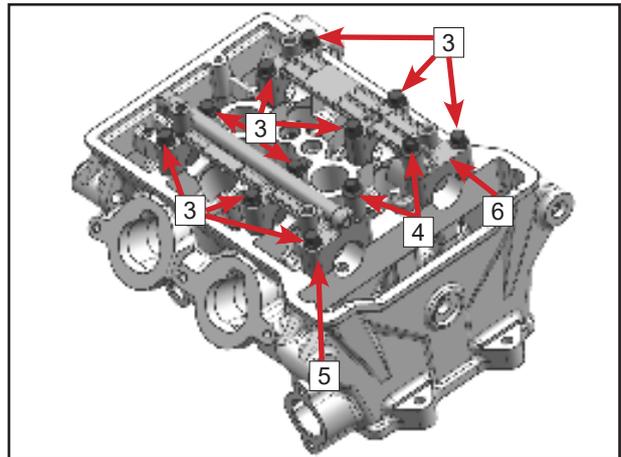
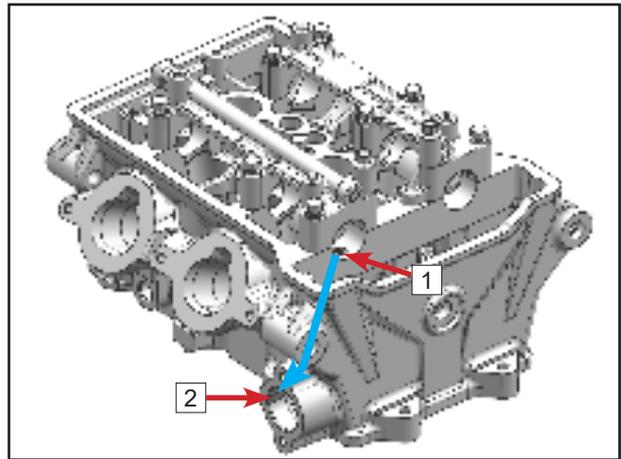
Apply an appropriate amount of 567 thread locker to the thread part of the main oil passage cone plug 7.

Install the main oil passage cone plug 7.

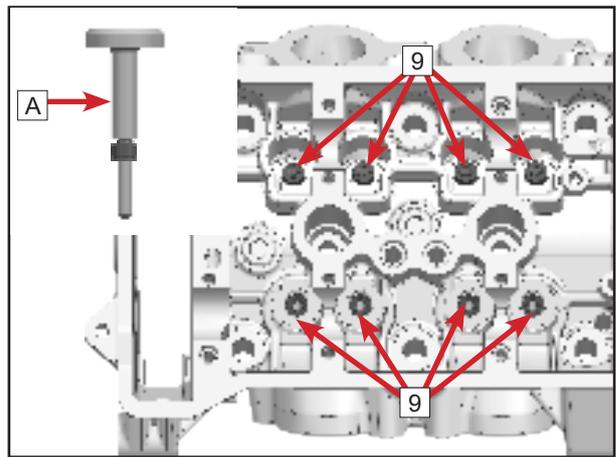
Main Oil Passage Cone Plug Torque

20N•m

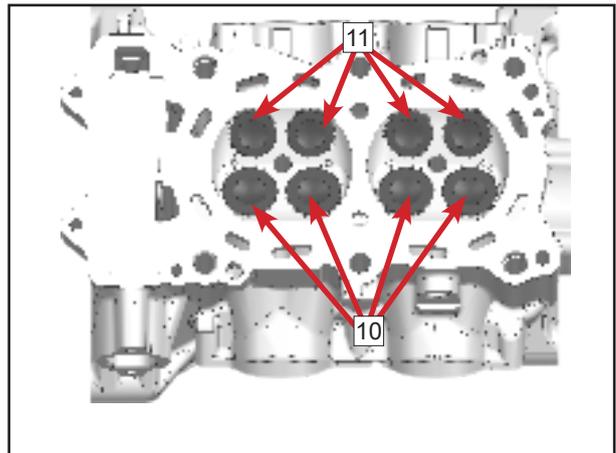
Install valve spring lower seat 8 (large end faces down).



Apply proper amount of oil on the valve guide (assembly valve rod sealing ring). Put the valve stem seal ring [9] on the valve stem seal ring hand punch [A] (0700-022400-923-002). Put the valve stem seal ring [9] on the valve guide.

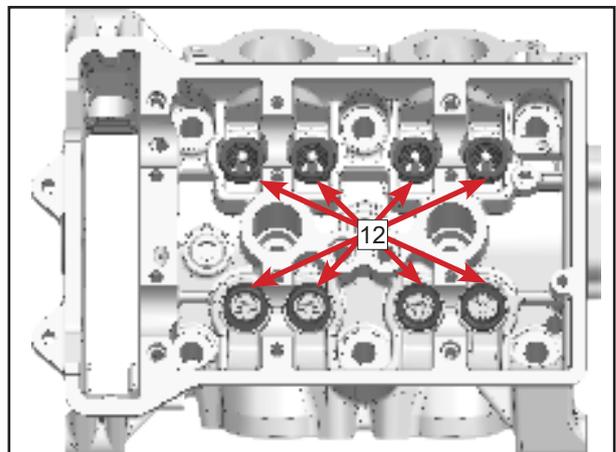


Flip the cylinder head. Apply proper amount of oil on the end of inlet and exhaust valve stem. Insert the inlet valve [10] into the inlet side valve guide, do not fall into the valve seat. Insert the exhaust valve [11] into the exhaust side valve guide, do not fall into the valve seat. Use air gun to blow clean the joint surface of valve and cylinder head. Push the valve so that it falls into the valve seat and inverts the cylinder head.

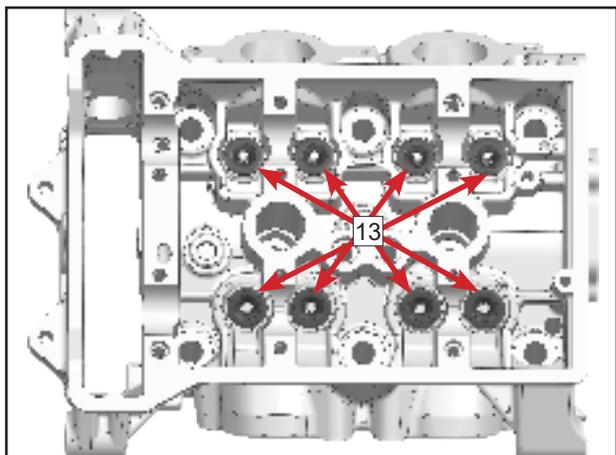


Install valve spring [12].

NOTE
The painted end of the valve spring faces up.



Install valve spring seat [13].

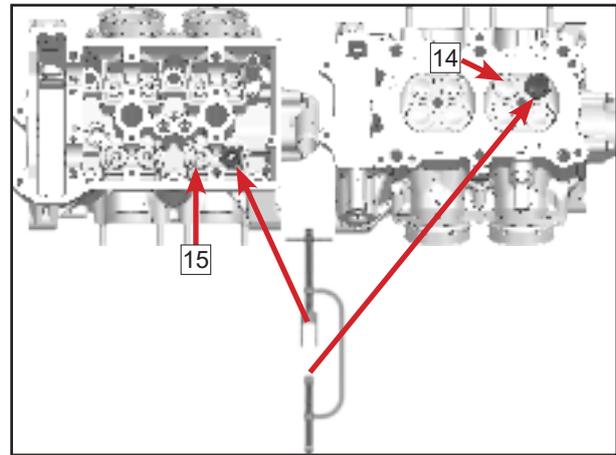


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Install valve spring compression fixture (0180-022006-922-001).

Put the lower part of the valve spring compression fixture against the valve disc **14**, and the upper part is pressed on the valve spring seat **15**.

Slowly rotate the rotary rod at the top of the valve spring compression fixture to compress the valve spring until the locking groove on the valve is completely exposed.



WARNING

Wear goggles when compressing the valve spring. Improper operation may cause the valve spring to fly out and injure people under strong pre-pressure.

Install the valve lock clamp **16** to the valve lock clamp tweezers.

NOTE

Add butter to the valve lock tweezers to prevent them from falling off.

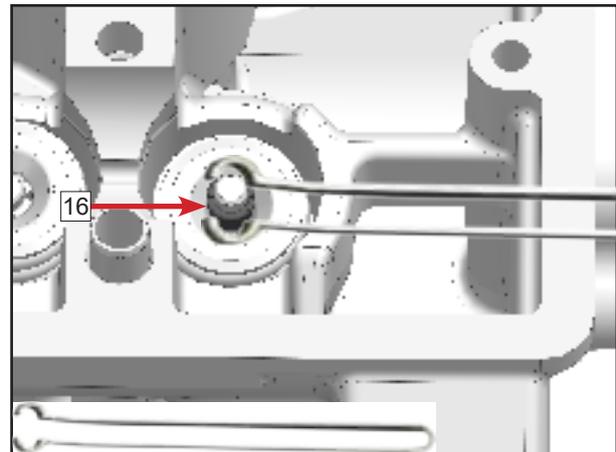
Install the valve lock clamp **16** to the valve lock clamp groove.

Slowly rotate the rotating rod at the top of the valve spring compression fixture, so that the valve spring back to the relaxation state.

Install other valve lock clamps in the same manner.

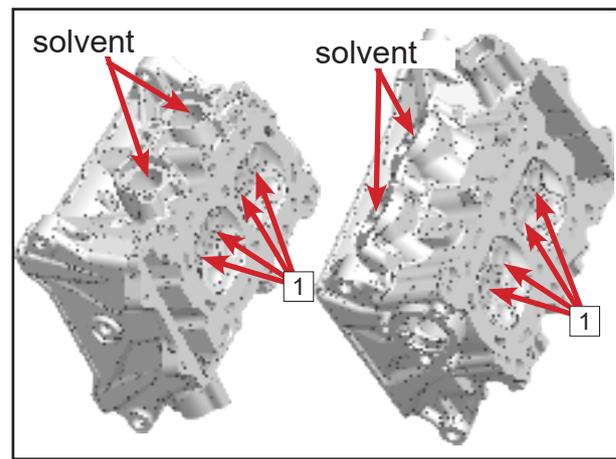
Use rubber rod and rubber hammer to gently hit each valve spring seat to make valve related parts in place.

Check the sealing of the cylinder head.



Cylinder head sealing inspection Oil inspection

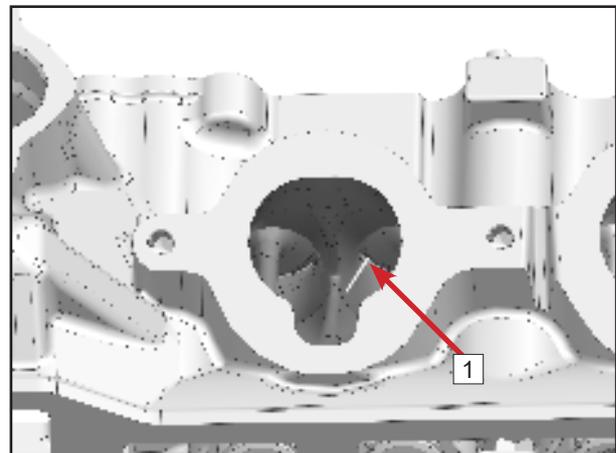
Clean the bottom of the cylinder head and the valve disc with dust-free paper.
Inject proper amount of cleaning solvent into the intake and exhaust channels.
After five minutes, check whether solvent is flowing from the valve seat ring **1**.



Light inspection

When there is no suitable cleaning solvent, use light inspection.
Align the bottom of the cylinder head with the light source.
Observe the valve seat ring from the intake and exhaust duct for light leakage **1**.

If the seal of the cylinder head does not pass the oil test or light test, remove the valve and check the surface of the corresponding valve and valve seat ring.
If there is no problem, clean the valve and valve seat ring again after assembly. If the cylinder head still does not pass the oil test or light test, replace the new part.

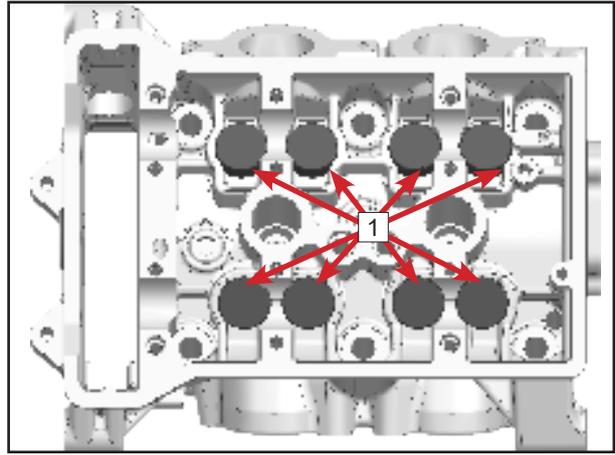


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Valve tappet installation

Apply a mixture of oil and MoS₂ grease (weight ratio 10:1) on the outer surface of the valve tappet.

Install valve tappet **1**.

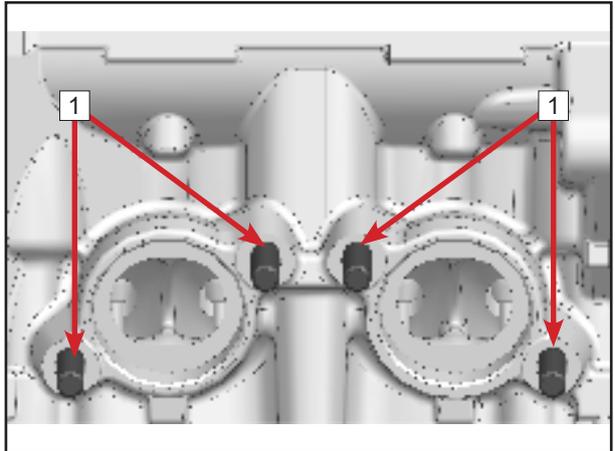


Stud installation

Install M8×42 double stud **1**.

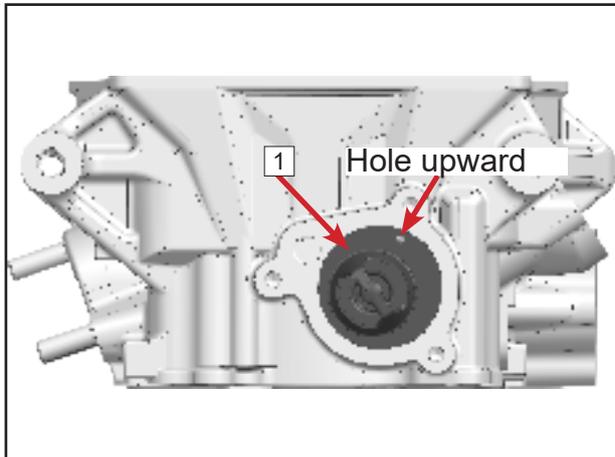
Cylinder Head Double Stud Torque

25N•m



Thermostat installation

Install thermostat **1** (hole upward).

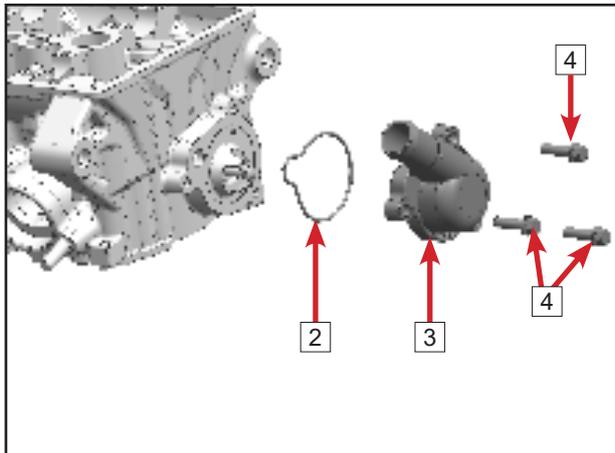


Put thermostat cover sealing ring **2** in thermostat cover **3**.

Use M6×22 bolt **4** to install thermostat cover on cylinder head.

Thermostat Cover Bolt Torque

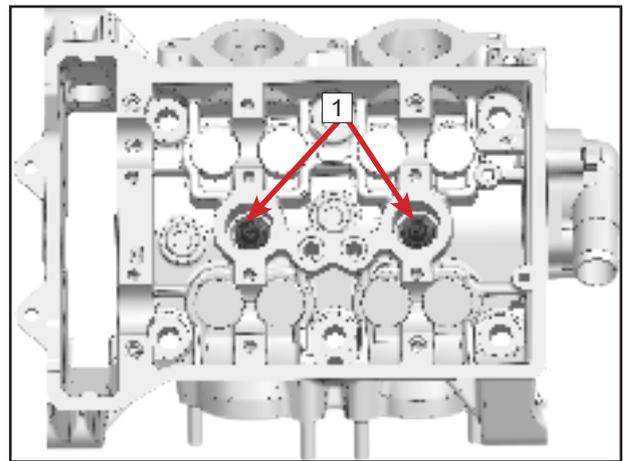
10N•m



Spark plug installation

Install spark plug 1.

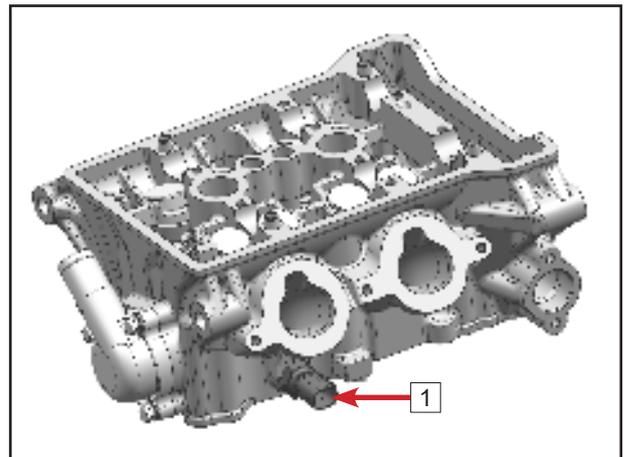
Spark Plug Torque
15N•m



Water temperature sensor installation

Install water temperature sensor 1.

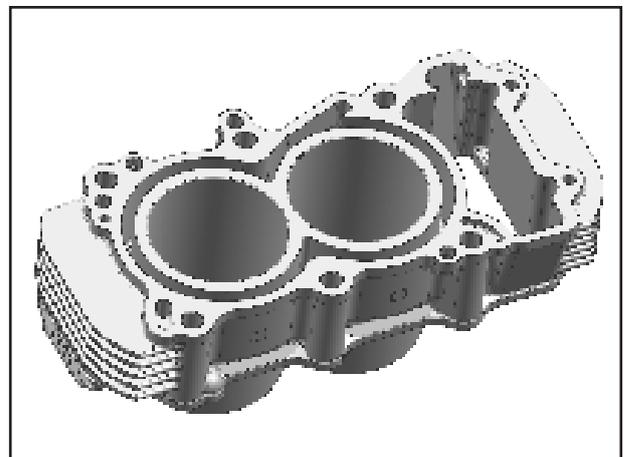
Water Temperature Sensor Torque
15N•m



13.6.4 Cylinder Body

Cylinder body inspection

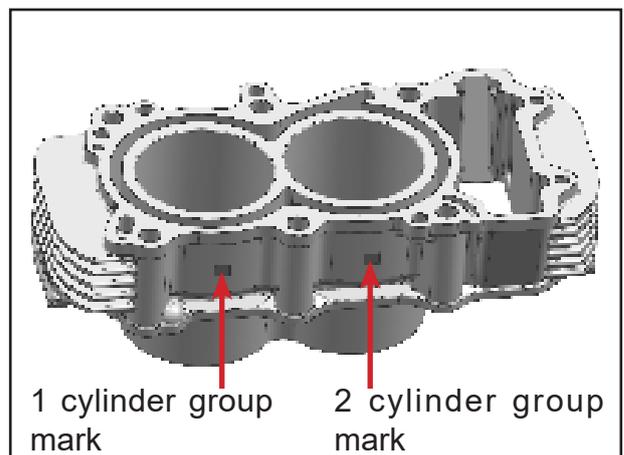
Check cylinder for cracks, strains and worn steps at upper and lower ends. If yes, replace it.



Cylinder diameter

The cylinder diameter is grouped according to the following table, and the group marking position is shown in the picture on the right.

Cylinder (New Part)	
Mark	Cylinder Diameter
I	72.000 mm ~ 72.010 mm
II	72.011 mm ~ 72.019 mm

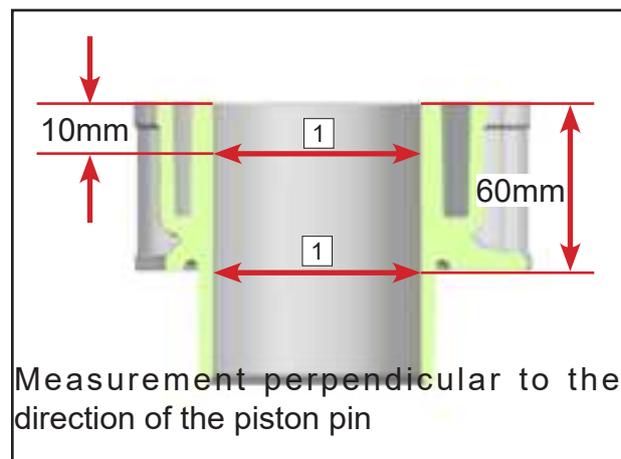
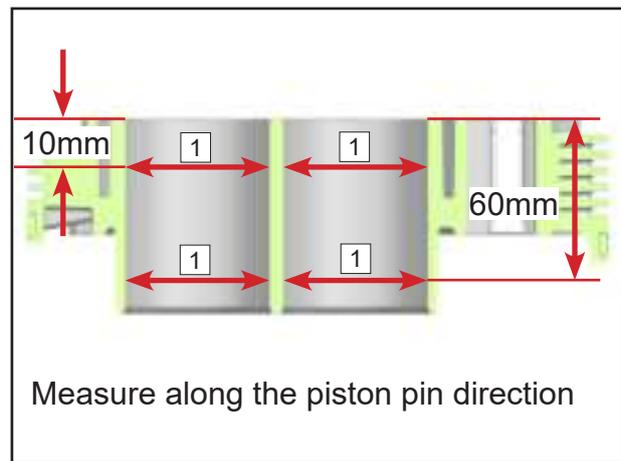


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Due to different wear degrees of the cylinder block in different directions, in the position shown on the right, 10mm and 60mm away from the upper plane of the cylinder block, along the piston pin direction and perpendicular to the piston pin direction, respectively measure the diameter [1] of the two cylinders. If any cylinder block diameter [1] exceeds service limit, replace the cylinder block.

Cylinder Block Diameter [1]	
Service Limit	72.065 mm

NOTE
When replacing the cylinder block, a new piston ring must be replaced.

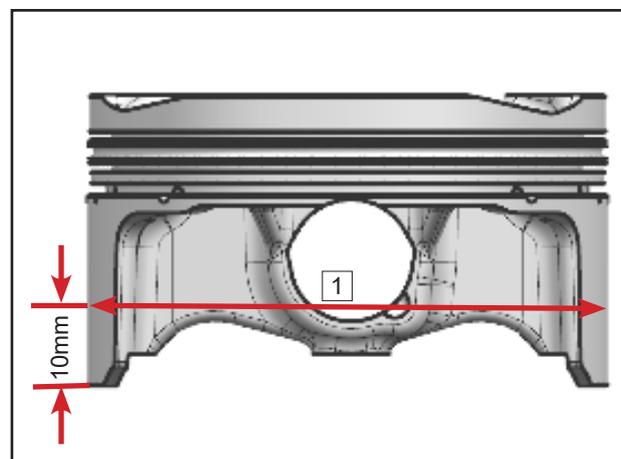


13.6.5 Piston/Piston Ring/Piston Pin Piston inspection

Inspect piston for scratches, cracks, or other damage. If yes, replace the piston and piston ring.

In the direction perpendicular to the piston pin hole and 10mm from the bottom of the piston, measure the piston skirt diameter [1], if less than the service limit, replace the piston.

Diameter of Piston Skirt [1]	
New Part	71.960 mm ~ 71.975 mm
Service Limit	71.910 mm



Piston/cylinder block clearance

Based on the above measurement results, calculate the fit clearance between piston and cylinder block. If the clearance is greater than the service limit, replace the piston or cylinder block, or both.

Piston/Cylinder Block Clearance	
Standard	0.033 mm ~ 0.052 mm
Service Limit	0.10 mm

Piston ring/Piston ring groove clearance

When the piston ring is in the piston ring groove, the feeler is used to measure the clearance between the piston ring and the ring groove.

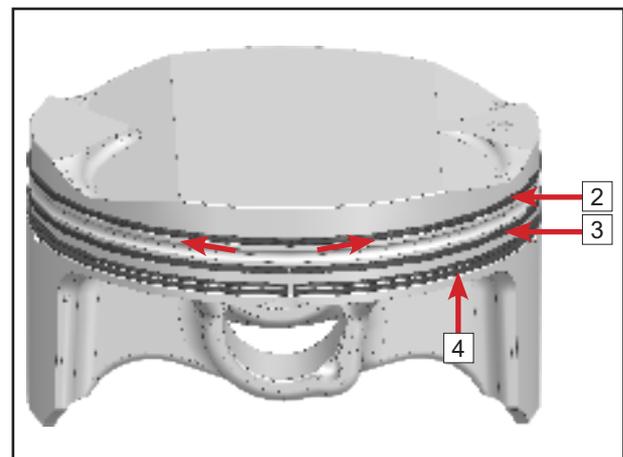
If the clearance is greater than the service limit, replace the piston and piston ring.

Piston Ring / Piston Ring Groove Clearance	
First Gas Ring / Groove	
Standard	0.02 mm~0.06 mm
Service Limit	0.15 mm
Second Gas Ring / Groove	
Standard	0.02 mm~0.06 mm
Service Limit	0.15 mm

Piston disassembly

Carefully open the opening of the first ring **2** with the thumb and push the ring outward to remove the first ring.

Remove the second ring **3** and combined oil ring **4** in the same manner.

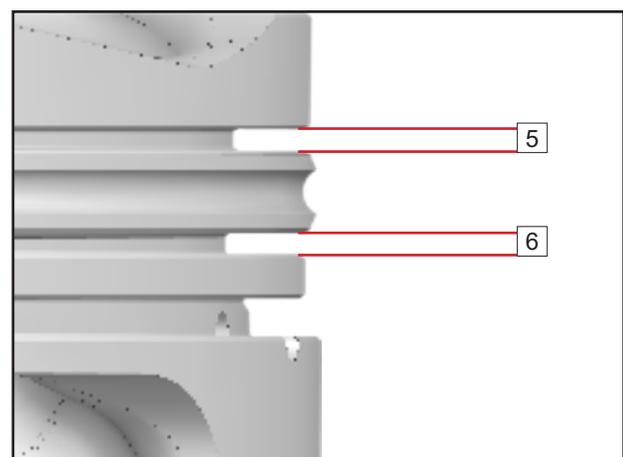


Piston ring groove width

Use vernier calipers to measure the width of the first gas ring groove **5** and the second gas ring groove **6** of the piston.

If ring groove width is greater than service limit, replace piston.

Piston Ring Groove Width	
First Gas Ring Groove	
New Part	1.01 mm ~ 1.03 mm
Service Limit	1.10 mm
Second Gas Ring Groove	
New Part	1.01 mm~1.03 mm
Service Limit	1.10 mm

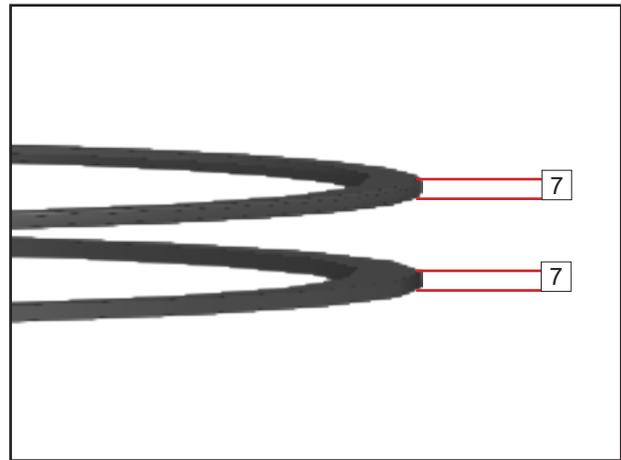


Piston ring thickness

Use micrometer to measure the thickness 7 of the piston ring.

If the measured value is less than the service limit, replace the gas ring.

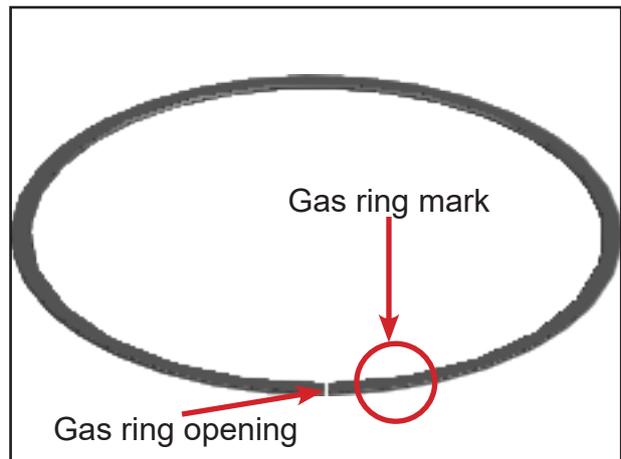
Piston Ring Thickness	
First Gas Ring	
New Part	0.97 mm ~ 0.99 mm
Service Limit	0.93 mm
Second Gas Ring	
New Part	0.97 mm ~ 0.99 mm
Service Limit	0.93 mm



Gas ring mark

first: ATG-V

second: A



Piston ring opening clearance

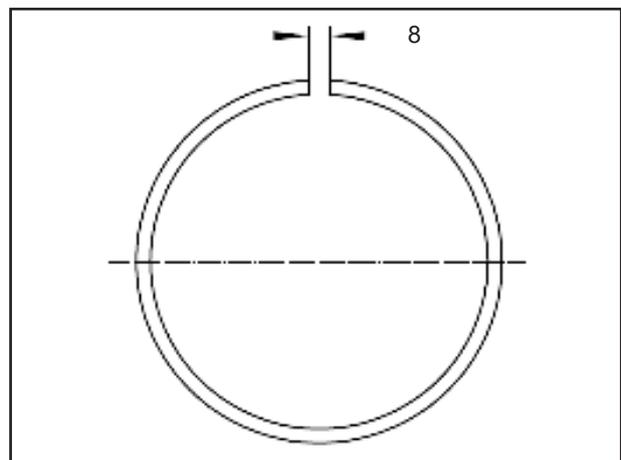
Put piston ring at the bottom of the cylinder hole of the cylinder block (i.e. the least wear position of the cylinder hole).

NOTE	
To place the piston ring correctly in the cylinder, use piston to push it in.	

Use feeler gauge to measure piston ring opening clearance 8.

If the clearance is greater than the service limit, replace the piston ring.

Piston Ring Opening Clearance	
First Gas Ring	
New Part	0.15 mm ~ 0.30 mm
Service Limit	0.55 mm
Second Gas Ring	
New Part	0.10 mm ~ 0.30 mm
Service Limit	0.55 mm

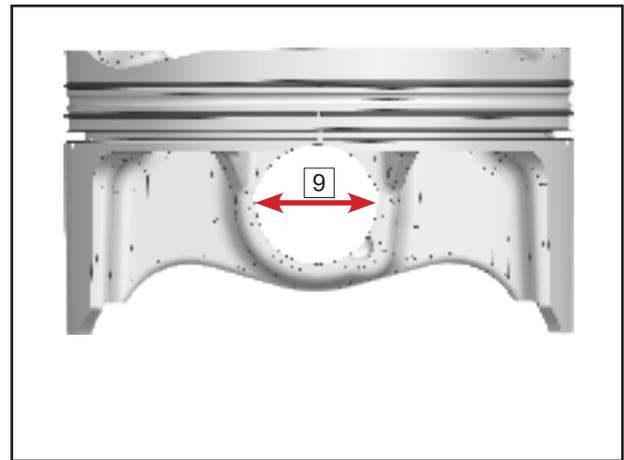


Piston pin hole

Use inner diameter dial gauge to measure the diameter 9 of piston pin hole.

If the measured value exceeds the service limit, replace the piston.

Diameter of Piston Pin Hole 9	
New Part	17.002 mm~17.008 mm
Service Limit	17.035 mm

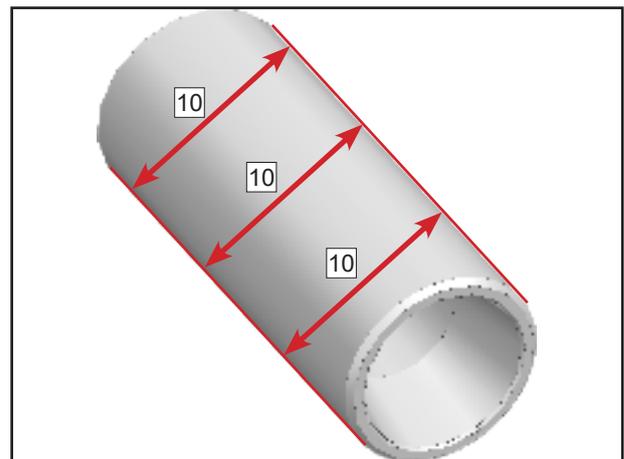


Piston pin diameter

Use micrometer to measure piston pin diameter 10 at multiple points.

Piston Pin Diameter 10	
New Part	16.992 mm ~ 16.997 mm
Service Limit	16.980 mm

If the measured value is less than the service limit, replace the piston pin.



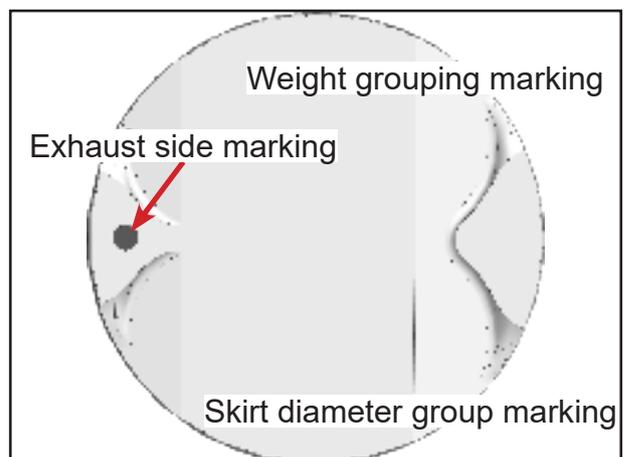
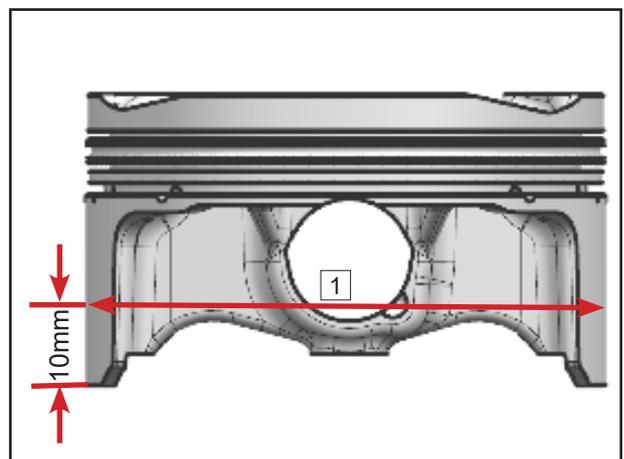
The piston group

The diameter 1 of the piston skirt and weight are grouped in the following table, and the marking positions are shown in the figure on the right.

Piston (New Part)	
Mark	Skirt Diameter
I	71.960 mm ~ 71.967 mm
II	71.968 mm ~ 71.975 mm

Piston (New Part)	
Mark	Weight
O	152.3 g ~ 155.3 g
No Mark	155.4 g ~ 158.3 g

NOTE	
Pistons of the same weight group must be fitted to the same engine.	



Piston/ cylinder grouping

Piston and cylinder must be fitted in accordance with the following table.

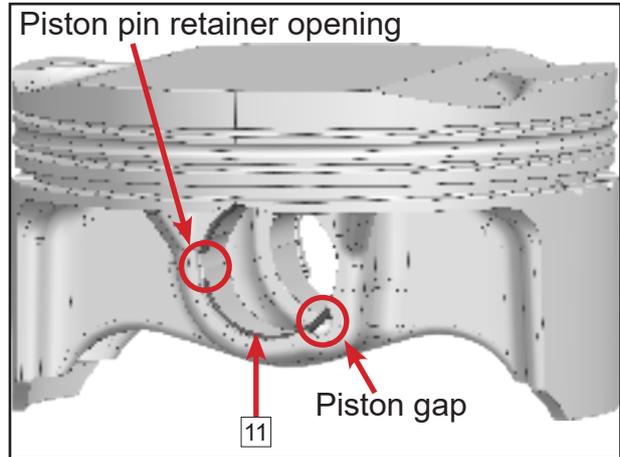
Cylinder	Piston
I	I
II	II

Piston assembly

Use needle-nosed pliers to load only one side of piston pin retaining ring **11** of the piston pin from the piston notch position. Stagger the piston pin retaining ring opening with the piston notch.

NOTE

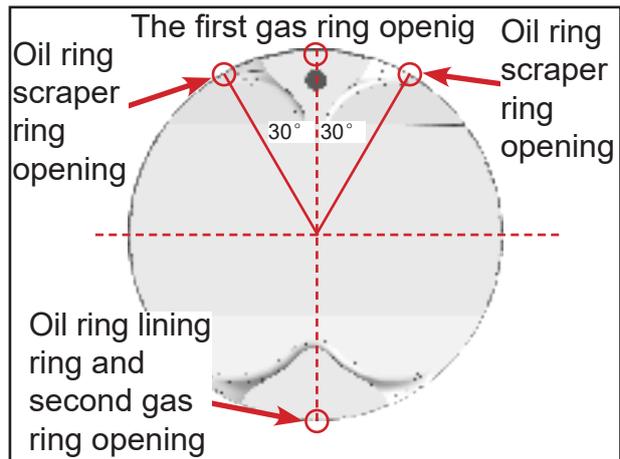
The piston pin retaining ring shall not be used twice and must be replaced with a new one.



Install the combined oil ring, the second gas ring and the first gas ring into the corresponding piston ring groove according to the picture on the right.

NOTE

When assembled, the "ATG-V" mark on the first gas ring is toward the top of the piston, and the "A" mark on the second gas ring is toward the top of the piston.

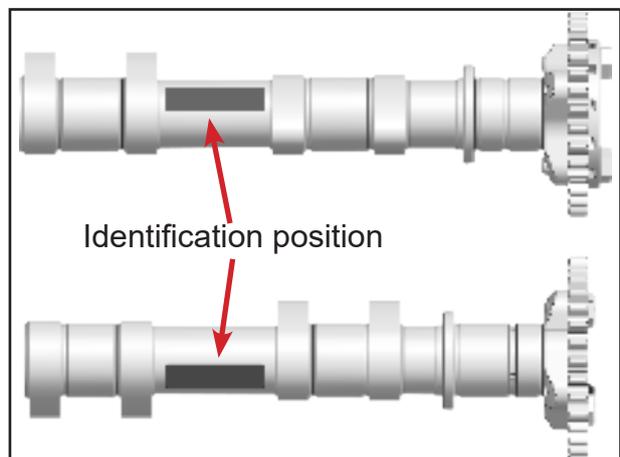


13.6.6 Distribution Drive Sub-assembly Camshaft identification

The camshaft is marked in casting between 1 cylinder CAM and 2 cylinder CAM.

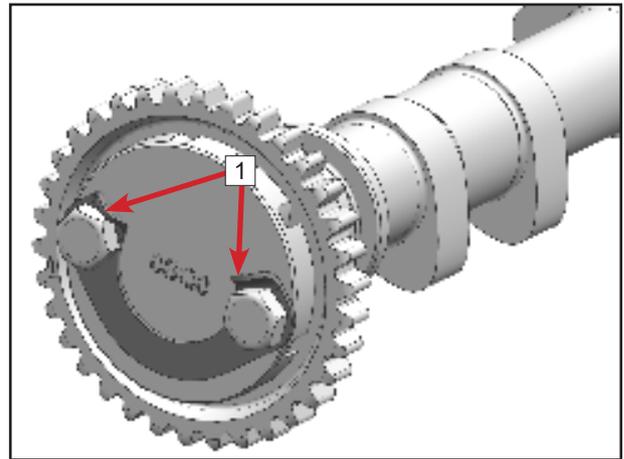
Intake camshaft : IN

Exhaust camshaft : EX

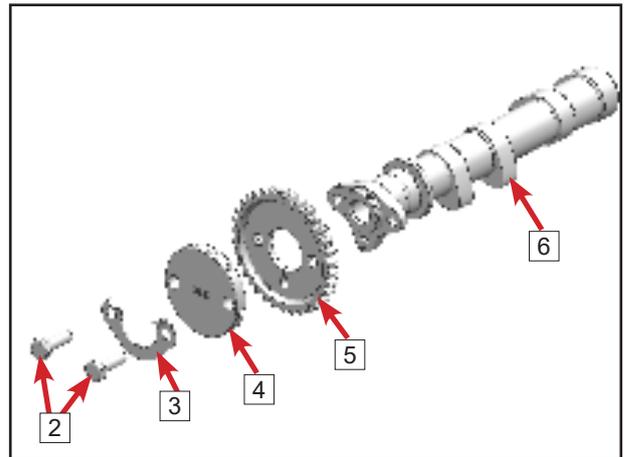


Disassembly of intake camshaft assembly

Turn over the tightening part of the stop baffle **1**.

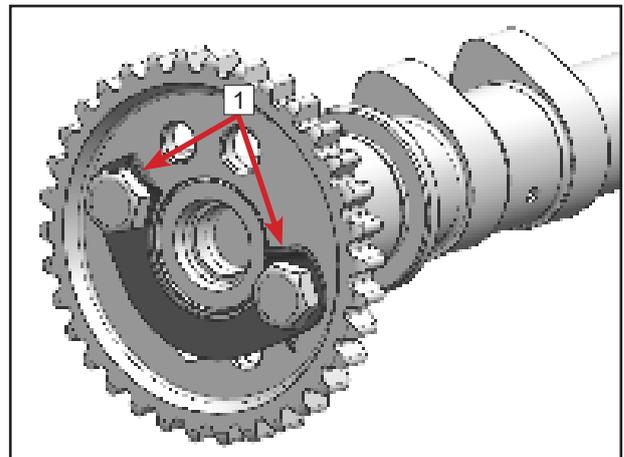


From the intake camshaft assembly **6** in turn remove M6×19 bolt **2**, stop block **3**, centrifugal wheel **4**, intake timing sprocket **5**.

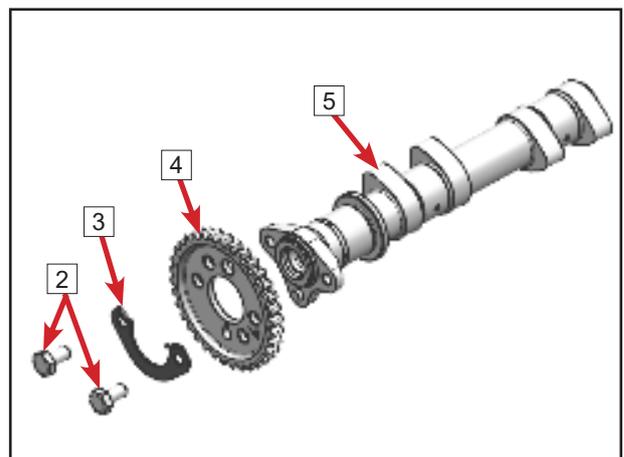


Disassembly of exhaust camshaft assembly

Turn over the tightening part of the stop baffle **1**.



From exhaust camshaft **5** in turn remove M6×12 bolt **2**, stop block **3**, exhaust timing sprocket **4**.



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Camshaft journal

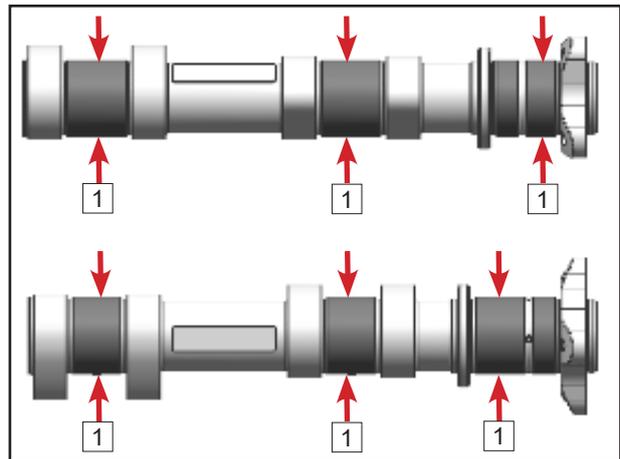
Measure camshaft journal diameter ¹.

Camshaft Journal Diameter ¹ (Intake and Exhaust)	
New Part	23.950 mm ~ 23.972 mm
Service Limit	23.920 mm

If the measured value exceeds the service limit, replace the camshaft with a new one.

Check the clearance between the camshaft journal and the camshaft bearing hole. If the clearance exceeds the service limit, replace the camshaft or cylinder head.

Clearance between The Camshaft Journal and The Camshaft Bearing Hole	
Standard	0.028 mm ~ 0.071 mm
Service Limit	0.13 mm

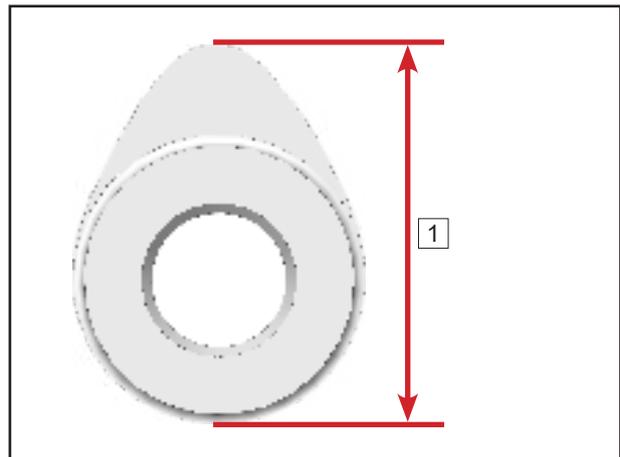


CAM height of camshaft

Measure CAM height ¹ of intake/exhaust camshaft respectively.

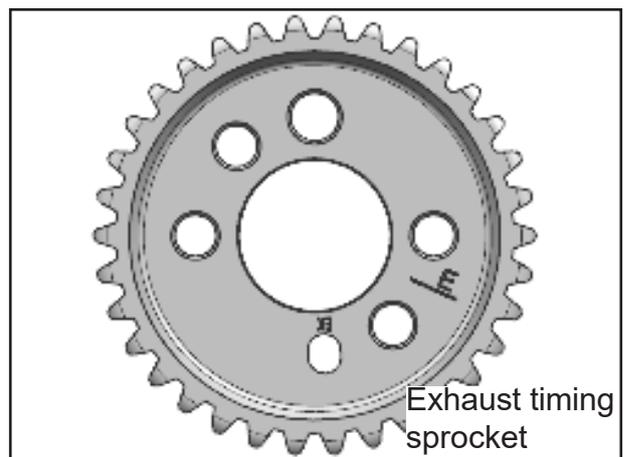
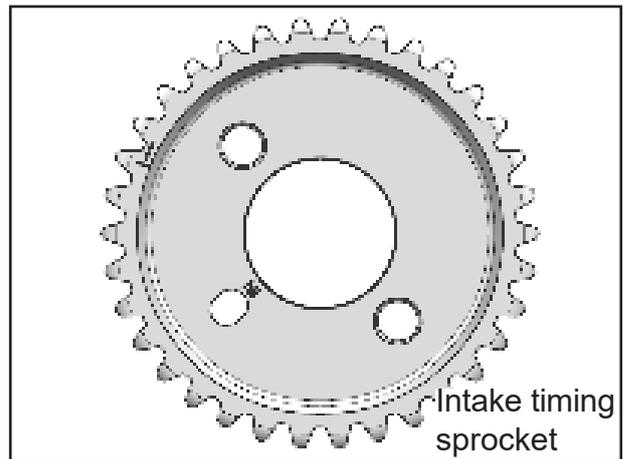
If the measured value exceeds the service limit, replace the camshaft with a new one.

CAM Height (Intake)	
New Part	32.298 mm~32.408 mm
Service Limit	32.200 mm
CAM Height (Exhaust)	
New Part	33.008 mm~33.118 mm
Service Limit	32.910 mm



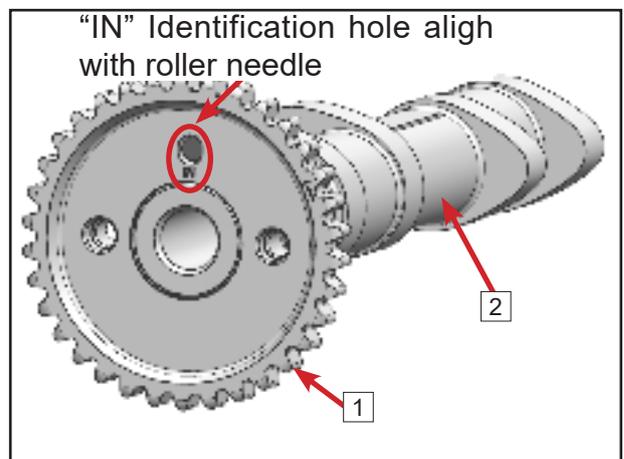
Timing sprocket

Check the intake/exhaust timing sprocket for broken, broken teeth or other damage, or severely worn teeth, if so, replace the timing sprocket.



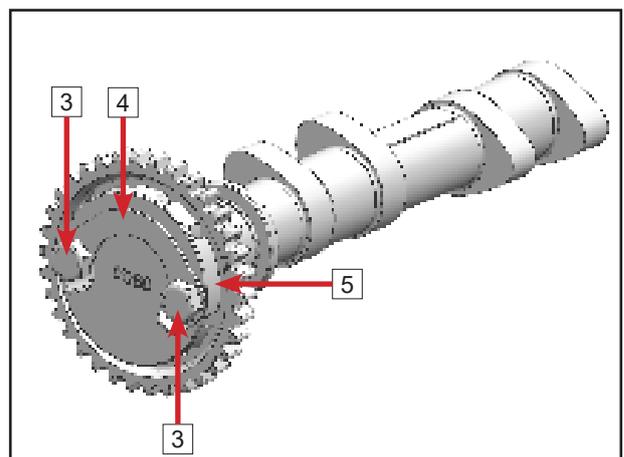
Assembly of intake camshaft assembly

Align the hole marked "IN" of the intake timing sprocket **1** with the roller needle on the intake camshaft **2** assembly, and install the intake timing sprocket on the intake camshaft.

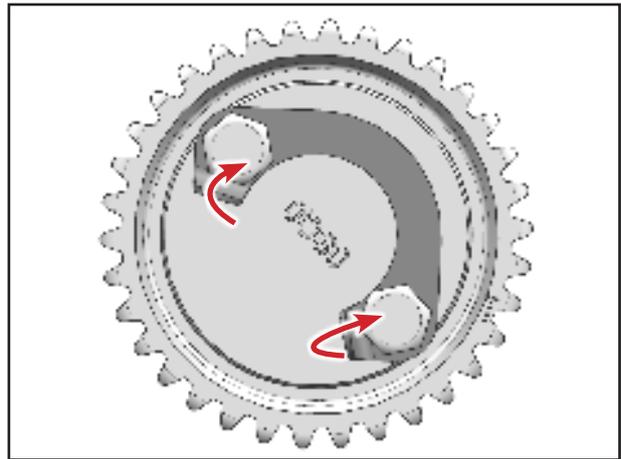


Put M6×19 bolt **3** in turn through stop block **4**, centrifugal wheel **5**, onto intake camshaft.

Intake Timing Sprocket Bolt Torque
10N•m

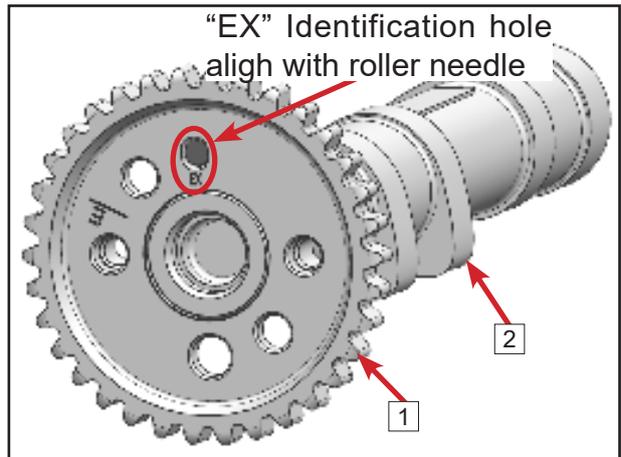


Flanging the stop block to prevent the bolt from loosening.



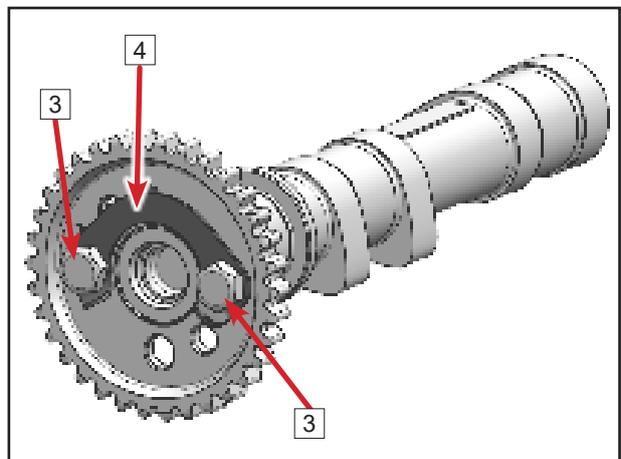
Assembly of exhaust camshaft assembly

Align the hole marked "EX" of the exhaust timing sprocket **1** with the roller needle on the exhaust camshaft assembly **2**, and mount the exhaust timing sprocket on the exhaust camshaft.

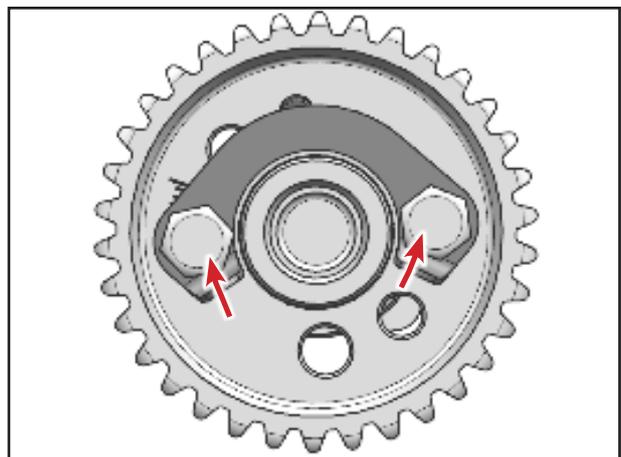


Put M6×12 bolt **3** through stop block **4**, onto exhaust camshaft.

Exhaust Timing Sprocket Bolt Torque
10N•m



Flanging the stop block to prevent the bolt from loosening.

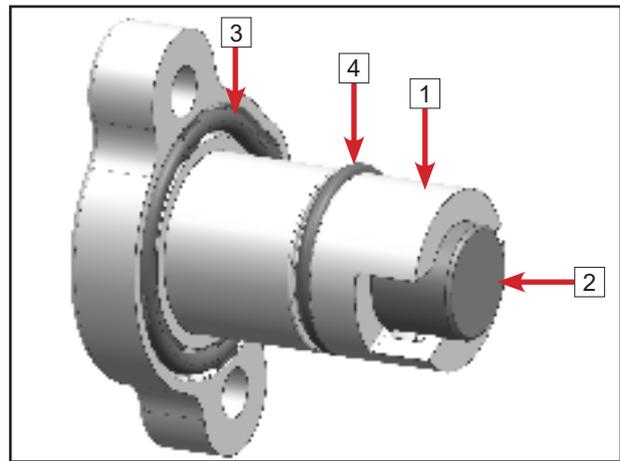


Hydraulic tensioner assembly

Check whether the shell [1] and plunger [2] of the tensioner are damaged or seriously worn, if so, replace the tensioner.

Check whether the sealing ring [3] and O-ring [4] of the tensioner are cracked or hardened, if so, replace with a new one.

Check whether the compression rebound of the hydraulic tensioner is smooth and powerful. If it is jammed, replace it with a new one.

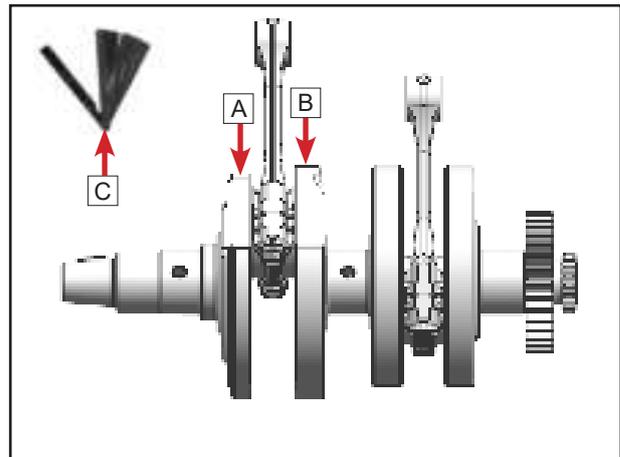


13.6.7 Crankshaft Connecting Rod

Big end clearance of connecting rod

Measuring the end clearance of the connecting rod: first, one side of the connecting rod big end is close to the crank arm [A] of the crankshaft, and then the gap between the other side of the connecting rod big end and the crank arm [B] of the crankshaft is measured with a feeler gauge [C].

The big end clearance of the other connecting rod is measured by the same method.



Big End Clearance of Connecting Rod	
Standard	0.15 mm~0.30 mm
Service Limit	0.50 mm

If the clearance is greater than the maintenance limit, replace the connecting rod and measure the clearance again. If the clearance still exceeds the service limit after replacing the connecting rod, the crankshaft must be replaced.

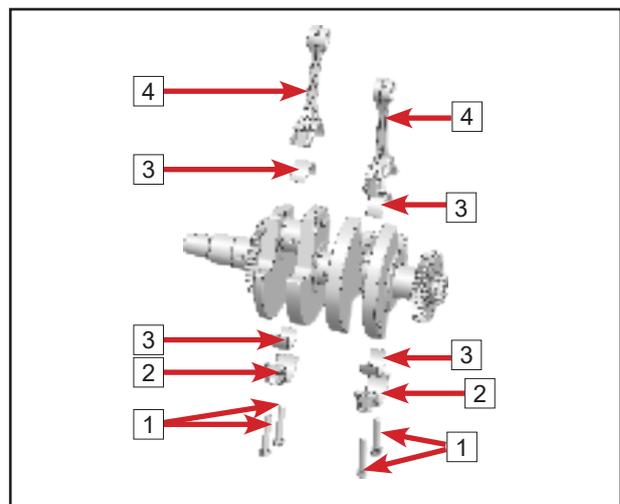
Disassembly of crankshaft connecting rod

Remove connecting rod bolts [1].

Remove connecting rod cap [2].

Remove connecting rod [4].

From connecting rod cap [2] and connecting rod [4] remove connecting rod bearing [3].



NOTE

When disassembling, the connecting rod cover, connecting rod body and connecting rod bearing should be marked and placed one by one, so that they can be quickly installed to the original position when reassembling. Do not remove if the connecting rod bearing is not excessive wear or damaged.

Parallelism of connecting rod

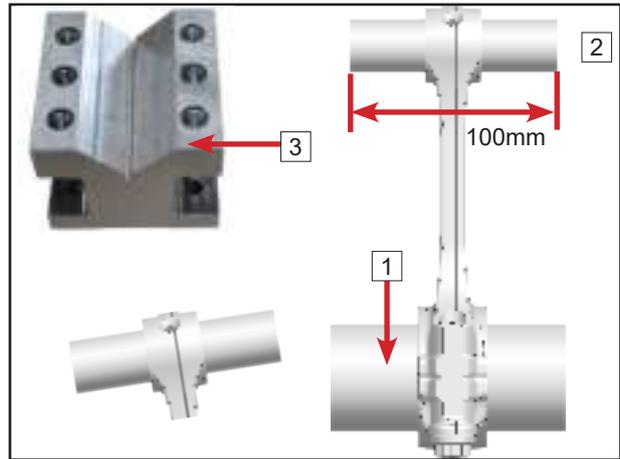
Remove the connecting rod bearing and reinstall the connecting rod head cover on the connecting rod body.

Insert the mandrel **1** into the big hole of the connecting rod.

Insert the mandrel **2** (length 100mm) into the small head hole of the connecting rod.

The connecting rod mandrel **1** is placed on the v-shaped block **3**.

Make the connecting rod vertical, measure the height difference between the two ends of the mandrel **2**, that is, the parallelism of the connecting rod.



Parallelism of connecting rod (mm)	
Standard	≤0.04
Service limit	0.2

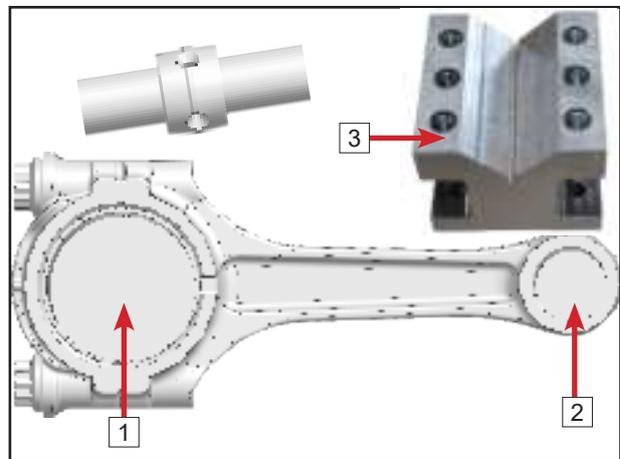
If the parallelism is greater than the service limit, the connecting rod must be replaced.

Connecting rod distortion

The connecting rod mandrel **1** is placed on the v-shaped block **3**.

Make the connecting rod level, measure the height difference between the two ends of the mandrel **2**, that is, the distortion of the connecting rod.

Connecting rod distortion (mm)	
Standard	≤0.08
Service limit	0.2



Connecting rod grouping

The diameter ① of the crank bore of the connecting rod and the weight of the connecting rod are grouped in the following table.

Crank Bore (New Part)	
Mark	Diameter ①
1	38.000 mm ~ 38.008 mm
2	38.009 mm ~ 38.015 mm

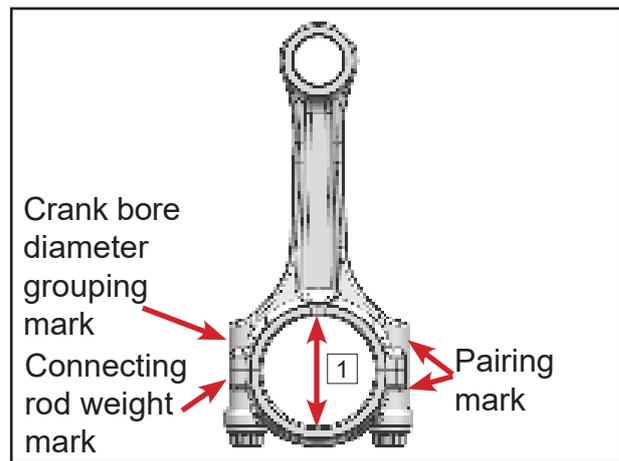
Connecting Rod Weight G (New Part)	
Mark	Weight Range (g)
290	$289 \leq G < 291$
292	$291 \leq G < 293$
294	$293 \leq G < 295$
296	$295 \leq G < 297$
298	$297 \leq G < 299$
300	$299 \leq G < 301$
302	$301 \leq G < 303$
304	$303 \leq G < 305$
306	$305 \leq G < 307$
308	$307 \leq G < 309$

NOTE

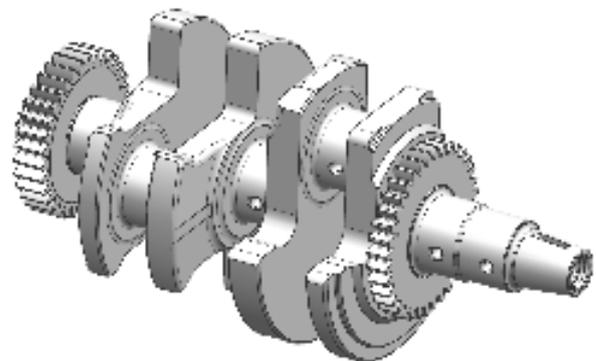
The same crankshaft must be fitted with the same weight group marked connecting rod.

Crankshaft connecting rod journal grouping

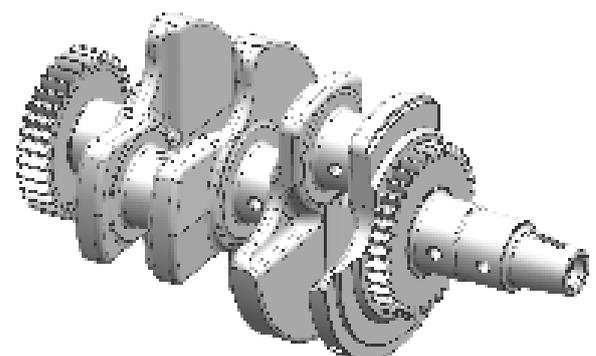
The state of the crankshaft is shown on the right.



Crankshaft: status 1



Crankshaft: status 2

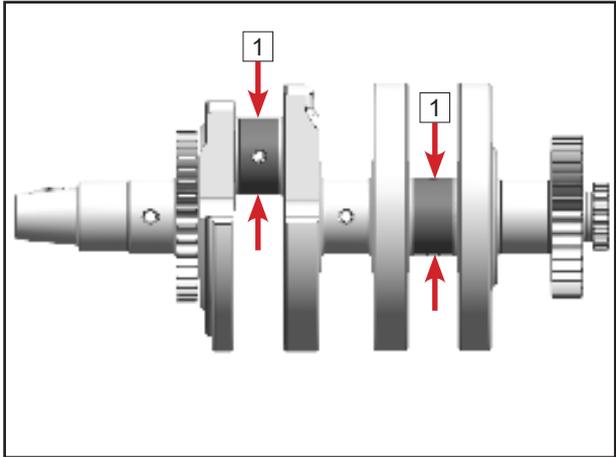


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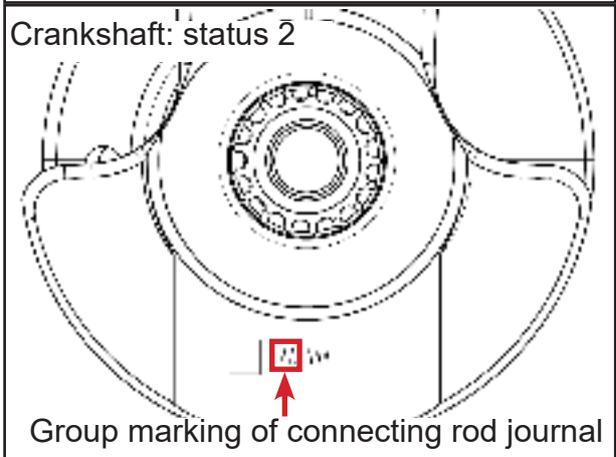
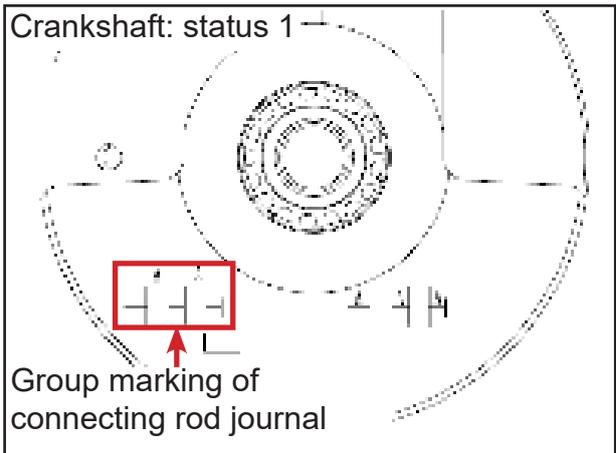
Crankshaft connecting rod journal diameter

① grouping is shown in the table below.

Crankshaft Connecting Rod Journal (New Part)	
Mark	Diameter
B	34.985 mm ~ 34.992 mm
A	34.993 mm ~ 35.000 mm



The group marking position of crankshaft connecting rod journal is shown in the example on the right, from left to right are the group marking of cylinder 1 and cylinder 2 connecting rod journal.

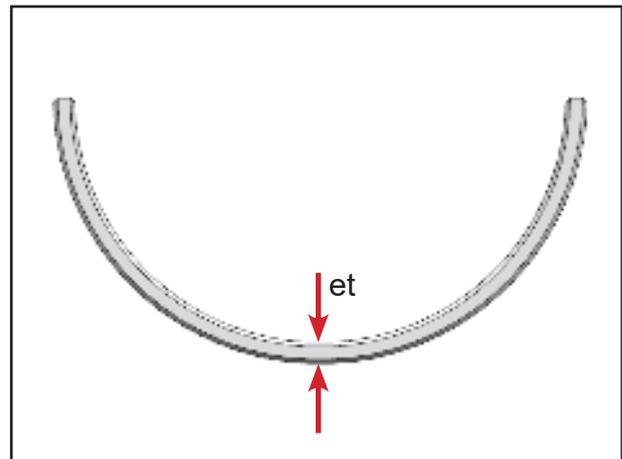


Connecting rod bearing grouping

Connecting rod bearing thickness [et].

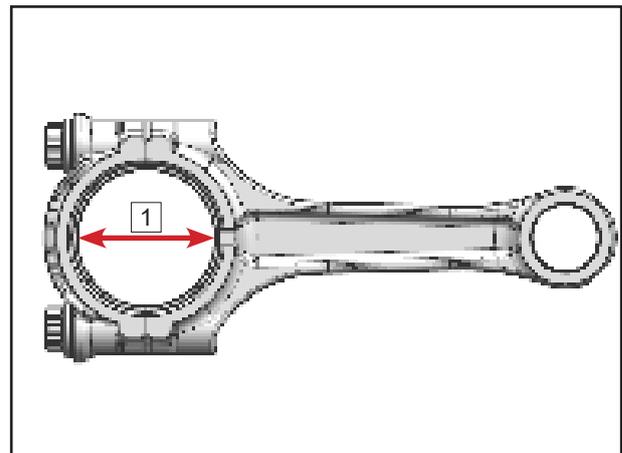
The grouping is shown in the table below.

Connecting Rod Bearing (New Part)	
Color Mark	Thickness [et]
Red	1.482 mm~1.486 mm
Black	1.487 mm~1.490 mm
Blue	1.491 mm~1.494 mm



Connecting rod big end radial clearance

Install the connecting rod bearing as in the initial state, install the connecting rod bolts and tighten them in two steps as shown below, then measure the inner diameter [1] of the big end bearing of the connecting rod.



First Step: Torque
20N•m±2N•m
Second Step: Corner Mounting
100°±5°

Measure the journal diameter of the crankshaft connecting rod and compare the inner diameter of the big end bearing of the connecting rod.

Journal Diameter of Connecting Rod	
New Part	34.985 mm ~35.000mm
Service Limit	34.955 mm

Inner Diameter of Big End Bearing of Connecting Rod	
Service Limit	35.055 mm

Radial Clearance of Big End of Connecting Rod	
Standard	0.04 mm ~ 0.06 mm
Service Limit	0.07 mm

If the service limit is exceeded, replace the crankshaft or connecting rod bearing, or both.

Crankshaft/connecting rod/connecting rod bearing grouping

Crankshaft/connecting rod/connecting rod bearing grouping must follow the table below.

Crank Bore Mark	Crankshaft Connecting Rod Journal Mark	Connecting Rod Bearing Mark
1	A	Red
1	B	Black
2	A	Black
2	B	Blue

Crankshaft connecting rod assembly is the reverse of the disassembly process, but pay attention to the following details:

When the inner diameter of the big end bearing of the connecting rod exceeds the maintenance limit, it is necessary to replace the new connecting rod bearing.

Connecting rod bearing into the connecting rod cover and connecting rod body, with compressed air carefully clean connecting rod bearing and connecting rod splitting surface.

The connecting rod head cover and connecting rod body must be assembled in pairs according to the marks on its side, and the matching marks of the two are the same.

Before connecting rod is installed to crankshaft, apply proper amount of oil on the inner surface of connecting rod bearing and crankshaft connecting rod journal.

Connecting rod bolts are tightened according to the statement mode:

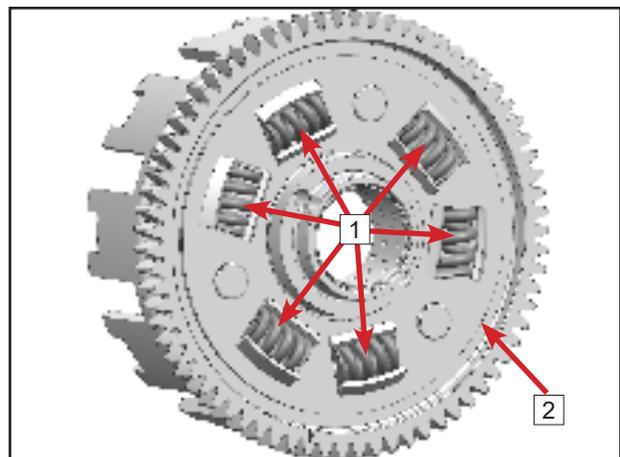
First step: torque $20\text{N}\cdot\text{m}\pm 2\text{N}\cdot\text{m}$

Second step: corner mounting, $100^\circ\pm 5^\circ$

13.6.8 Clutch

Clutch cover

Check whether the internal buffer spring 1 is worn, if worn, there will be shaking between the gear and clutch housing, and produce abnormal noise, such as shaking larger, then need to replace the primary driven gear assembly 2.



Lining disc or driven disc

Check lining disc and driven disc one by one.

if the friction material fall off, loose and other defects.

if the friction surface has discoloration or uneven wear caused by overheating.

Measure the thickness 1 of each lining disc at different points.

If any piece shows signs of damage or wear exceeds the maintenance limit, replace with a new one.

Lining Disc Thickness	
New Part	2.90 mm ~ 3.10 mm
Service Limit	2.80 mm

Lining disc or driven disc is placed on the plate.

Use a feeler gauge to measure the clearance between the friction plate or driven plate and the plate from multiple directions. The clearance is the flatness of the lining disc or driven disc.

Flatness of The Lining Disc or Driven disc	
New Part	≤0.15 mm
Service Limit	0.3 mm

Clutch spring

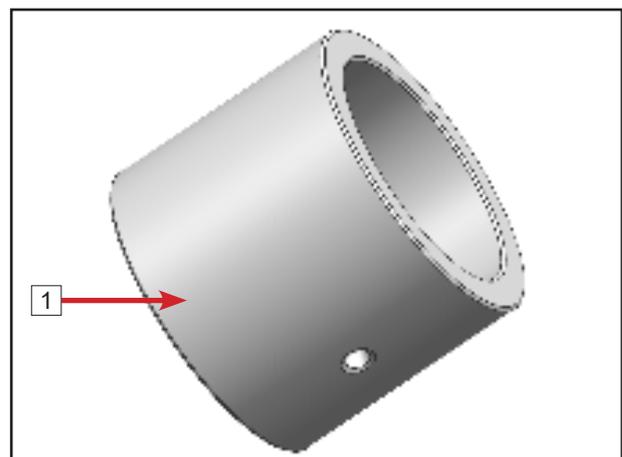
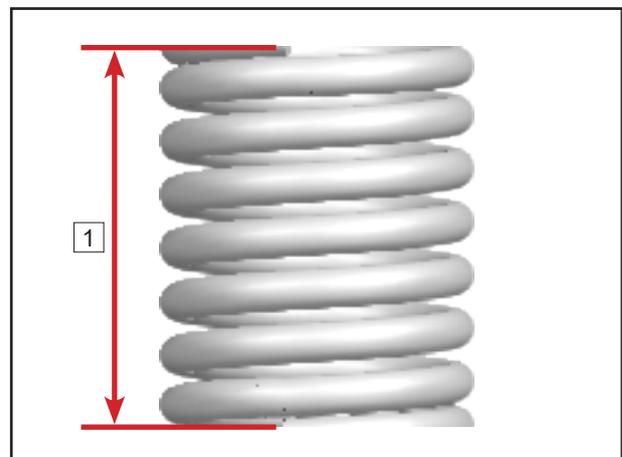
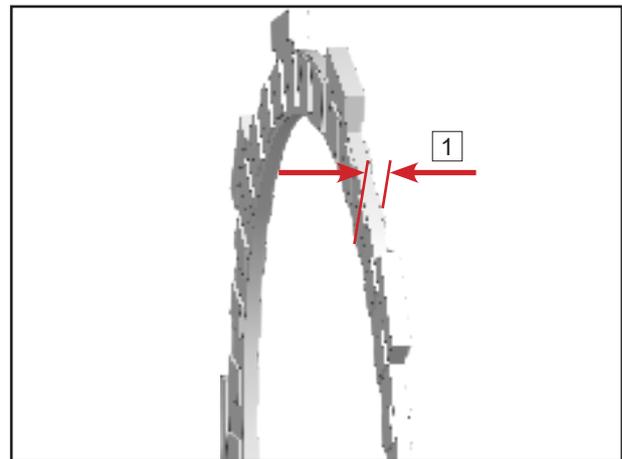
Measuring the free length 1 of clutch spring.

If the measured value is less than the maintenance limit, replace the pressure spring.

Clutch Spring Free Length	
New Part	42.5 mm ~ 43.5 mm
Service Limit	41.5 mm

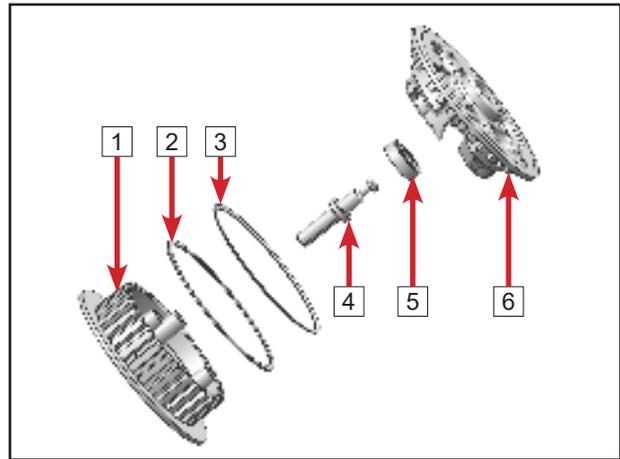
Clutch shaft sleeve

Check the clutch sleeve 1 for serious wear or damage. Replace if any.



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Check central sleeve [1], disc spring seat [2], disc spring [3], tie rod [4], rolling bearing [5], press plate [6] for severe wear or damage, replace if any.

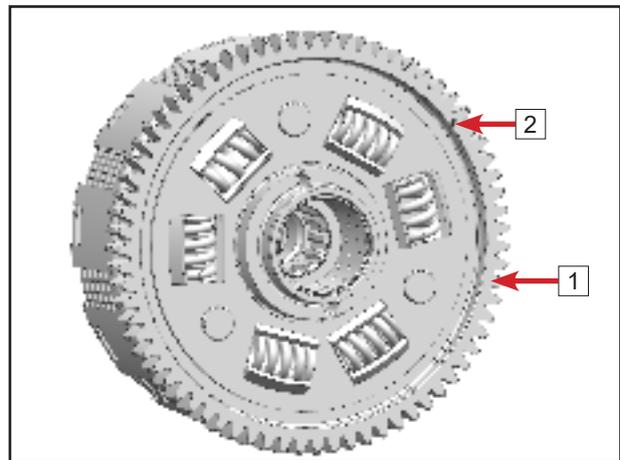


Clutch grouping

The clutch is divided into group A and group B according to its primary driven gear [1]. A grouping mark [2] is stamped into the primary driven gear.

Assemble clutch and crankshaft in pairs according to the following.

Clutch Grouping Mark	Crankshaft Grouping Mark
A	B
B	A



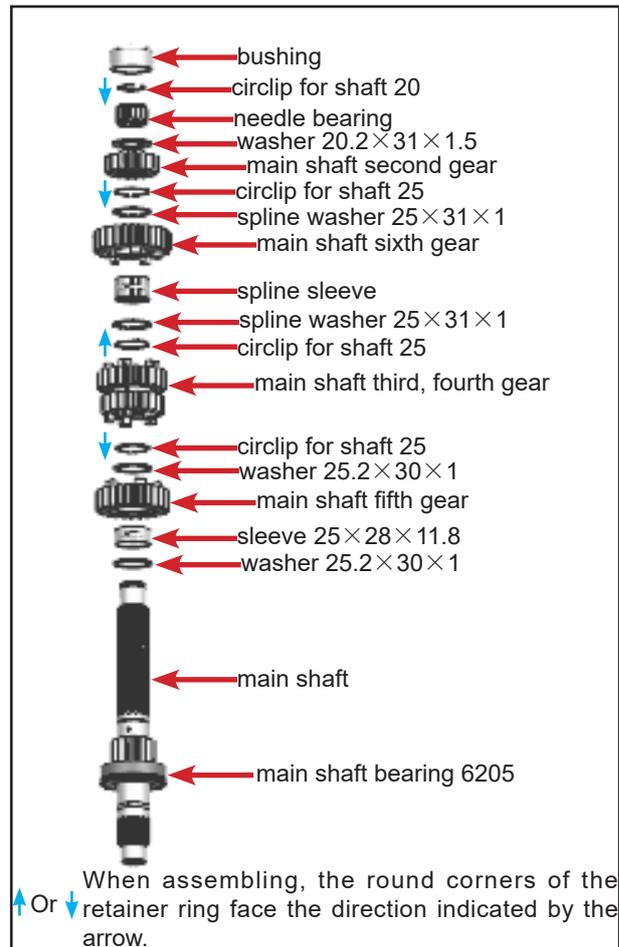
The grouping of crankshaft refers to chapter 13.6.1.1.

13.6.9 Shift Gear

13.6.9.1 Main Shaft

Disassembly

Disassemble the main shaft assembly as shown on the right. Check whether the tooth surface of each gear has pitting, collision and excessive wear, check whether the needle roller bearing, bearing sleeve, spline sleeve and gasket wear or damage, if there is abnormal, replace the new part.



Inspection

Gear

NOTE

When changing gears, they must be replaced in pairs. The retaining ring must be replaced after removal.

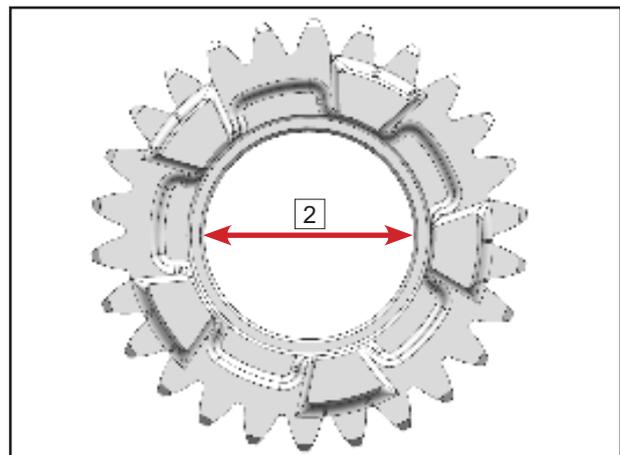
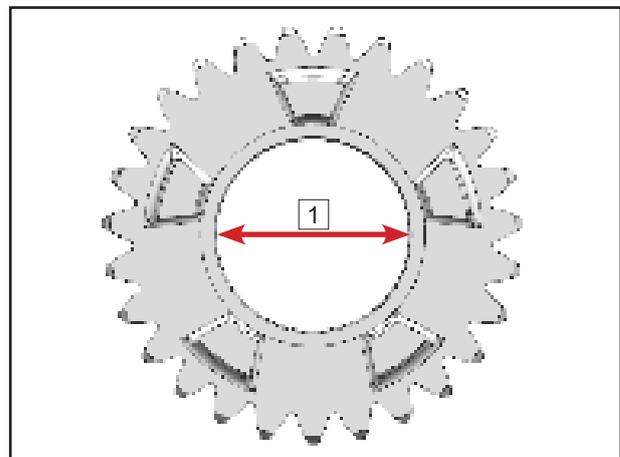
Check whether the gear is damaged, if so, then replace the new parts.

Measure the inner diameter [1] of the sixth gear of the main shaft. If it is greater than the maintenance limit, replace it with a new one.

Inner Diameter of Sixth Gear of The Main Shaft	
New Part	28 mm ~ 28.021 mm
Service Limit	28.027 mm

Measure the inner diameter [2] of the fifth gear of the main shaft. If it is greater than the maintenance limit, replace it with a new one.

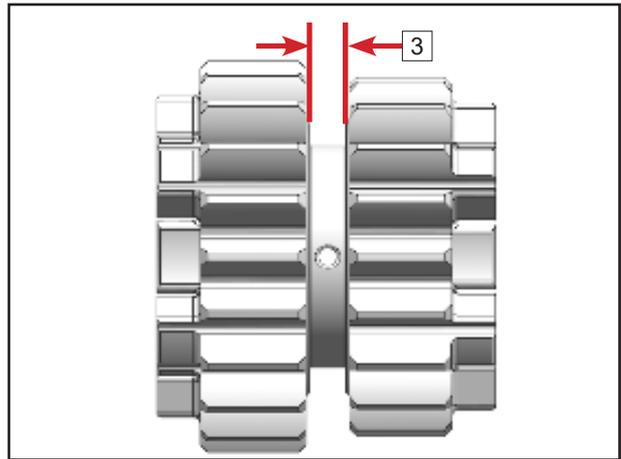
Inner Diameter of Fifth Gear of The Main Shaft	
New Part	28 mm ~ 28.021 mm
Service Limit	28.027 mm



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Measure the width 3 of the fork groove of the third and fourth gear of the main shaft, if it is greater than the maintenance limit, replace it with a new one.

Width of The Fork Groove of The Third and Fourth Gear of The Main Shaft	
New Part	5.10 mm ~ 5.17 mm
Service Limit	5.27 mm

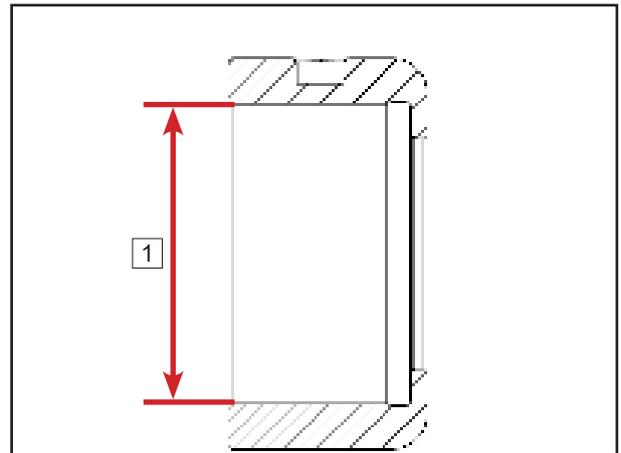


Bushing

Check whether the bushing is seriously worn or damaged, if so, replace it with a new one.

Measure the inner diameter 1 of the bushing. If it is larger than the maintenance limit, replace it with a new one.

Bushing Inner Diameter	
New Part	26.007 mm ~ 26.020 mm
Service Limit	26.027 mm

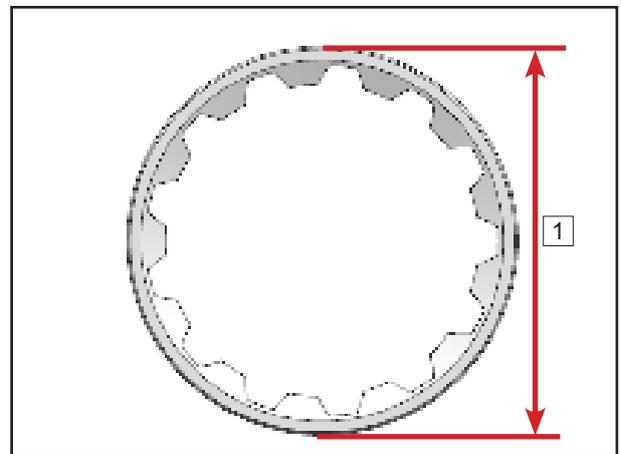


Spline sleeve

Check whether spline sleeve is seriously worn or damaged, if so, replace it with a new one.

Measure the outer diameter 1 of spline sleeve, if less than repair limit, replace with a new one.

Spline Sleeve Outer Diameter	
New Part	27.959 mm ~ 27.980 mm
Service Limit	27.952 mm

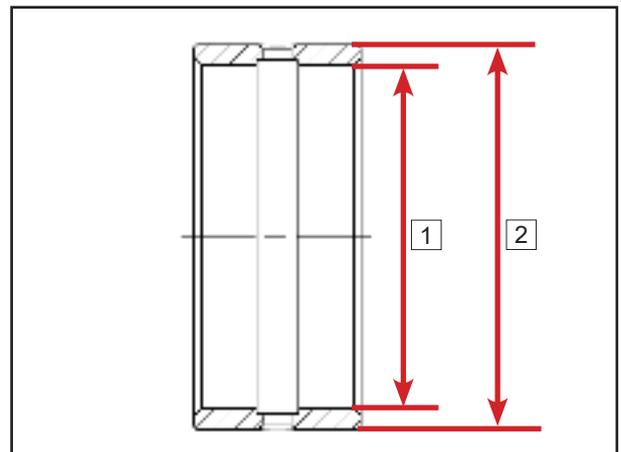


Bushing

Check whether the bushing is severely worn or otherwise damaged, if so, replace it with a new one.

Measure the inner 1 and outer 2 diameters of the bushing, and replace it with a new one if it exceeds the service limit.

Bushing Inner Diameter 1	
New Part	25.000 mm ~ 25.021 mm
Service Limit	25.027 mm
Bushing Outer Diameter 2	
New Part	27.959 mm ~ 27.980 mm
Service Limit	27.952 mm

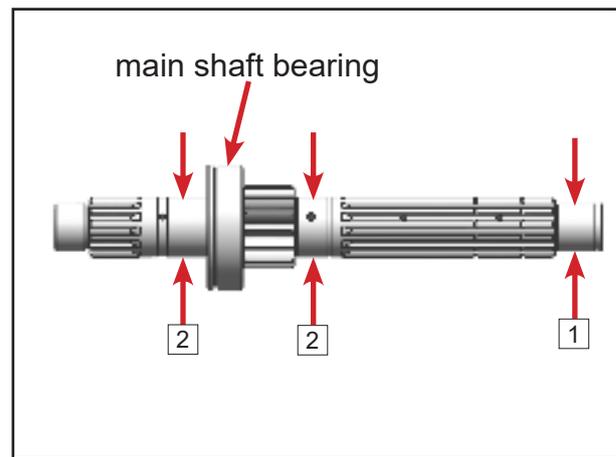


Main shaft and main shaft bearing

Check whether the main shaft is damaged. Check whether the spline on the main shaft has pitting, collision and excessive wear, if there is abnormal, replace the new part.

Check whether the main shaft bearing rotates flexibly, whether there is stuck or abnormal sound, if so, replace the new parts.

Measure the main shaft outer diameter [1] and diameter [2], if less than the maintenance limit, then replace the new parts.



Main Shaft Outer Diameter [1]	
New Part	19.987 mm ~ 20.000 mm
Service Limit	19.980 mm
Main Shaft Outer Diameter [2]	
New Part	24.967 mm ~ 24.980 mm
Service Limit	24.960 mm

NOTE

When the main shaft or main shaft bearing needs to be replaced, the main shaft and main shaft bearing must be replaced together.

Installation

Assemble in the reverse order of disassembly, but pay attention to the following details:

Before assembly, apply appropriate amount of oil on the matching surface of the main shaft, sleeve, main shaft fifth gear, spline sleeve and sixth gear.

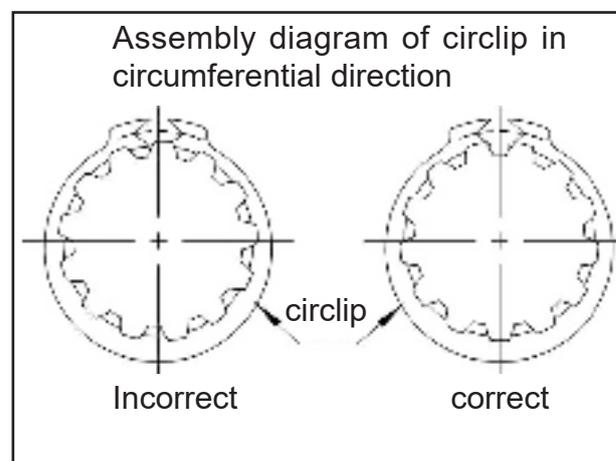
The third and fourth gear of the main shaft should slide smoothly under its own weight after installation.

The removed circlip can not be used again, must be replaced with a new one.

The circlip for shaft is not allowed to be installed backwards. Please refer to the disassembly section of section 13.6.9.1 for details about the direction of the circlip.

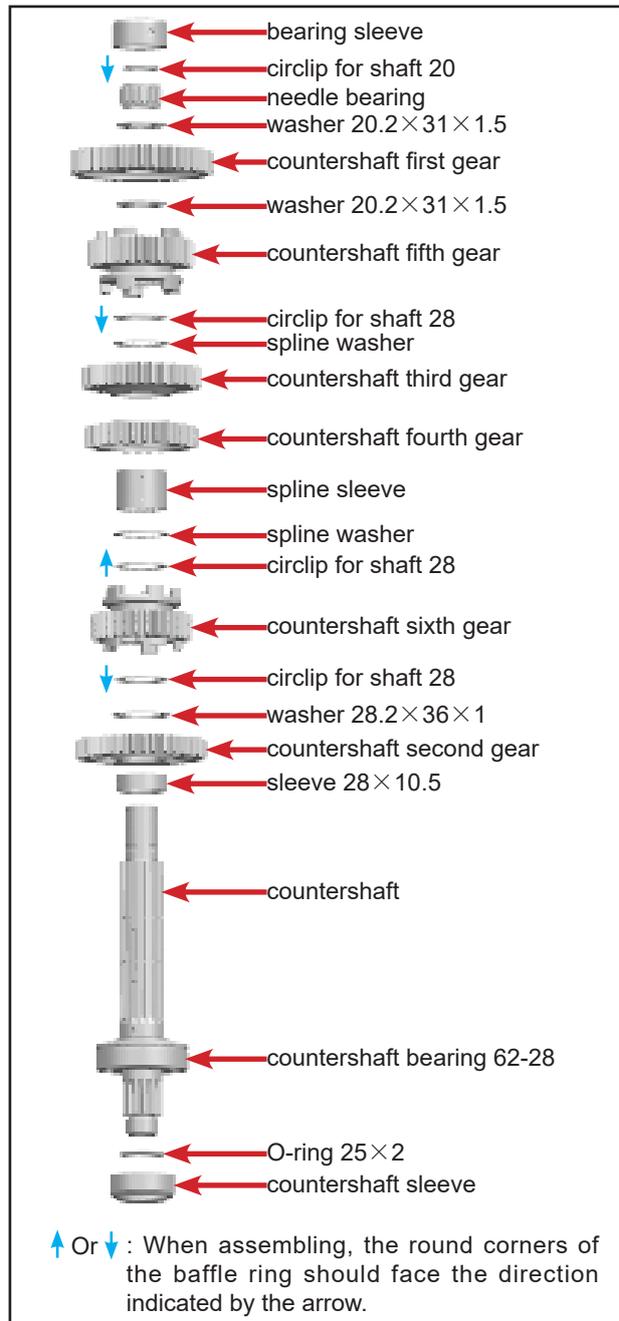
The circumferential direction assembly of circlip for shaft should be as shown in the figure on the right.

Make sure the circlip is fully inserted into the clamping slot.



13.6.9.2 Countershaft Disassembly

Disassemble the Counter shaft assembly as shown in the picture on the right. Check whether the tooth surface of each gear has pitting, collision and excessive wear, check whether the needle roller bearing, shaft sleeve, spline sleeve and gasket are worn or damaged, if there is abnormal, replace the new part.



Inspection

Gear

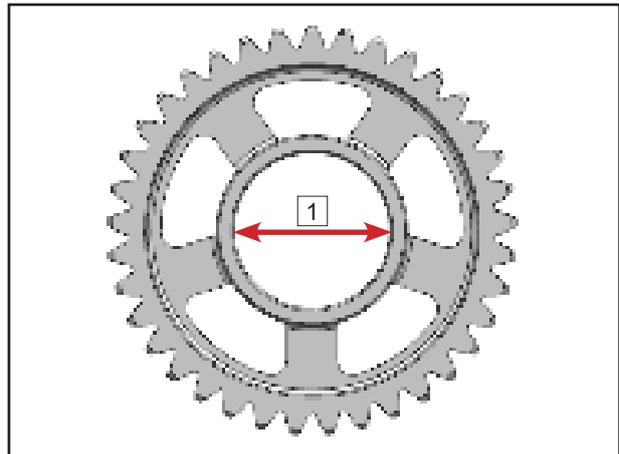
NOTE

When changing gears, they must be replaced in pairs. The retaining ring must be replaced after removal.

Check whether the gear is damaged, if so, then replace the new parts.

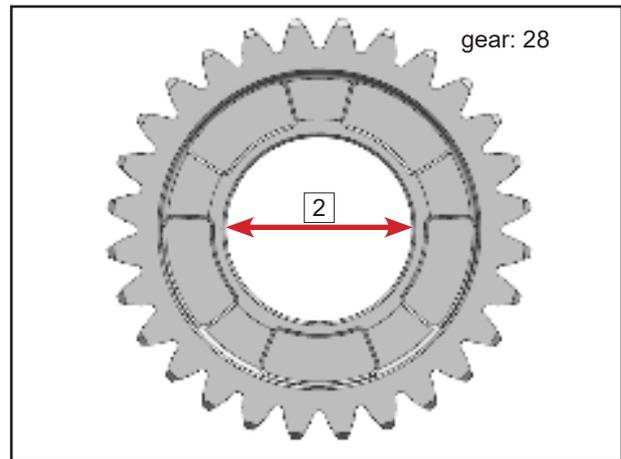
Measure the inner diameter 1 of the second gear of the auxiliary shaft. If it is greater than the maintenance limit, replace it with a new one.

Inner Diameter of The Second Gear of The Auxiliary Shaft	
New Part	31.000 mm ~ 31.025 mm
Service Limit	31.032 mm



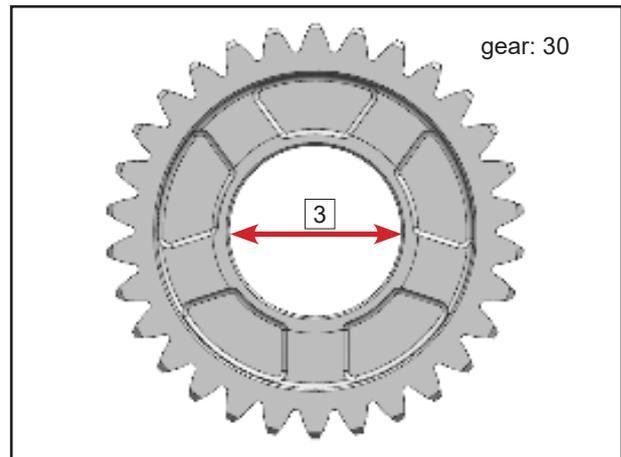
Measure the inner diameter 2 of the fourth gear of the counter shaft. If it is bigger than the maintenance limit, replace it with a new one.

Countershaft Fourth Gear Inner Diameter	
New Part	31.000 mm ~ 31.025 mm
Service Limit	31.032 mm



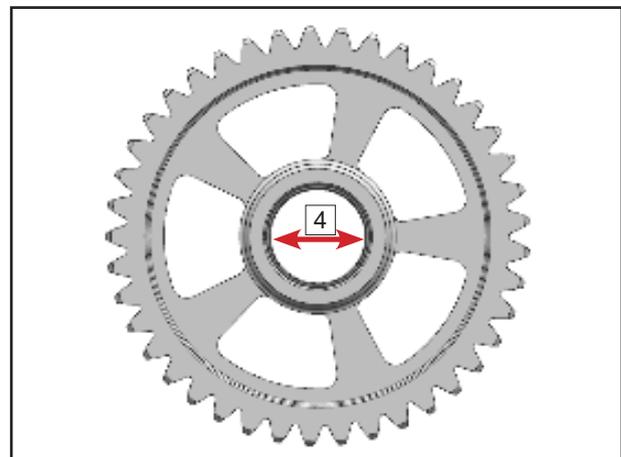
Measure the inner diameter 3 of the third gear of the counter shaft. If it is greater than the maintenance limit, replace it with a new one.

Countershaft Third Gear Inner Diameter	
New Part	31.000 mm ~ 31.025 mm
Service Limit	31.032 mm



Measure the inner diameter 4 of the first gear of the counter shaft. If it is greater than the maintenance limit, replace it with a new one.

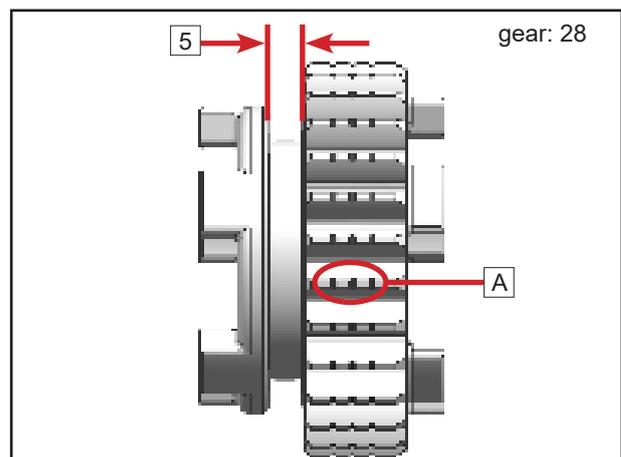
Countershaft First Gear Inner Diameter	
New Part	20.020 mm ~ 20.041 mm
Service Limit	20.048 mm



Measure the width 5 of countershaft sixth gear fork slot. Replace it if it is above service limit.

Countershaft Sixth Gear Fork Slot Width	
New Part	5.10 mm ~ 5.17 mm
Service Limit	5.27 mm

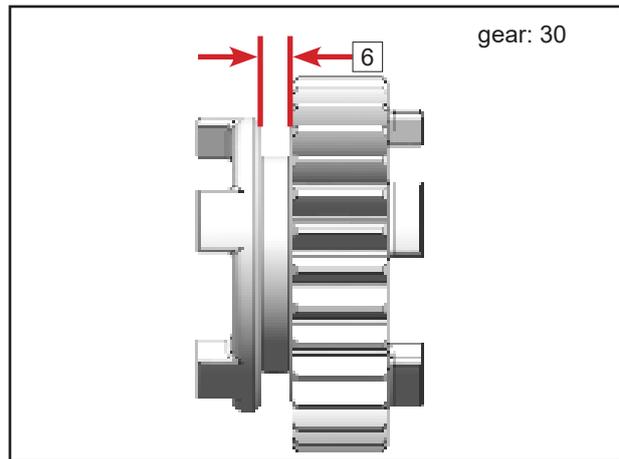
NOTE	
A mark slot A on the countershaft sixth gear distinguishes it from the countershaft fifth gear.	



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Measure the width 6 of countershaft fifth gear fork slot. Replace it if it is above service limit.

Countershaft Fifth Gear Fork Slot Width	
New Part	5.10 mm ~ 5.17 mm
Service Limit	5.27 mm

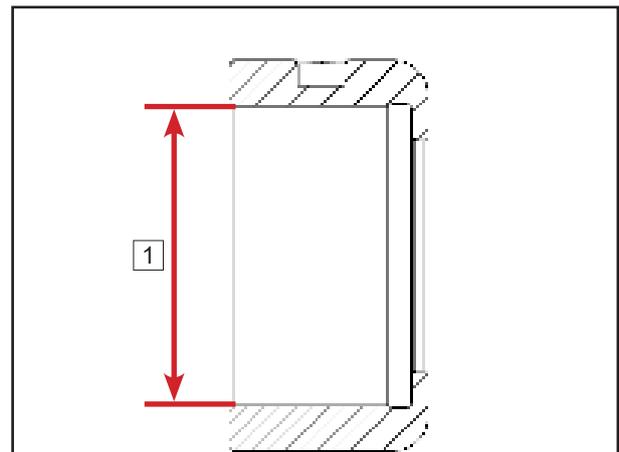


Bearing sleeve

Check whether the bearing sleeve is severely worn or otherwise damaged. If so, replace it with a new one.

Measure the inner diameter 1 of the bearing sleeve. If it is larger than the maintenance limit, replace it with a new one.

Bearing Sleeve Inner Diameter	
New Part	26.007 mm ~ 26.020 mm
Service Limit	26.027 mm

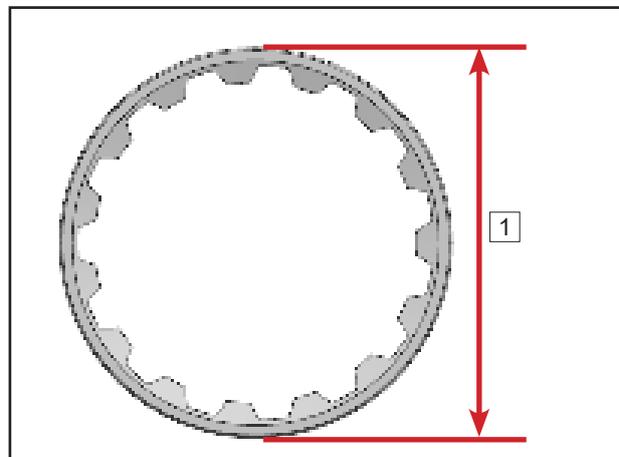


Spline sleeve

Check whether spline sleeve is seriously worn or damaged, if so, replace it with a new one.

Measure the outer diameter 1 of spline sleeve, if less than repair limit, replace with a new one.

Spline Sleeve Outer Diameter	
New Part	30.950 mm ~ 30.975 mm
Service Limit	30.943 mm

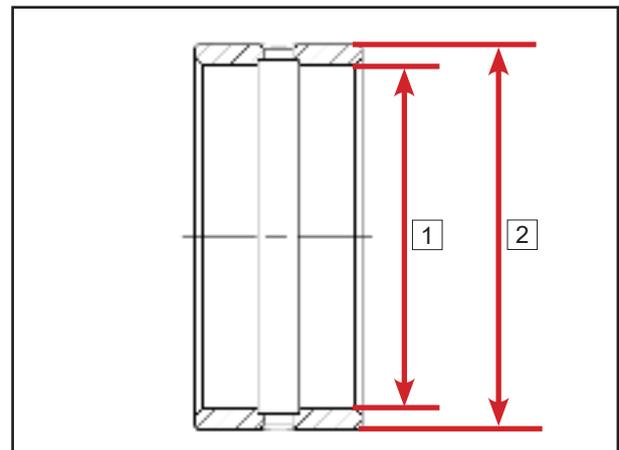


Shaft bushing 28×10.5

Check whether the shaft bushing is severely worn or otherwise damaged, if so, replace it with a new one.

Measure the inner 1 and outer 2 diameters of it, and replace it with a new one if it exceeds the service limit.

Shaft Bushing Inner Diameter 1	
New Part	28.000 mm ~ 28.021 mm
Service Limit	28.027
Shaft Bushing Outer Diameter 2	
New Part	30.950 mm ~ 30.975 mm
Service Limit	30.943 mm

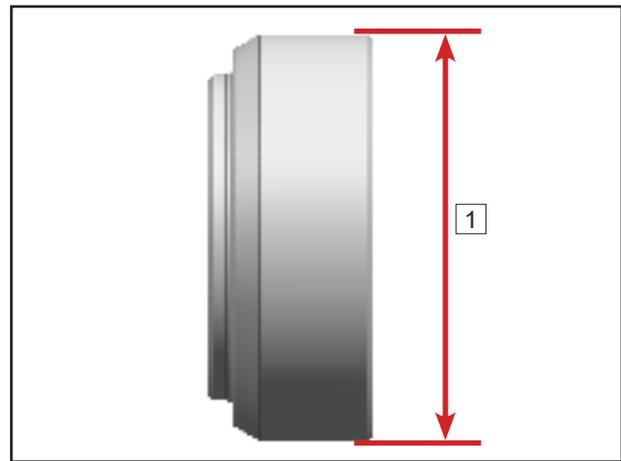


Countershaft collar

Check whether the countershaft collar is seriously worn or damaged, if so, replace it with a new one.

Measure the outer diameter 1 of countershaft collar, if less than the service limit, replace the new part.

Countershaft Collar Outer Diameter	
New Part	39.975 mm ~ 40.000 mm
Service Limit	39.965 mm



Countershaft and countershaft bearing

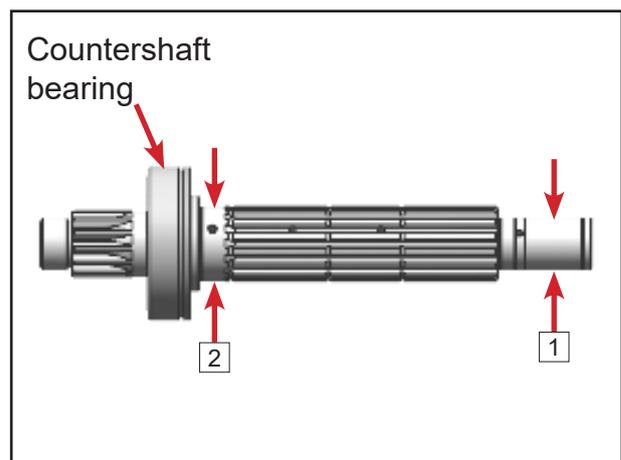
Check whether the countershaft is damaged.

Check whether the spline on the countershaft has pitting, bruise and excessive wear, if there is abnormal, replace it with a new one.

Check whether the countershaft bearing rotates flexibly, whether there is stuck or abnormal sound, if so, replace the new parts.

Measure the outer diameter 1 and outer diameter 2 of the countershaft, if less than the service limit, then replace the new part.

Countershaft Outer Diameter 1	
New Part	19.987 mm ~ 20.000 mm
Service Limit	19.980 mm
Countershaft Outer Diameter 2	
New Part	27.967 mm ~ 27.980 mm
Service Limit	27.960 mm



NOTE

When the countershaft or countershaft bearing needs to be replaced, the countershaft and countershaft bearing must be replaced together.

Installation

Assemble in the reverse order of disassembly, but pay attention to the following details:

Before assembly, daub appropriate amount of oil on the matching surface of the countershaft, shaft sleeve, spline sleeve and each gear.

The sixth gear and the fifth gear of the countershaft should slide smoothly under the dead weight after installation.

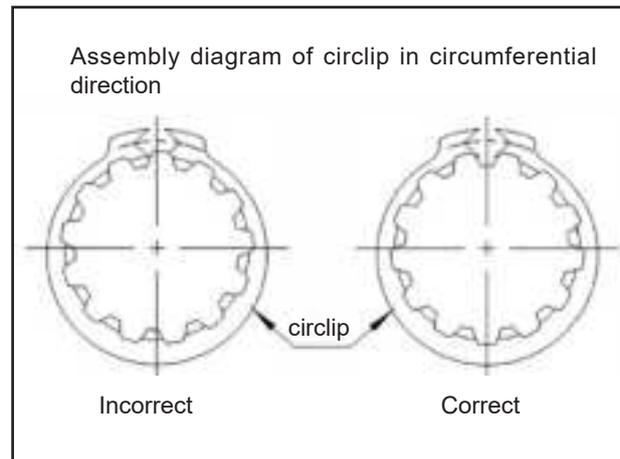
O-ring must be replaced with a new one.

The removed elastic retaining ring can not be used again, must be replaced with a new one.

The elastic retaining ring for shaft is not allowed to be installed backwards. Please refer to the direction of the retaining ring in the disassembly section of section 13.6.9.2.

The circumferential direction assembly of elastic retaining ring for shaft should be as shown in the figure on the right.

Make sure the retaining ring is fully inserted into the clamping slot.



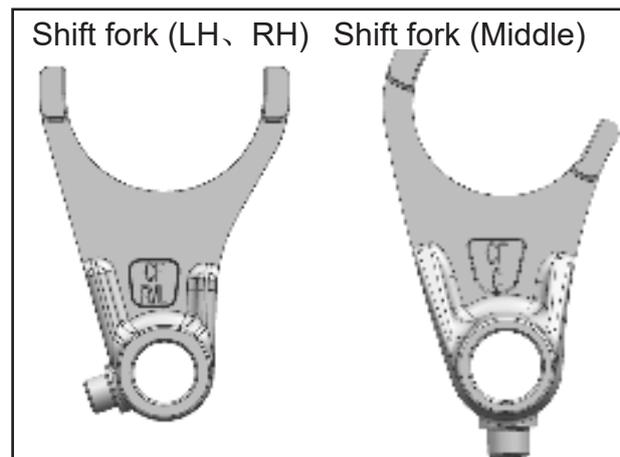
Shift fork

Fork identification

Identification marks are attached to the fork body.

Shift fork(LH、RG): CF R/L

Shift fork(middle): CF C

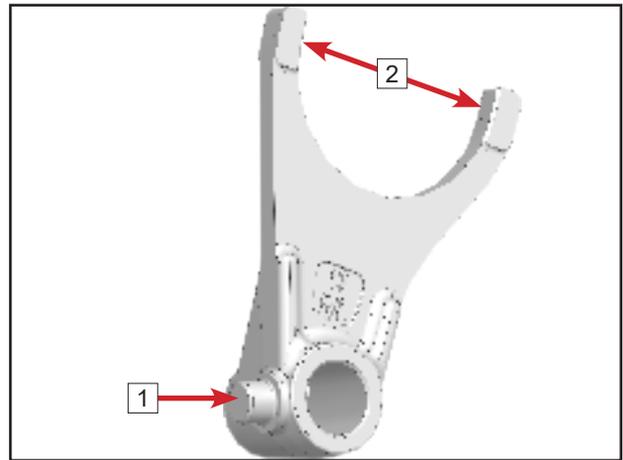


Fork inspection

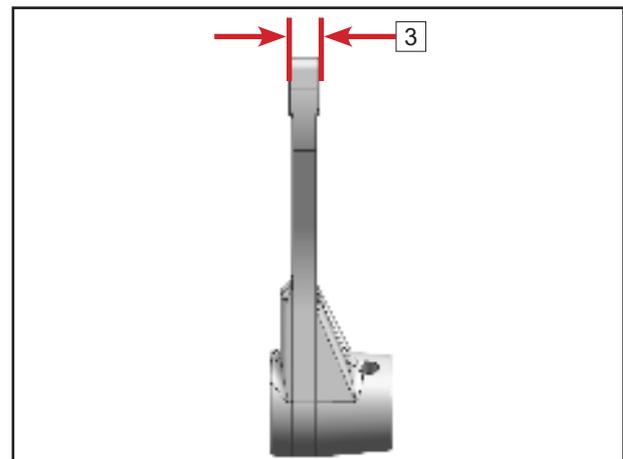
Check the fork guide pin **1** and fork claws **2** for severe wear or other damage.

Check whether the shifting fork claws **2** are bent. The bent shifting fork will lead to shifting difficulties or abnormal gear meshing.

If there is any abnormality, replace with new part.

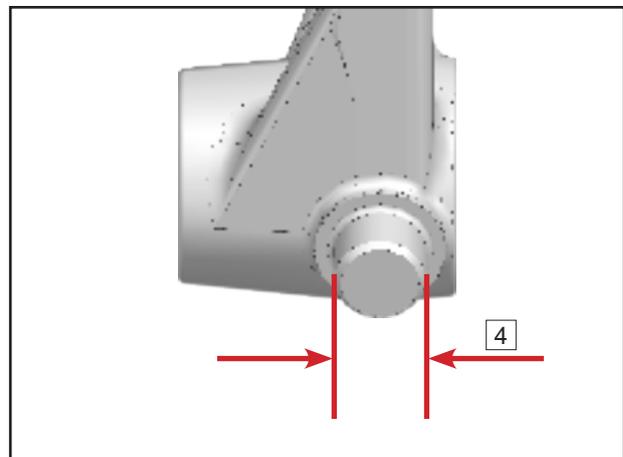


The thickness of the shifting fork (LH and RH) and the shifting fork (middle) is the same, measure the thickness **3** of the shifting fork claw, if less than the service limit, replace with new part.



Shifting Fork Claw Thickness	
New Part	4.93 mm ~ 5.00 mm
Service Limit	4.83 mm

The diameters of the guide pins of the shift forks (LH and RH) and the shift forks (middle) are the same. Measure the diameters **4** of the guide pins of the shift forks. If the diameters are smaller than the service limit, replace them with new ones.

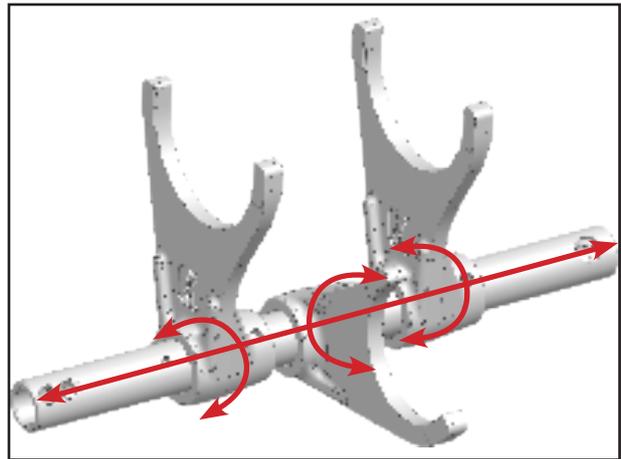


Diameter of Fork Guide Pin	
New Part	6.942 mm ~ 7.000 mm
Service Limit	6.850 mm

Fork shaft

Check whether there is deformation, scratch, wear and other damage to the fork shaft, if so, replace it with a new one.

Set the fork on the fork shaft, move the fork back and forth, turn the fork left and right, check whether the action is smooth, if not, replace the new part.

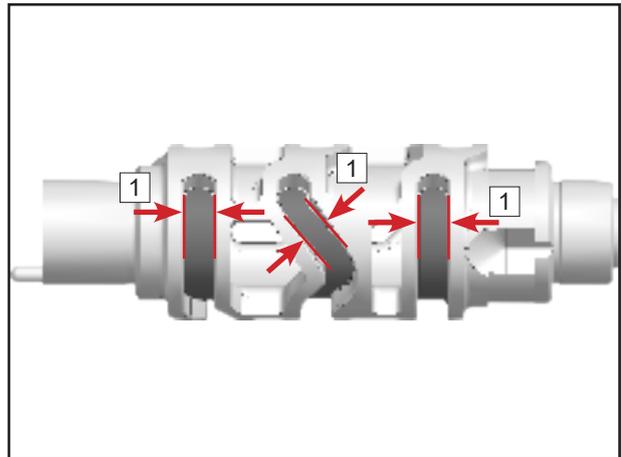


Shift drum

Check whether the shift drum is excessively worn or damaged, if so, replace it with a new one.

Measure the slot width [1] of the shift drum. If it is smaller than the service limit, replace it with a new one.

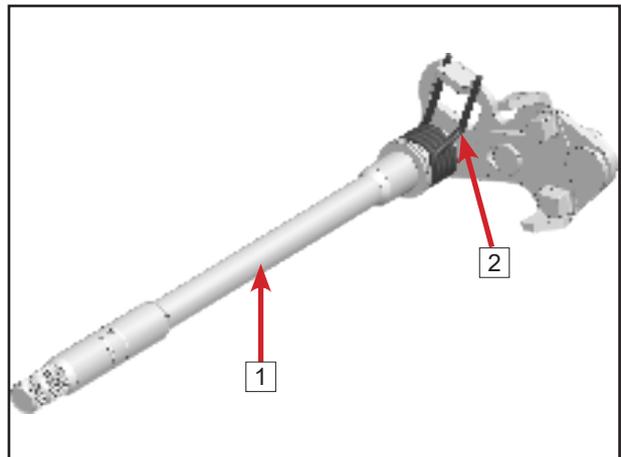
Slot Width of Shift Drum	
New Part	5.45 mm ~ 5.55 mm
Service Limit	5.35 mm



Gearshift lever assembly

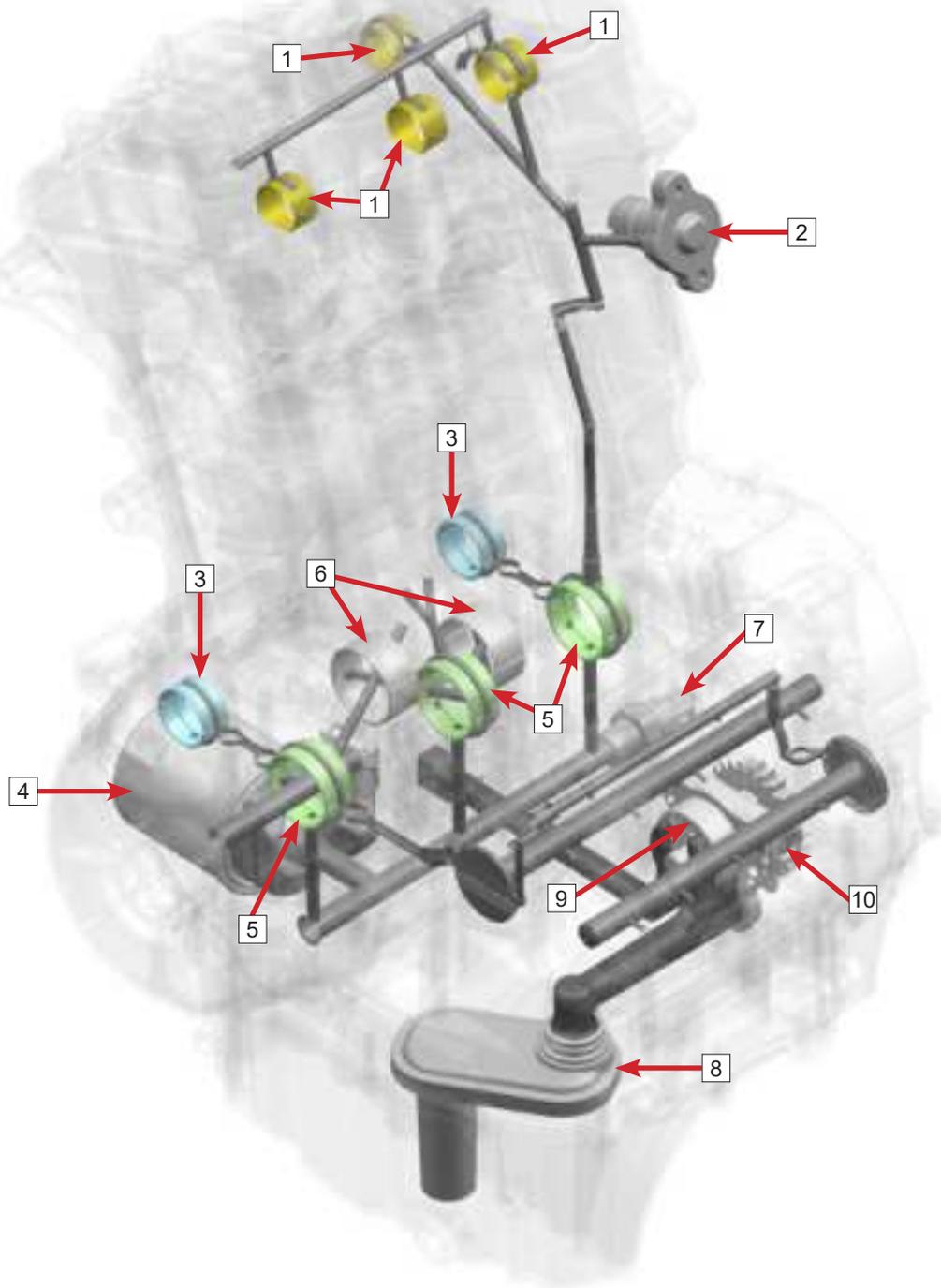
Check whether there is any damage, bending, serious wear of the welding components of the gearshift lever assembly [1], if there is, replace with new parts.

Check whether the return spring [2] of the gearshift lever is damaged or seriously deformed. If so, replace it with a new one.



13.6.10 Lubrication System

13.6.10.1 Lubricating Chart

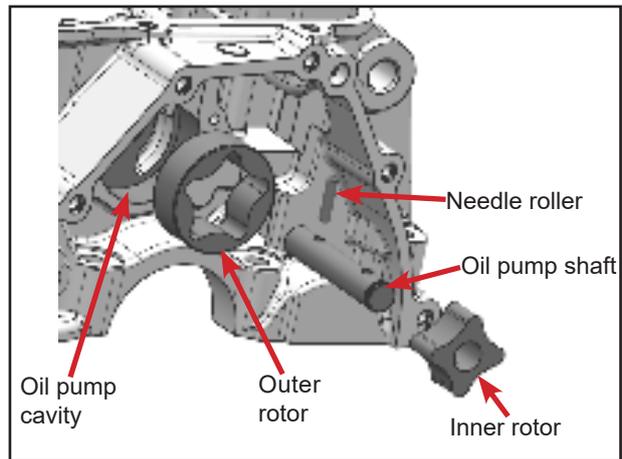


- 1: Camshaft bearing
- 2: Hydraulic tensioner assembly
- 3: Balance shaft bearing
- 4: Oil filter
- 5: Main shaft bearing
- 6: Connecting rod bearing

- 7: Oil pressure switch
- 8: Suction filter
- 9: Oil pump
- 10: Oil pressure relief valve

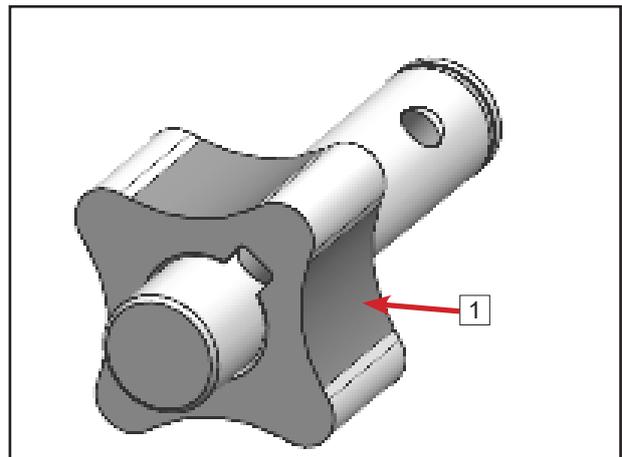
13.6.10.2 Oil Pump

Check the friction and wear of oil pump.
 Check the friction and wear between the outer rotor of the oil pump and the oil pump cavity on the crankcase.
 If the parts are severely worn or damaged, they must be replaced with new ones.



Check the friction and wear of the needle groove on the inner rotor, if it is seriously worn or damaged, it must be replaced with a new inner rotor.

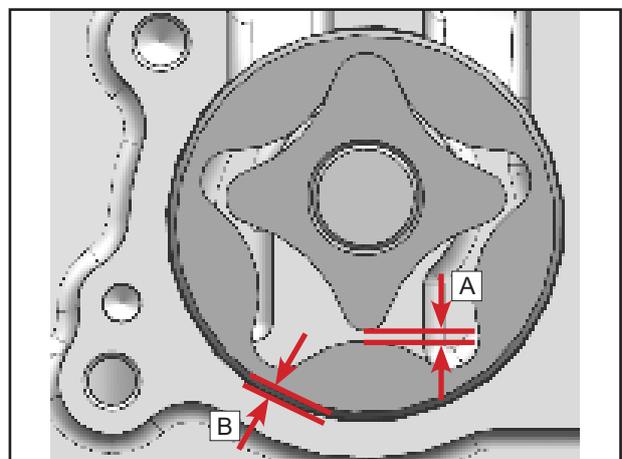
Check the wear of the concave surface **1** of the inner rotor, if it is seriously worn or damaged, it must be replaced with a new inner rotor.



Measure top clearance **A** (clearance between inner and outer rotors) and side clearance **B** (clearance between outer rotor and oil pump cavity) with a feeler gauge. If the service limit is exceeded, the inner and outer rotors must be replaced at the same time.

Clearance between Inner and Outer Rotors A	
Service Limit	0.25 mm

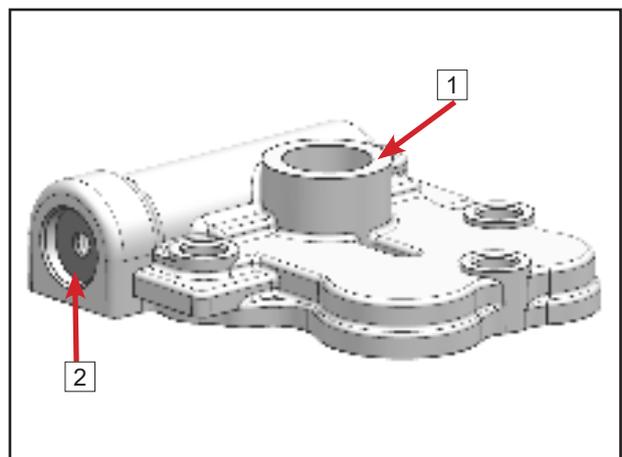
Clearance between Outer Rotor and Oil Pump Cavity B	
Service Limit	0.25 mm



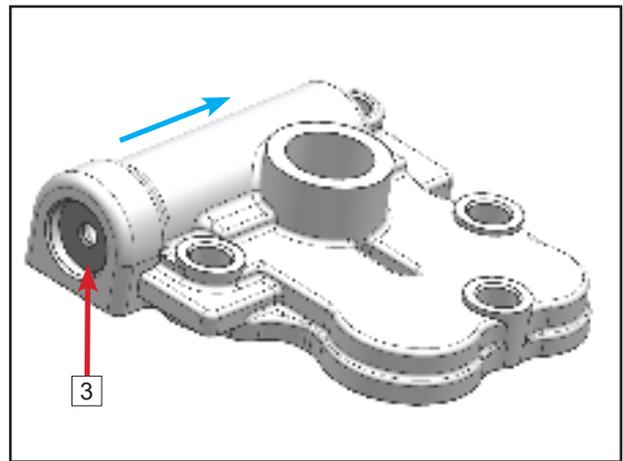
13.6.10.3 Oil Pressure Relief Valve

Check whether the oil pump cover **1** is seriously worn or damaged, if so, replace it with a new one.

The oil pressure limiting valve **2** is installed on the oil pump cover.



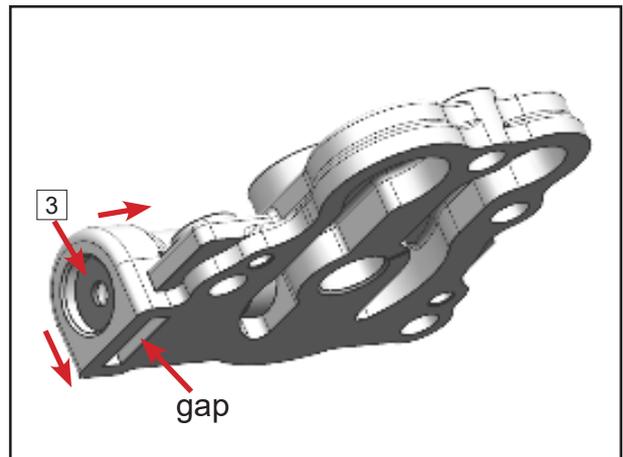
Press the gasket **3** of the oil pressure limiting valve with the appropriate tool in the direction indicated by the arrow on the right to feel whether the spring movement is smooth or not. If the phenomenon of stagnation occurs, remove the oil pressure limiting valve and carefully check each part.



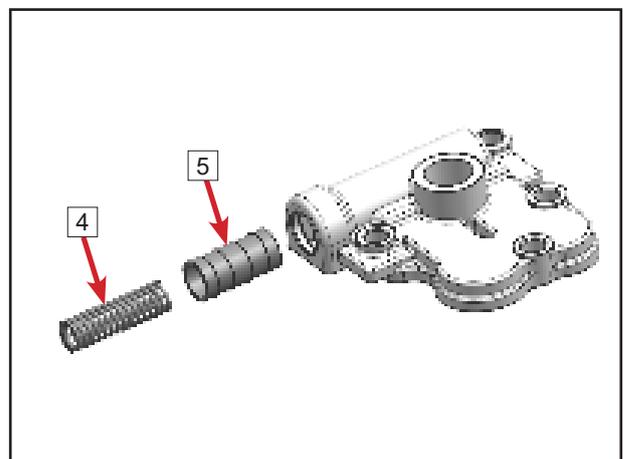
Oil pressure relief valve

Removal

Use appropriate tools to push the gasket **3** to the gap of the oil pump cover, remove the gasket **3** from the gap.



Remove spring **4** .
Remove plunger **5** .



Inspection

Check whether gaskets, springs and plungers are severely worn or damaged, if so, replace them with new ones.

Measure the free length of the spring, if less than the service limit, replace the spring.

Spring Free Length	
New Part	39.4 mm
Service Limit	38.5 mm

Installation

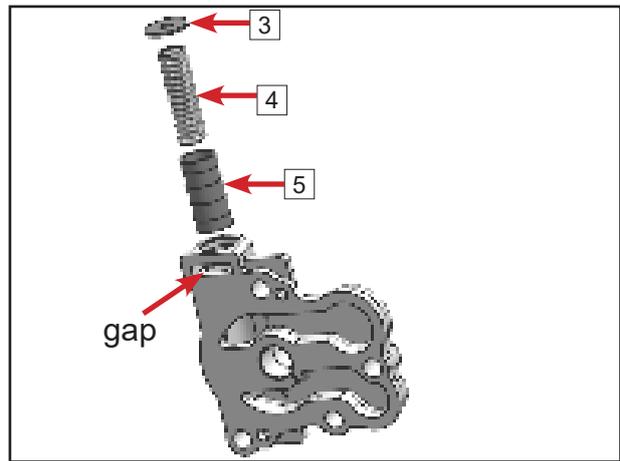
Assemble the oil pressure limiting valve in the reverse order of disassembly.

Daub appropriate amount of oil on the outer surface of the plunger [5], put the plunger [5] into the corresponding hole of the oil pump cover.

Daub appropriate amount of oil on the surface of the spring [4], put the spring [4] into the plunger [5].

Use appropriate tools to compress the spring [4], from the oil pump cover gap to load the gasket [3], and ensure that the gasket [3] completely fall in the step hole of the oil pump cover.

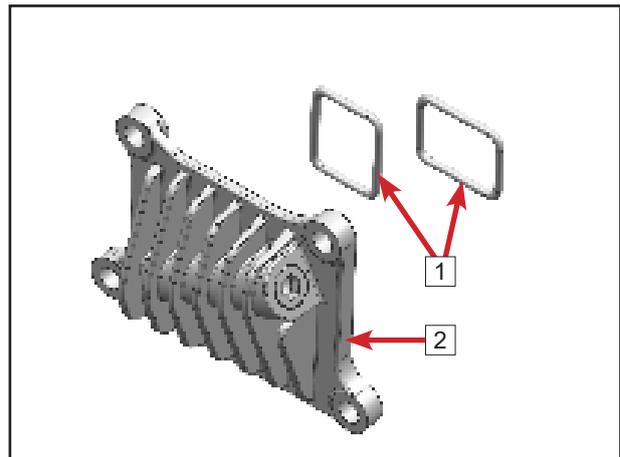
Press gasket [3] with appropriate tool, spring [4] movement should be smooth without stuck.



13.6.10.4 Oil Rail Cover Plate Assembly

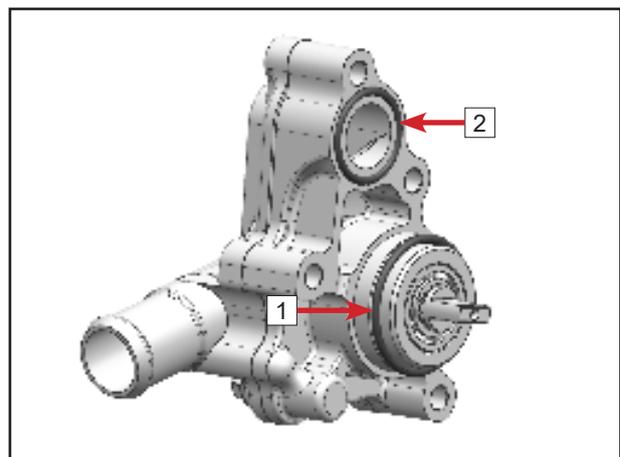
Inspect oil cooler seal ring [1] for damages or hardening, replace if any.

Inspect oil rail cover plate assembly [2] for damages, replace if any.



13.6.11 Water Pump Assembly

Check whether the O-ring 34×2.5 [1] and the O-ring 22×2.3 [2] are aging, damaged or seriously deformed, if so, replace them with new ones.

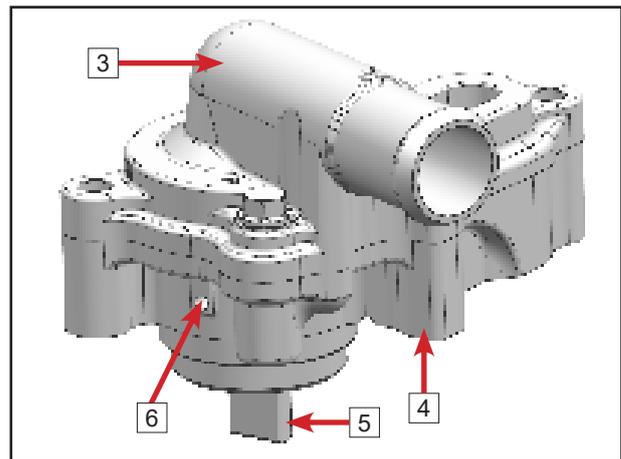


Water pump sub assembly

Check whether the pump cover **3** and pump body **4** are cracked or damaged, if so, replace with a new one.

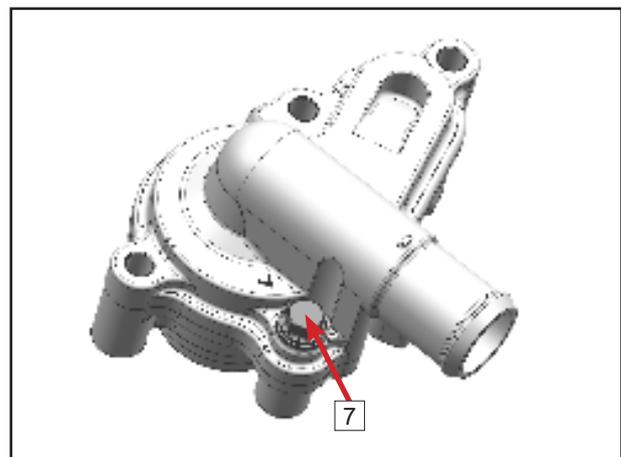
Check whether the pump shaft **5** rotation is flexible, if the bearing stuck, replace with new parts.

Check whether there is coolant leakage at the joint surface of the water pump cover and water pump body. If there is, it indicates that there is a problem with the sealing ring of the water pump cover, or the water pump cover or water pump body is seriously deformed and needs to be replaced. Check whether there is liquid flow out of the leakage hole **6** on the pump body. If there is coolant flow out, it means that the water seal has problems. If there is oil flow out, it means that the oil seal has problems and needs to be replaced with a new part.



Pump cover removal

Remove M6×22 bolt **7** and washer, remove pump cover.

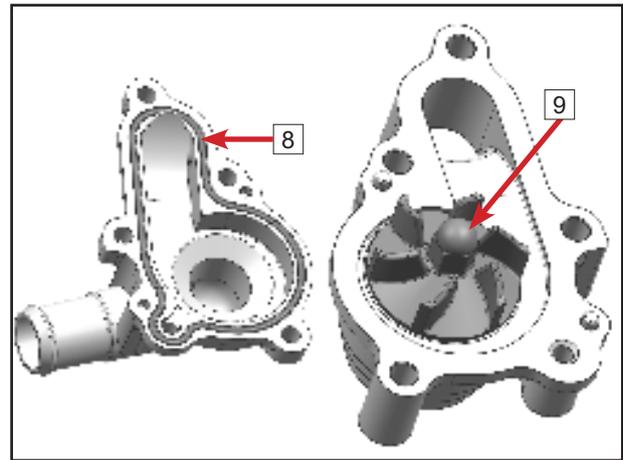


Check whether the sealing ring [8] of the water pump cover is aging, damaged or seriously deformed, if so, replace it with a new one.

Check whether the pump impeller [9] is broken or damaged. If yes, replace it.

NOTE

Water pump sub assy is high-requiring in sealing of the parts, during maintenance, in addition to the pump cover and pump cover sealing ring can be replaced separately, the rest should be replaced as a whole. Replacement of the entire pump sub assy is recommended.



Pump cover installation

Assemble pump cover in reverse order of disassembly with M6x22 bolt torque of 10N•m.

13.6.12 Electric Starter

Overriding clutch assembly

Disassembly

Remove the starting gear assembly [1].

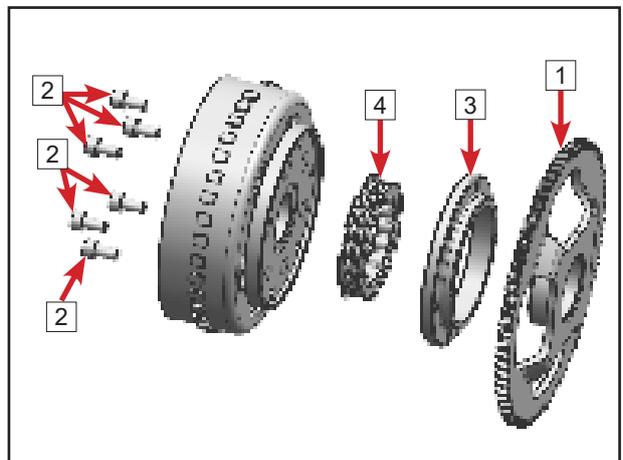
Remove M6×12 hexagon socket cap screws [2].

Remove overriding clutch seat [3].

Remove overriding clutch [4].

NOTE

If the overriding clutch does not fail, it does not need to be removed.



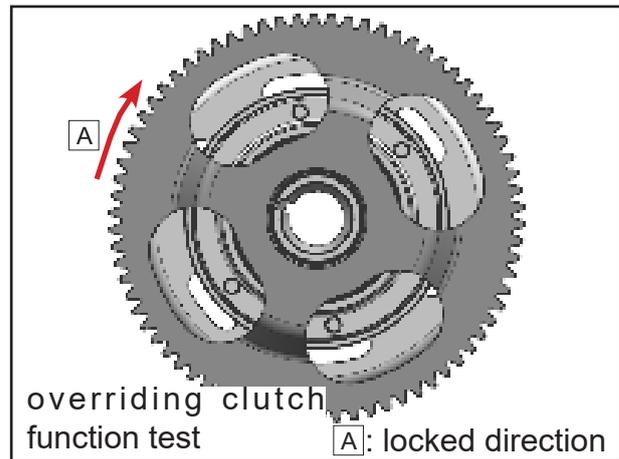
Inspection

Carry out function test of overriding clutch, rotate the big gear assembly.

Inspect overriding clutch and overriding clutch seat for wear and other damage.

NOTE

Overriding clutch must be locked when starting big gear assembly by clockwise rotation. Overriding clutch, overriding clutch seat and starting gear assembly should be replaced simultaneously if damaged.



Installation

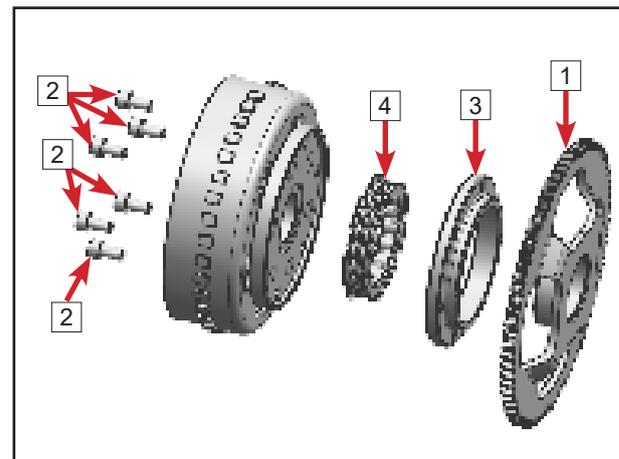
Install overriding clutch [4] onto overriding clutch seat [3].

Install overriding clutch seat [3] onto magneto rotor.

Install M6×12 hexagon socket cap screw [2] (Apply 243 thread locking glue on the thread), screw torque: 10N·m.

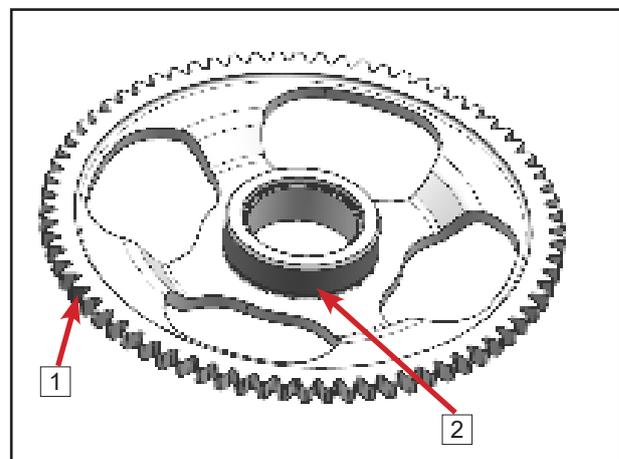
At overriding clutch [4] inner circle, apply some oil.

Rotate the starting big gear [1] into overriding clutch [4].



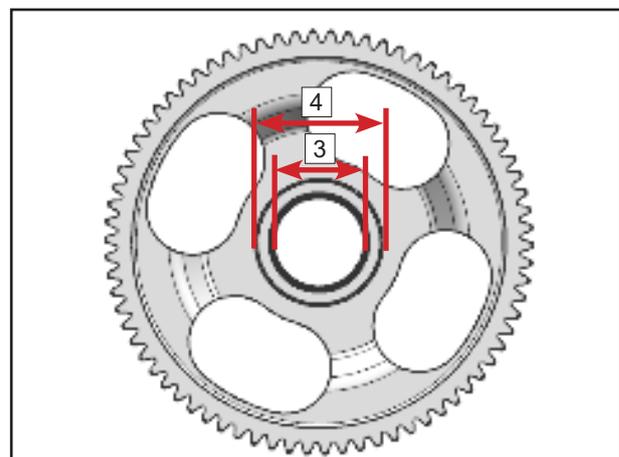
Starting big gear assembly, double gear, double gear shaft inspection

Check the wear and other damage of the starting big gear assembly, especially the tooth surface [1] and clutch cylinder surface [2]. If necessary, replace the starting gear assembly.

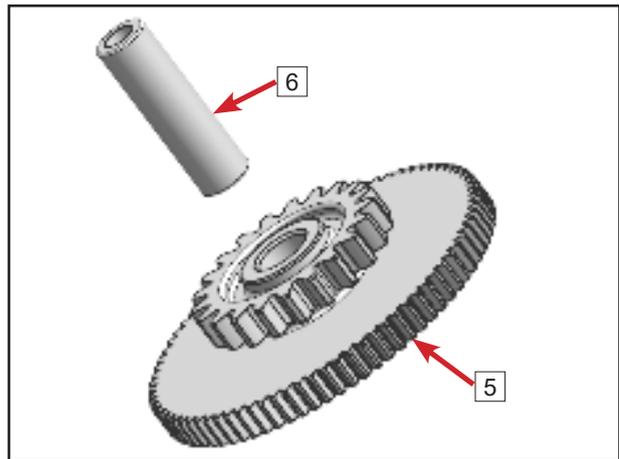


Measure the inner [3] and outer [4] diameters of the starting big gear assembly, and replace it if it exceeds the service limit.

Inner Diameter of Starting Big Gear	
New Part	32.025 mm ~ 32.050 mm
Service Limit	32.075 mm
Outer Diameter of Starting Big Gear	
New Part	45.660 mm ~ 45.673 mm
Service Limit	45.635 mm



Check whether the double gear **5** and double gear shaft **6** are seriously worn or damaged. If so, replace them with new ones.



13.6.13 Magneto Stator

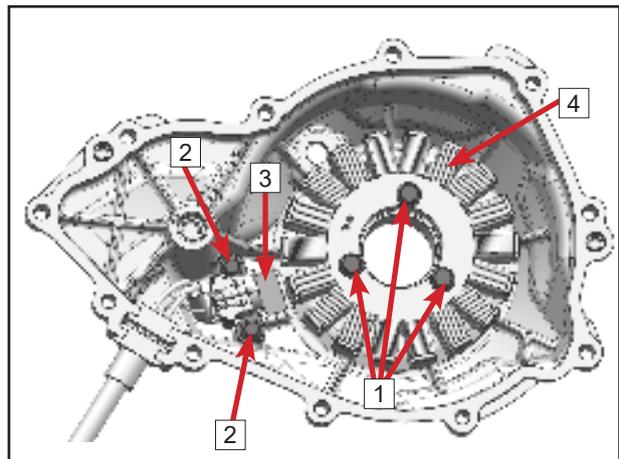
Removal

Remove M6×30 bolt **1**.

Remove M5×16 bolt **2**.

Remove stator wire plate **3**.

Remove magneto stator **4**.



Inspection

Check whether the stator is damaged, if so, replace it with a new one.

Check whether the metal coil is damaged, aged or otherwise damaged. If so, replace it.

Installation

Install the magneto stator **4** on the left cover.

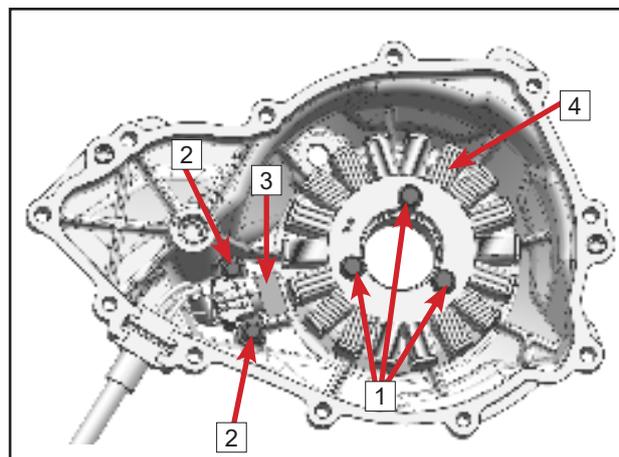
Install M6x30 bolts **1** (apply 243 thread locking glue on the thread part).

Magneto Stator Bolt Torque
12N•m

Tidy the magneto stator wire harness, install stator wire pressing plate **3** to press the wire harness.

Install M5×16 bolts **2**.

Stator Wire Pressing Plate Bolt Torque
6N•m

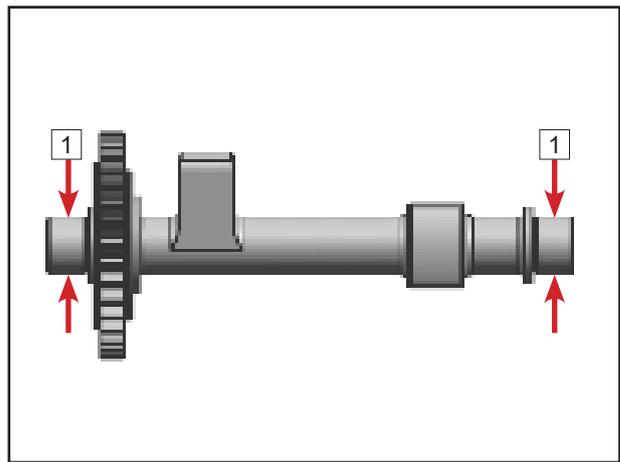


13.6.14 Rear Balance Shaft Assembly

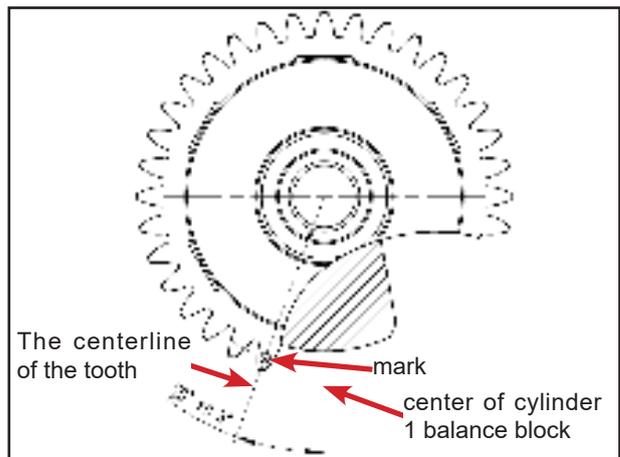
Check whether the rear balance shaft is seriously worn or damaged, if so, replace it with a new one.

Use micrometer to measure the rear balance shaft journal diameter 1, if it is less than service limit, replace with a new one.

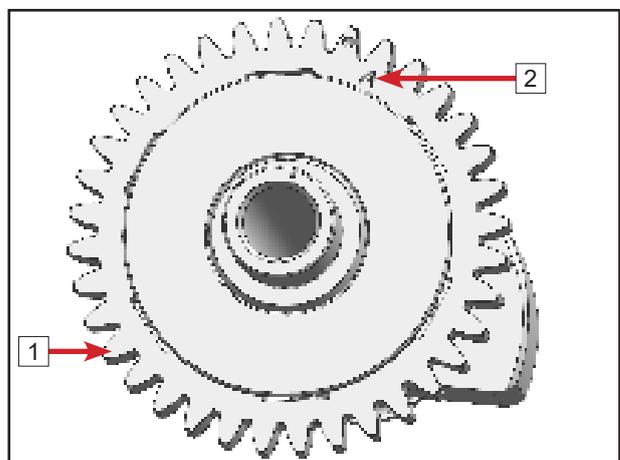
Rear Balance Shaft Journal Diameter	
New Part	19.980 mm ~ 19.993 mm
Service Limit	19.960 mm



Check to make sure the balance shaft marks are correctly located, as shown on the right.



The rear balance shaft is divided into group A and group B according to its driven gear 1. A grouping mark 2 is stamped into the driven gear .



Assemble rear balance shaft and crankshaft in pairs according to the following.

Rear Balance Shaft Grouping Mark	Crankshaft Grouping Mark
A	B
B	A

The grouping of crankshaft refers to chapter 13.6.1.1.

13.7 Engine Assembly

13.7.1 Rear Balance Shaft Assembly Installation

NOTE

Assemble crankshaft and rear balance shaft in pairs according to the following.

Rear Balance Shaft Grouping Mark	Crankshaft Grouping Mark
A	B
B	A

The grouping of rear balance shaft refers to chapter 13.6.14.

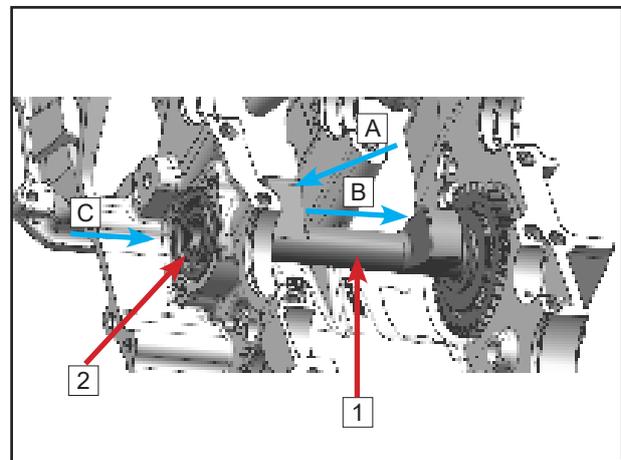
The grouping of crankshaft refers to chapter 13.6.1.1.

Apply an appropriate amount of oil evenly on the surface of the mounting hole of the upper crankcase bearing and the inner ring of the two rolling bearings.

[A]: Tilt the clutch side of the rear balance shaft assembly [1], and then sleeve it into the bearing mounting hole of the upper crankcase.

[B]: The gear side journal of the rear balance shaft assembly [1] is loaded into the magneto side rolling bearing.

[C]: From the clutch side install the 6204 rolling bearing [2] (bearing marked surface outward) into the corresponding hole on the crankcase, and make the bearing inner ring through the balance shaft journal.

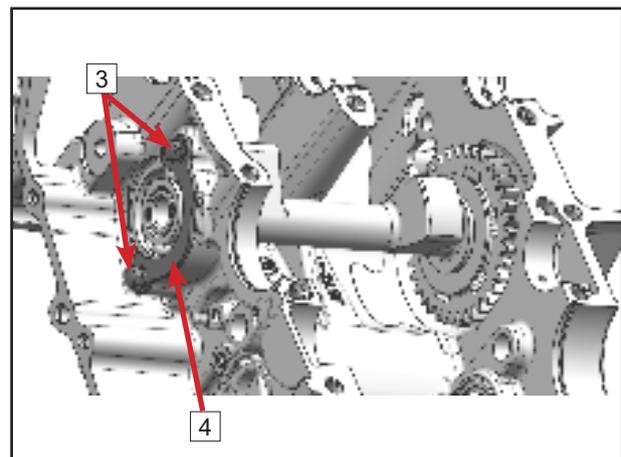


At M6×16 bolt [3] evenly apply 243 thread locking glue to the thread part.

Use M6×16 bolt [3] to put the right bearing baffle [4] tighten the upper crankcase.

Right Bearing Baffle Bolt Torque

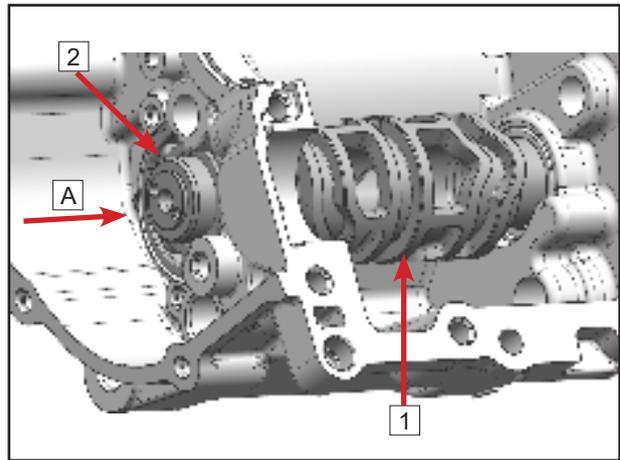
10N•m



13.7.2 Shift Drum, Position Cam, Position Swing Arm Installation

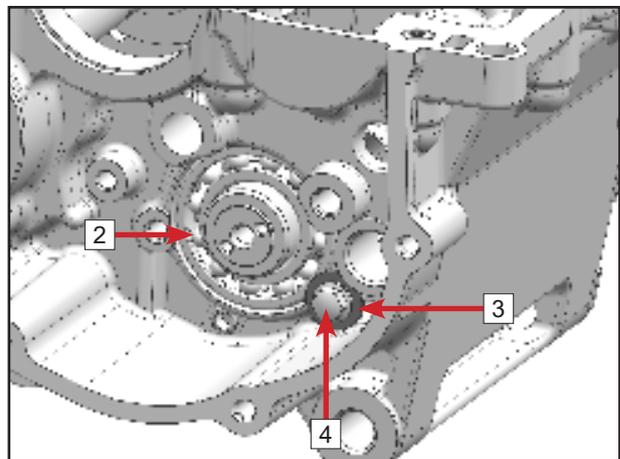
On shift drum **1** both side support shaft, apply some oil. Put 16005 rolling bearing **2** (The marked bearing faces the clutch side) onto shaft of shift drum **1**.

A: From clutch side put shift drum **1** and 16005 rolling bearing **2** onto upper crankcase.



Install 6.3×16.3×1.2 washer **3** and M6×16 bolt **4**, press down 16005 rolling bearing **2**.

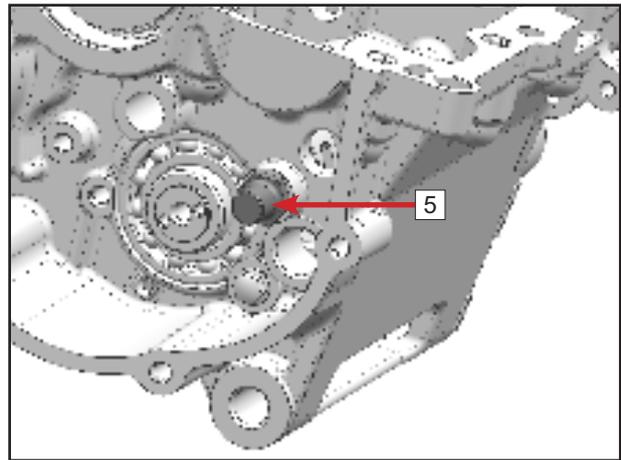
M6×16 Bolt Torque
10N•m



Apply 243 thread locking glue evenly on the thread part of the shift positioning torsion spring pin [5].

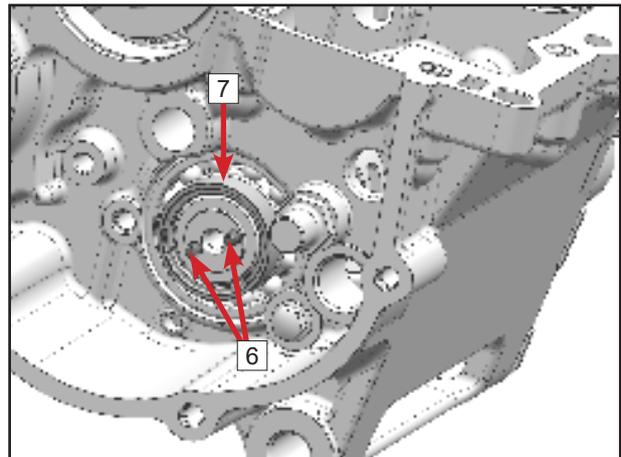
The shift positioning torsion spring pin [5] is mounted on the top crankcase.

Shift Positioning Torsion Spring Pin Torque
20N•m

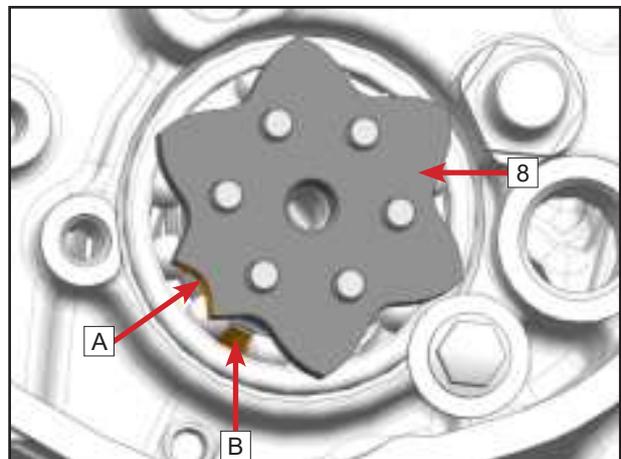


Install P3×9.8 needle roller [6] into the corresponding hole of the shift drum.

Install shift drum sleeve [7] onto the shift drum.



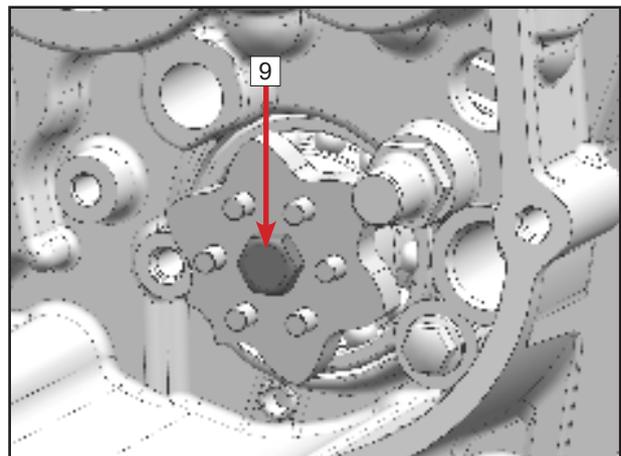
Align the pin hole of the position cam [8] with P3×9.8 needle roller [6], assemble the position cam [8] on the shift drum and ensure that the neutral position [A] of the position cam is close to the neutral stop groove [B] of the shift drum.



Apply 243 thread locking glue evenly on the thread part of M6x16 bolt [9].

Fix the position cam to the shift drum with M6x16 bolt [9].

Position Cam Bolt Torque
10N•m

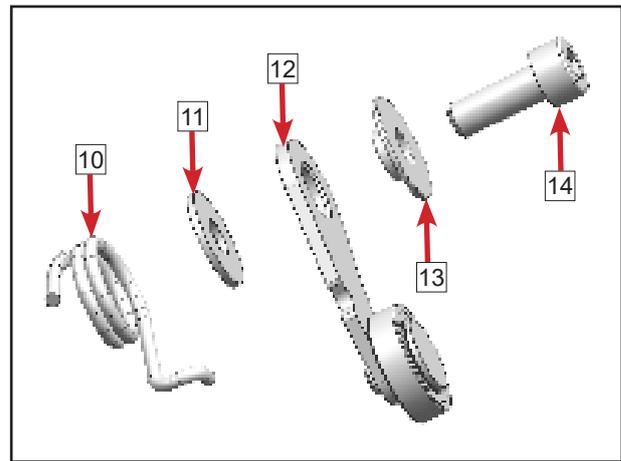


Position swing arm installation

As shown in the figure on the right, assemble the gear shifting positioning swing spring [10], washer 6.3×16.3×1.2 [11], gear shifting positioning swing arm parts [12], gear shifting positioning swing arm sleeve [13] and M6x16 inner hexagon head screws [14] together.

The end of the spring of the shift positioning swing arm should be stuck into the groove of the shift swing arm part.

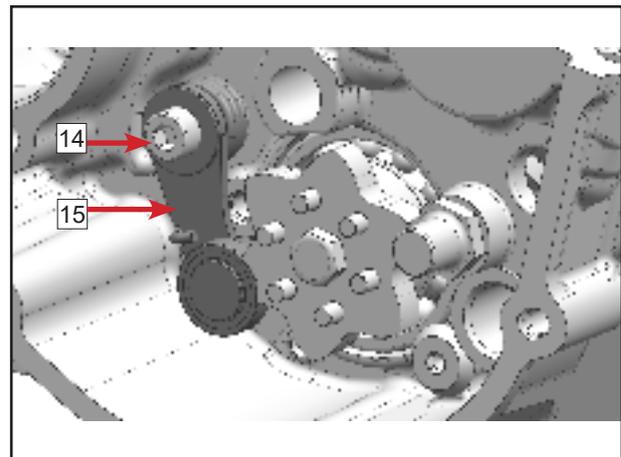
Shifting swing arm parts in shifting positioning swing arm sleeve rotation should be flexible.



NOTE
Washer 6.3 x 16.3 x 1.2 smooth face towards shift positioning swing arm parts.

Turn the shift drum to the position shown on the right.

The gear shifting positioning parts [15] is fixed on the top crankcase, and the positioning wheel of the gear shifting swing arm part is clamped into the neutral position of the positioning cam.

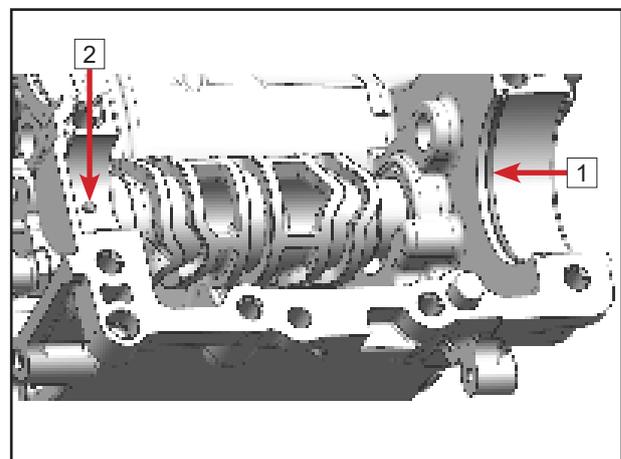


M6x16 hexagon socket head screw [14] Torque
10N·m

13.7.3 Countershaft Installation

Install the 62-28 bearing stop ring [1] into the groove of the upper crankcase to ensure that it is fully slotted.

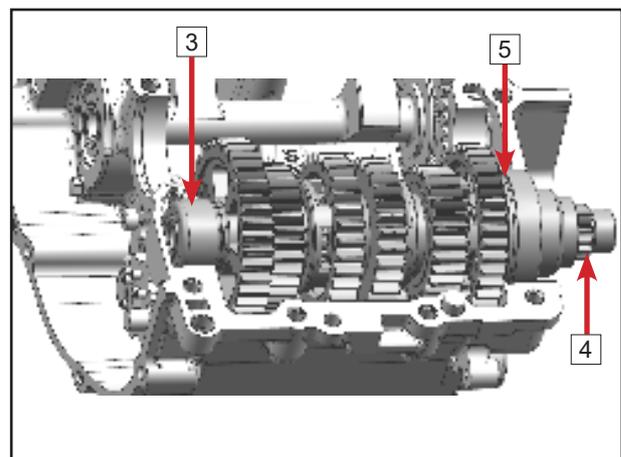
Install P4×7.8 needle roller [2] into the corresponding hole of the upper crankcase.



Apply an appropriate amount of oil evenly on the inner surface of the bearing sleeve [3].

The bearing sleeve [3] is set to the needle roller bearing of the countershaft assy [4].

Align the bearing thrust groove [5] of the countershaft assy [4] with the 62-28 bearing stop ring [1], align the limit hole of the bearing sleeve [3] with P4×7.8 needle roller [2], and install the countershaft assy [4] on the upper crankcase.



13.7.4 Fork Shaft and Gearshift Fork Installation

Daub an appropriate amount of oil evenly on the outer surface of the fork shaft assembly.

Pass the fork shaft assembly **1** (with the end of the bowl plug facing the magneto side) through the mounting hole of the upper crankcase.

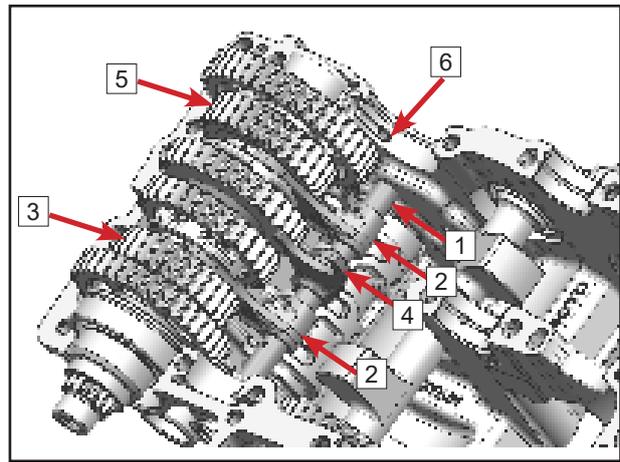
The shift fork (LH and RH) **2** is inserted into the fork slot of the sixth gear **3** of the countershaft, and the fork shaft assembly **1** is pushed through the fork hole.

The shift fork (middle) **4** is mounted on the fork shaft assembly **1**.

The shift fork (LH and RH) **2** is inserted into the fork slot of the fifth gear **5** of the countershaft, and the fork shaft assembly **1** is pushed through the fork hole.

Rotate the fork shaft assembly **1**, so that the upper needle align with the groove of upper crankcase, push the fork shaft assembly **1** in place (At this point, the positioning hole at the other end of the fork shaft assembly **1** is aligned with the hole in the upper crankcase).

Insert the 6×16.2 positioning pin **6** into the positioning hole of the fork shaft assembly **1** to fix the position of the fork shaft assembly **1**.

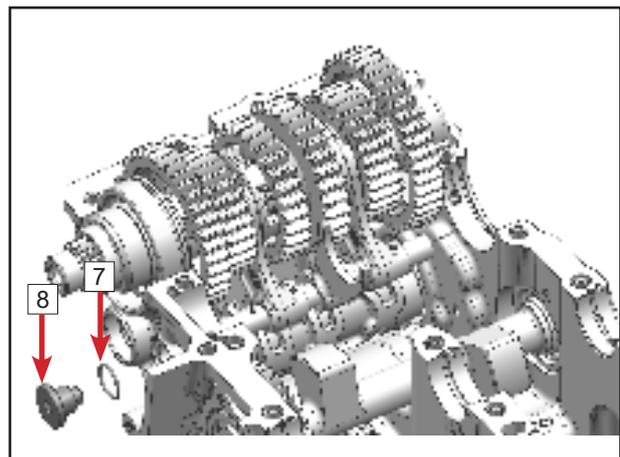


NOTE
The label "CF R/L" of the shift fork (left and right) faces the magneto side, the label "CF C" of the shift fork (middle) faces the clutch side, and the guide pin of the shift fork is correctly stuck into the slot of the shift drum.

Put an appropriate amount of oil on the surface of the 15× 1.9 O-ring **7** evenly and put it into the corresponding hole of the upper crankcase.

Install fork shaft cover **8** on upper crankcase.

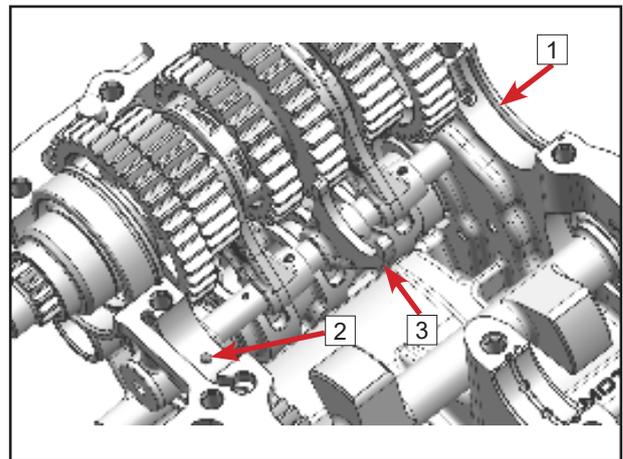
Fork Shaft Cover Torque
5N·m



13.7.5 Main Shaft Installation

Install the 6205 bearing stop ring [1] into the groove of the upper crankcase to ensure that it is fully slotted.

Install P4×7.8 needle roller [2] into the corresponding hole of the upper crankcase.

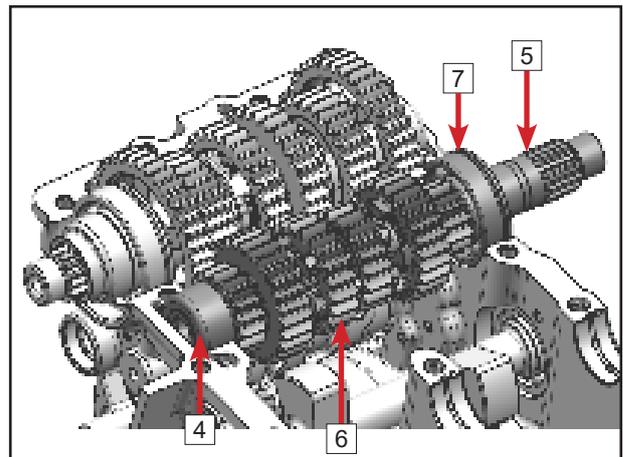


Apply an appropriate amount of oil evenly on the inner surface of the bearing sleeve [4].

Set the bearing sleeve [4] to the needle roller bearing of the shaft assembly [5].

The shift fork (middle) [3] is clamped into the fork groove of the third and fourth gear [6] of the main shaft.

Align the bearing thrust groove [7] of the shaft assembly [4] with the 6205 bearing stop ring [1], align the limit hole of the bearing sleeve [4] with P4×7.8 needle roller [2], and install the shaft assembly [5] on the upper crankcase.



The gears of the main and countershafts should be engaged normally.

Daub appropriate amount of oil on the tooth surface of each gear.

Rotate the shaft combination [5], should be flexible without stuck.

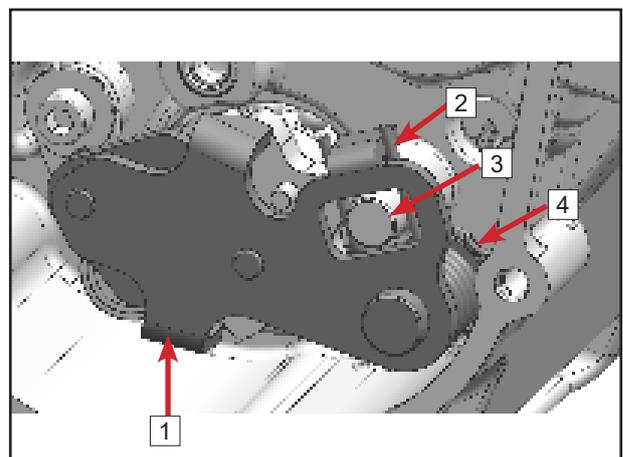
13.7.6 Gearshift Lever Installation

Daub an appropriate amount of oil evenly on the mating surface of the gearshift lever.

Align the lever with the mounting hole on the box body, use gearshift lever return spring [2] to stuck the shift positioning spring pin [3], and the gearshift lever [1] is assembled on the crankcase.

NOTE

Before assembly, check whether the shaft elastic retaining ring 14 [4] on the gearshift lever is completely located in the retaining ring groove, and whether the washers 14×21×1 on both sides of the retaining ring are lost.



13.7.7 Crankshaft Connecting Rod and Front Balance Shaft Installation

Before assembly, according to the following table, confirm again that the main shaft bearing ① and the balance shaft bearing ② on the upper crankcase are correctly assembled.

Crankcase/Crankshaft/Main Shaft Bearing Grouping		
Crankshaft main bearing seat hole mark	Crankshaft main journal mark	Main shaft bearing color
A	A	red
A	B	black
B	A	black
B	B	blue

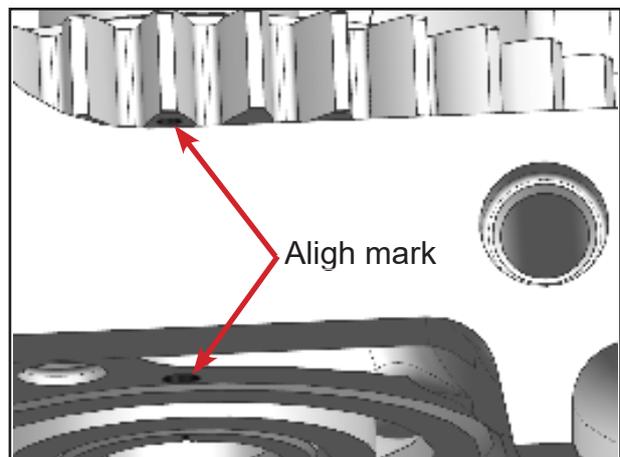
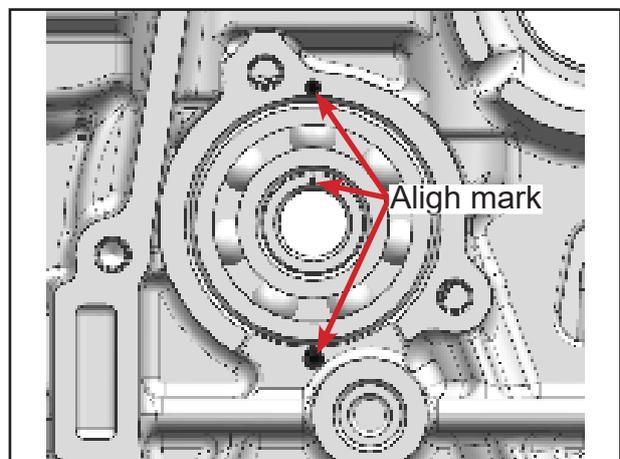
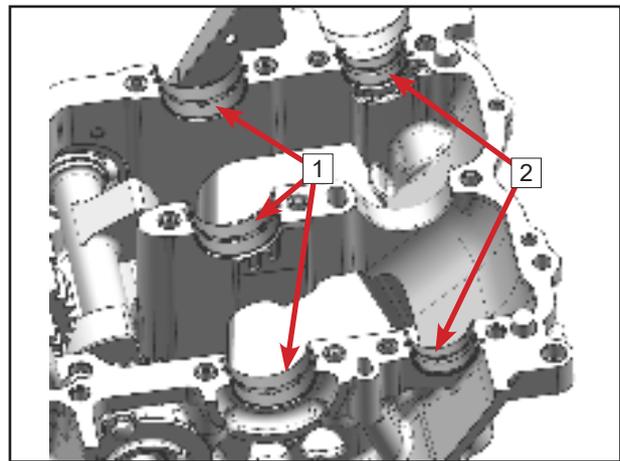
Crankcase/front balance shaft/balance shaft bearing grouping		
Front Balance Shaft Bearing Seat Hole Mark	Front Balance Shaft Journal Mark	Balance Shaft Bearing Color
A	1	Black
A	2	Red
B	1	Blue
B	2	Black

Clean the surface of main shaft bearing and balance shaft bearing with dust-free paper.

Evenly apply proper amount of oil on the inner surface of the main shaft bearing and balance shaft bearing.

Rotate the balance shaft to align the marking line with the marking pit on the crankcase vertically.

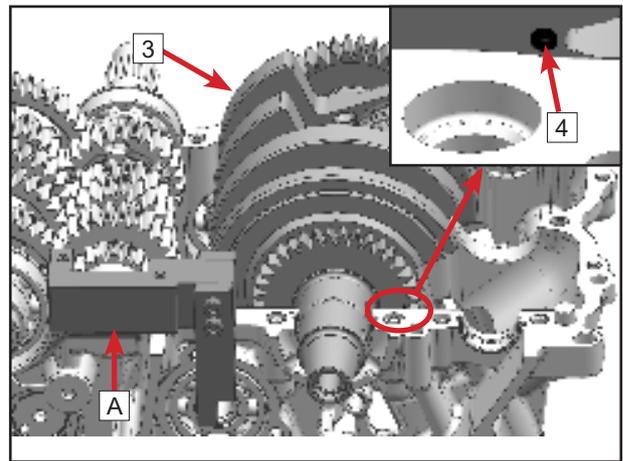
At this point, the dot mark on the balance shaft driven gear and the pit mark on the crankcase are also vertically aligned.



Fix the rear balance shaft in the position with the rear balance shaft positioning stop fixture [A] (0SQ0-000000-922-005).

Clean crankshaft journal with dust-free paper.

Hold the cone part on the left side of the crankshaft and the timing sprocket on the right side respectively with both hands, from right to left with the horizontal direction of 45°, slowly place the crankshaft connecting rod assembly [3] in place, at this time the mark [4] on the driving gear of the balance shaft is flush with the box closing surface.



NOTE

Assemble crankshaft and rear balance shaft in pairs according to the following.

Crankshaft Grouping Mark	Rear Balance Shaft Grouping Mark
A	B
B	A

The grouping of crankshaft refers to chapter 13.6.1.1.

The grouping of rear balance shaft refers to chapter 13.6.14.

Clean the journal of the front balance shaft assembly [5] using dust-free paper.

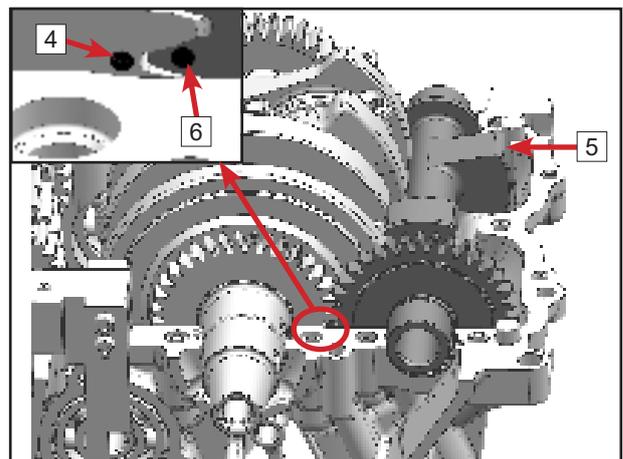
Align the mark [6] on the balance shaft driven gear with that [4] on the balance shaft driving gear, and slowly place the front balance shaft assembly [5] in place.

NOTE

Assemble crankshaft and front balance shaft in pairs according to the following.

Crankshaft Grouping Mark	Front Balance Shaft Grouping Mark
A	B
B	A

The grouping of front balance shaft refers to chapter 13.6.1.1.



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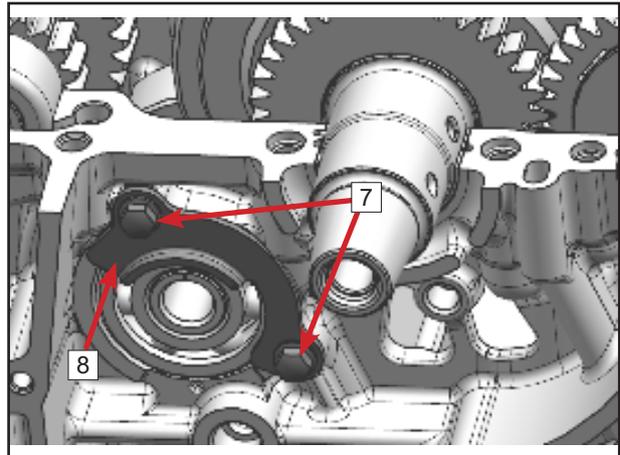
Daub an appropriate amount of oil evenly on the surface of the exposed crankshaft journal and the front balance shaft journal. Remove the rear balance shaft positioning stop gear.

Rotation crankshaft, should be flexible without stuck.

Apply 243 thread locking glue evenly on the thread part of M6x16 bolt **7**. Fix the left bearing baffle plate **8** on the upper crankcase with M6x16 bolts **7**, and press the bearing.

Left Bearing Baffle Plate Bolt Torque
--

10N•m



13.7.8 Crankcase Closing

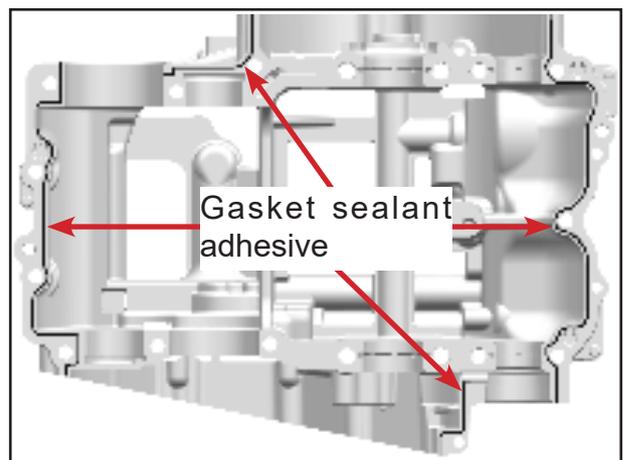
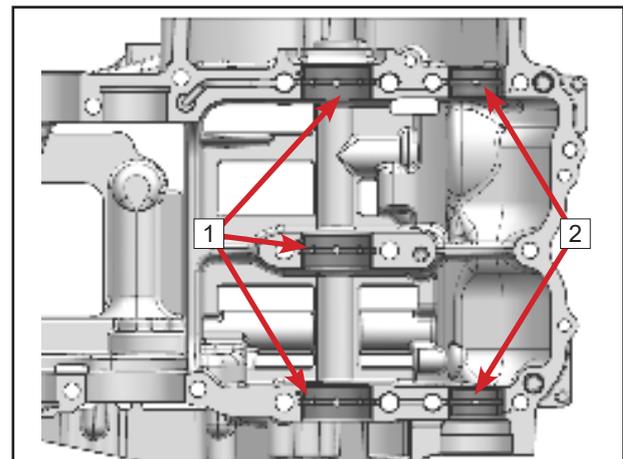
According to the paired assembly list in the section of "Engine assembly - Mounting crankshaft connecting rod assembly and front balancing shaft assembly", reconfirm that the main shaft bearing **1** and balancing shaft bearing **2** assembly on the lower crankcase are correct.

Clean the surface of main shaft bearing and balance shaft bearing with dust-free paper.

Evenly apply proper amount of oil on the inner surface of the main shaft bearing and balance shaft bearing.

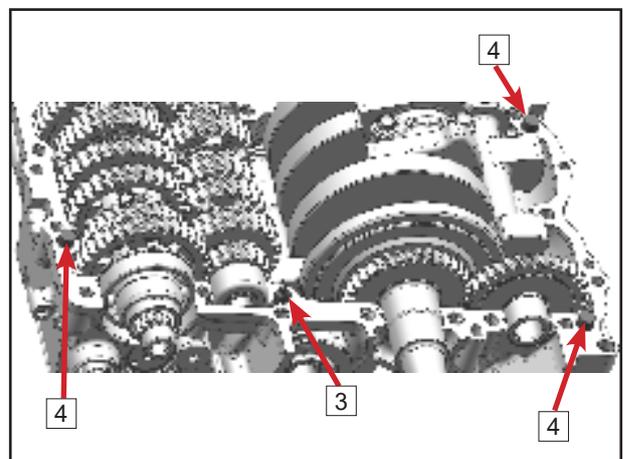
Wipe the upper and lower crankcase sealing surface with dust-free paper to ensure that the sealing surface is clean and dry.

The sealing surface of the lower crankcase is coated with KB598 sealant, the diameter of the glue line is (1.5 ± 0.5) mm, the glue line should be continuous and uniform, and the glue track is shown in the black area on the right.

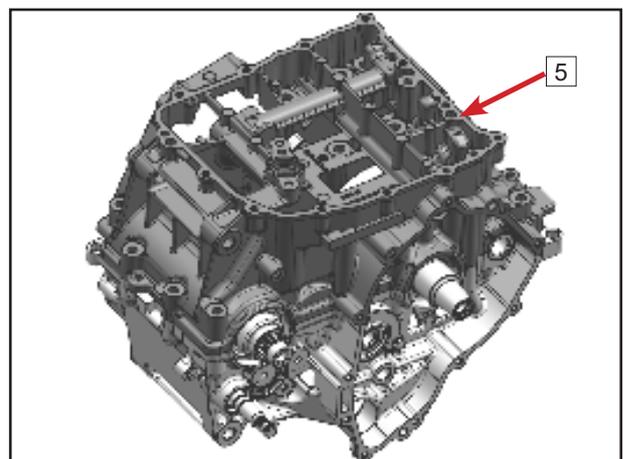


Install the throttle plug **3** (small hole down) into the corresponding hole of the upper crankcase.

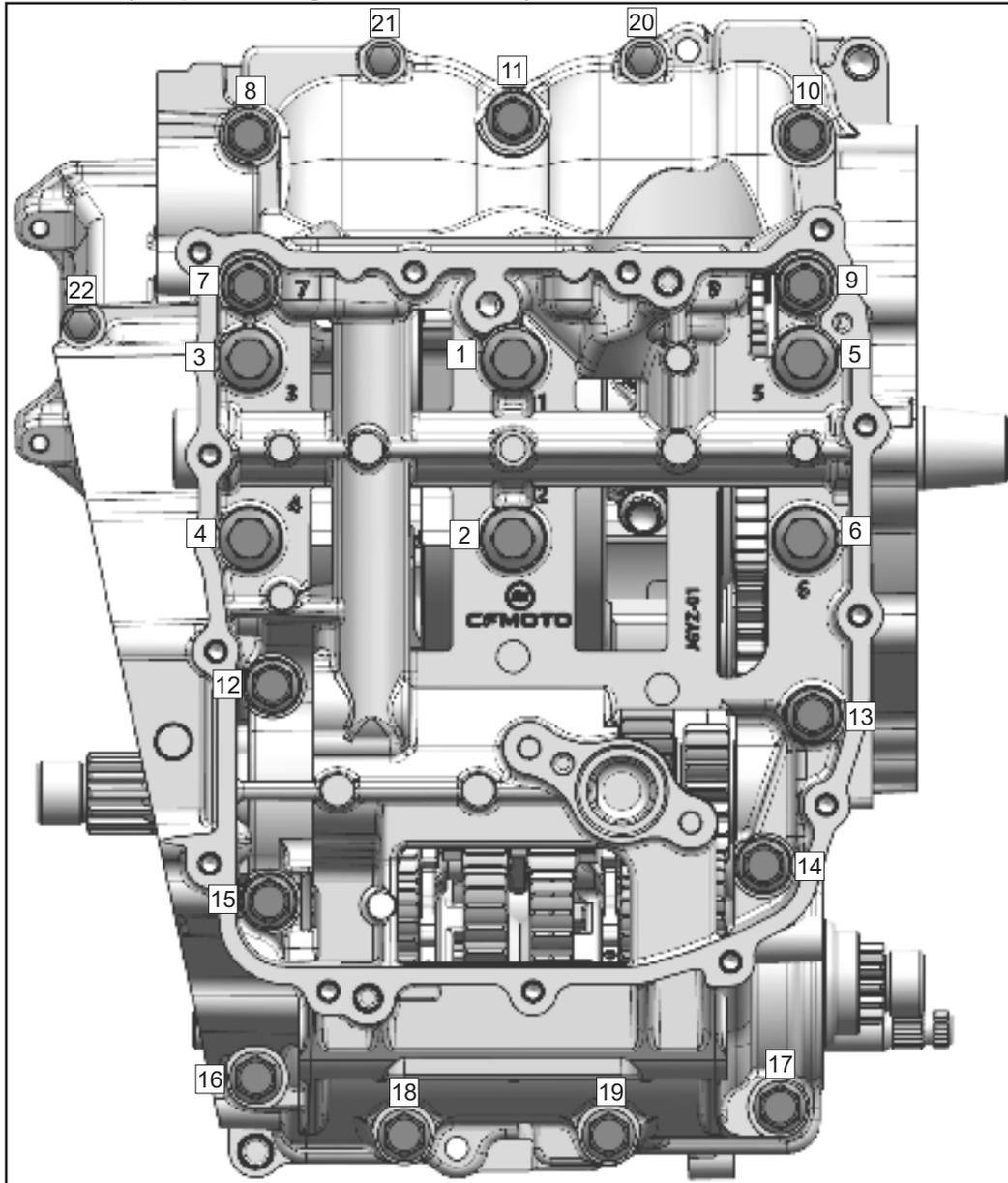
Check whether $\Phi 10 \times 14$ locating pins **4** are missing at all places of the upper crankcase.



The positioning hole **5** of the lower crankcase is aligned with the $\Phi 10 \times 14$ positioning pin **4** on the upper crankcase, and the lower crankcase is assembled on the upper crankcase.



According to the serial order shown, pretighten the box bolts until the bolt heads just fit the box surface (torque not higher than 4N•m)



Tighten the box bolts in the same sequence and in the following steps.

Step	Bolt No.	Torque (N•m)
1	1 ~ 19	8
2	1 ~ 19	20
3	1 ~ 6	35
4	7 ~ 19	27
5	20 ~ 22	10

Bolt No.	Part Name
1 ~ 6	bolt assy M9×108
7 9 13	bolt assy M8×105
14	bolt assy M8×55
12 15	bolt assy M8×45
11 18 19	bolt M8×45
8 10 16 17	bolt M8×55
20 21 22	bolt M6×30

Use dust-free paper to wipe clean the sealant squeezed out of the box surface.

The crankshaft, main shaft and counter shaft should be rotated flexibly without stagnation, otherwise, the box closing bolts should be loosened for inspection.

NOTE

It should be controlled within 5 minutes from the beginning of glue coating to the completion of box tightening bolts. Before assembling bolts, evenly daub the mixture of oil and MoS₂ grease (weight ratio 10:1) on the supporting surface of bolt head and thread part of bolt ① ~ ⑥, evenly daub the mixture of oil and MoS₂ grease on the thread part of bolt ⑦ ~ ⑱ (weight ratio 10:1).

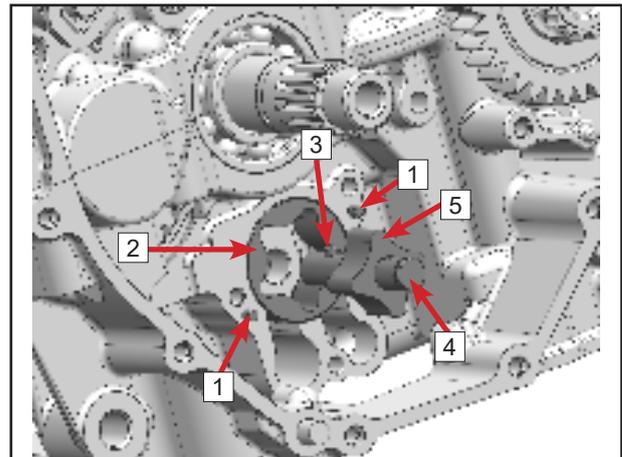
13.7.9 Oil Pump Sub-assembly and Oil Pressure Switch Installation

Install the P4×7.8 needle roller ① into the corresponding hole of the lower crankcase. Install the outer rotor of the oil pump ② into the corresponding hole of the lower crankcase.

Insert P4×15.8 needle roller ③ into the hole of the oil pump shaft ④, and make the length of the hole exposed at both ends of the needle roller roughly the same.

Make the needle groove of the rotor ⑤ of the oil pump face inward and align with P4×15.8 needle roller ③, and install the rotor of the oil pump on the shaft of the oil pump.

Install the oil pump shaft and the inner rotor of the oil pump together on the lower crankcase.

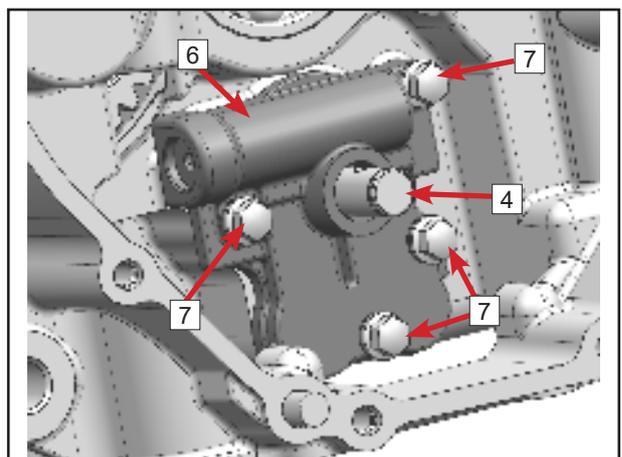


NOTE

Before assembly, evenly apply proper amount of oil on the surface of oil pump mounting hole of the lower crankcase and oil pump shaft.

Pass the oil pump cover assembly ⑥ through the oil pump shaft ④, align the P4×7.8 needle, and install it on the lower crankcase.

Install and diagonally cross tighten M6×22 bolts ⑦.



Oil Pump Cover Bolt Torque

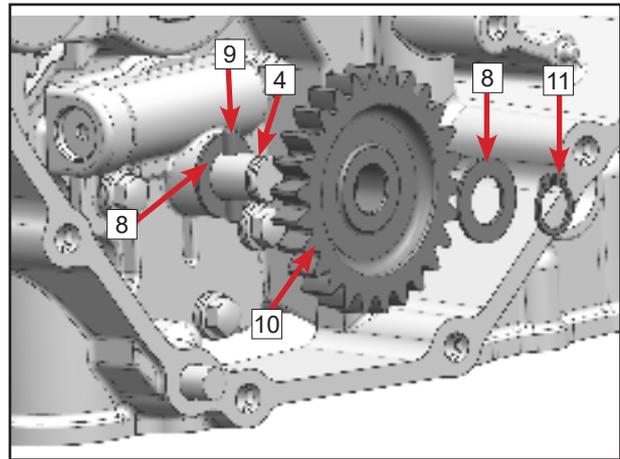
10N·m

Install the washer 11×20×1 [8] on the oil pump shaft.

Insert P4×21.8 needle roller [9] into the hole of the oil pump shaft [4], and make the length of the hole exposed at both ends of the needle roller roughly the same.

Make the needle roller groove of the oil pump gear [10] face inward and align with P4×21.8 needle roller [9], and install the oil pump gear on the oil pump shaft.

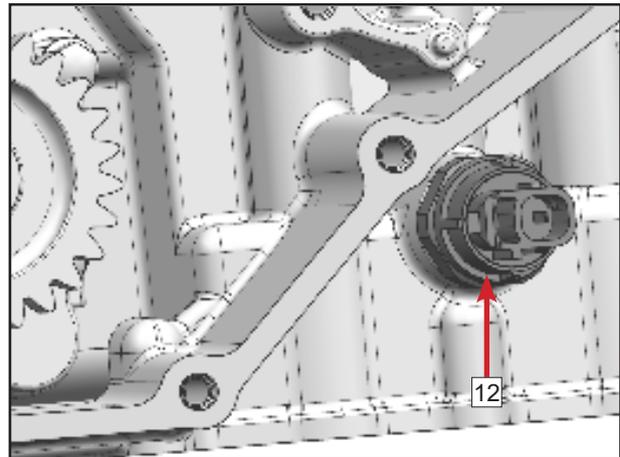
Then the washer 11×20×1 [8] and elastic ring [11] for Φ11 shaft are installed on the oil pump shaft.



NOTE

Circlips for shaft shall not be used twice, must be replaced with a new. The circlip must fall completely into the clamping groove of the oil pump shaft.

Apply an appropriate amount of 567 thread sealant to the thread part of the oil pressure switch [12] and install it on the lower crankcase.



Oil Pressure Switch Torque

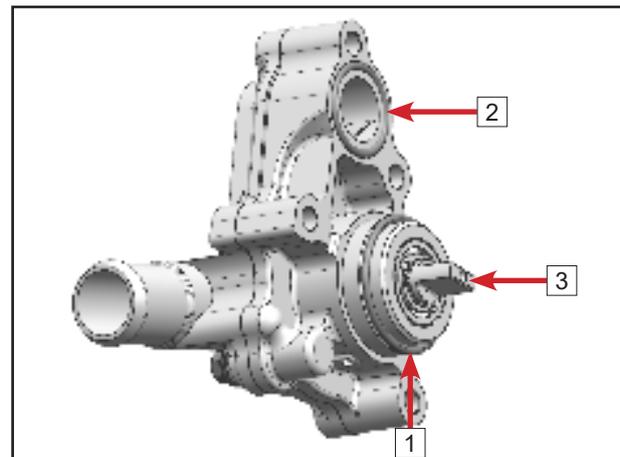
10N•m

13.7.10 Water Pump Installation

Check and confirm that O-ring 34×2.5 [1] and O-ring 22×2.3 [2] are not damaged or lost.

Turn the pump shaft [3], so that the square part of the shaft is aligned with the square groove on the balance shaft.

Insert the pump shaft [3] into the square groove of the front balance shaft.



Use M6x42 bolts [4] to fix the water pump assembly [5] onto the crankcase, and tighten the bolts diagonally.

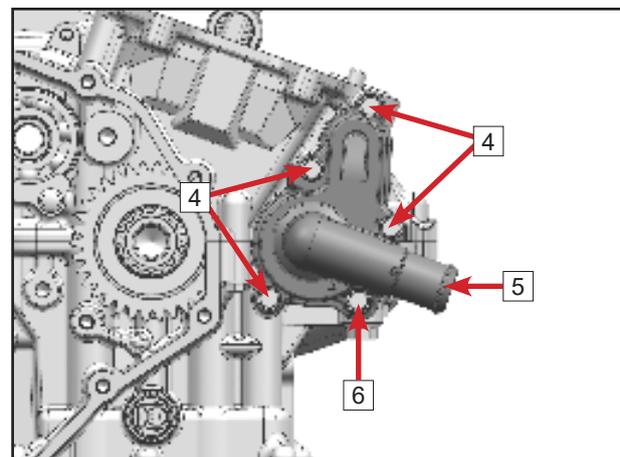
Water Pump Bolt Torque

10N•m

Tighten M6×22 bolt [6].

M6×22 Bolt Torque

10N•m



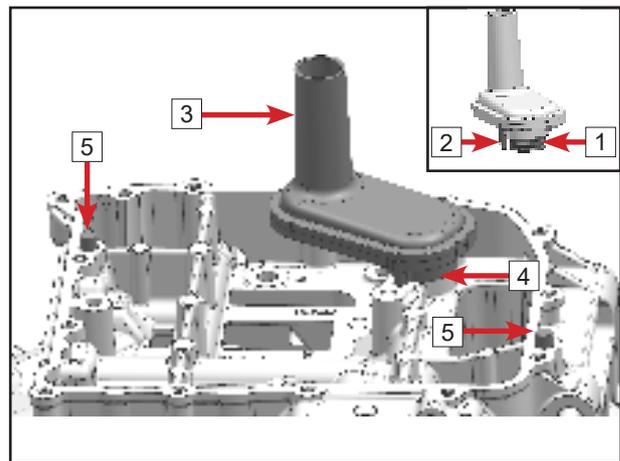
13.7.11 Oil Pan Installation

Check and confirm no damage and loss of oil suction pan sealing ring [1].

Align the positioning column [2] of the filter set [3] with the positioning hole on the crankcase, and insert the filter set [3] into the corresponding hole of the lower crankcase.

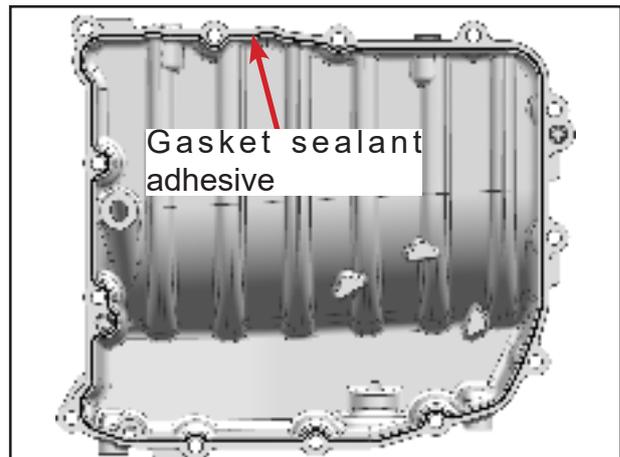
Press the filter set [3] to make its end face [4] contact with the lower crankcase and install it in place.

Install $\Phi 8 \times 12$ positioning pin [5].



Wipe the sealing surface of the crankcase and oil pan with dust-free paper to ensure that the sealing surface is clean and dry.

KB598 sealant is applied on the sealing surface of the oil pan. The diameter of the sealant line is (1.5 ± 0.5) mm. The glue line should be continuous and uniform, and the glue track is shown in the black area on the right.

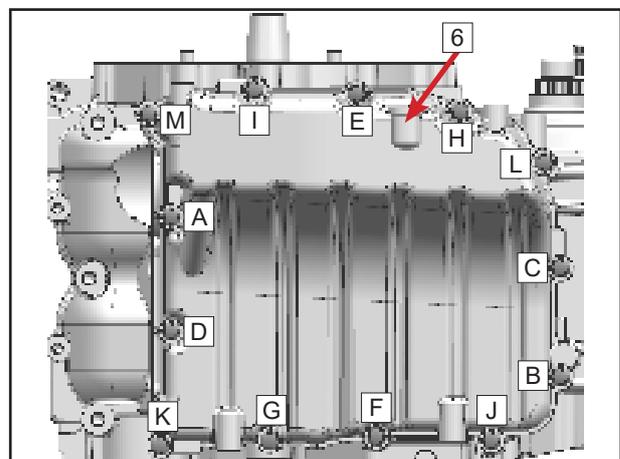


Align the positioning hole of the oil pan [6] with $\Phi 8 \times 12$ positioning pin on the lower crankcase, and install the oil pan to the lower crankcase.

Install and tighten the M6x25 bolts in the sequence of [A] ~ [M].

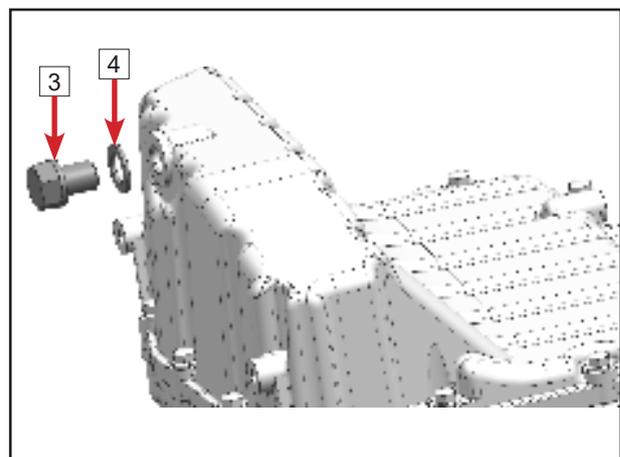
Oil Pan Bolt Torque
10N•m

NOTE
It should be controlled within 5 minutes from the beginning of gluing to the completion of bolt tightening.



The M12x1.5 magnetic oil drain bolt [3] is fitted with a washer [4] and installed on the oil pan.

Magnetic Oil Drain Bolt Torque
35N•m



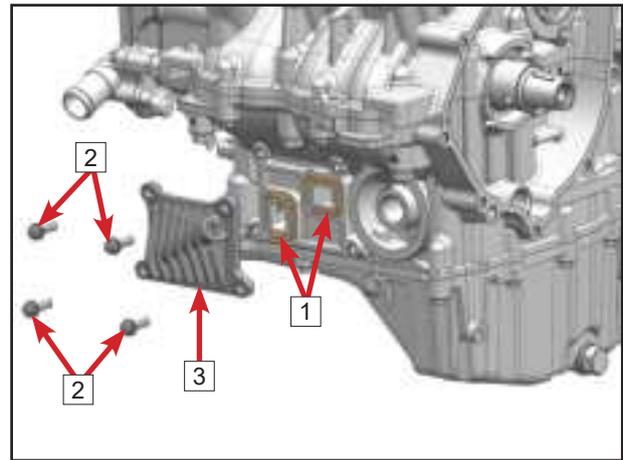
13.7.12 Oil Rail Cover Plate Assembly Installation

Turn over the housing assembly and place it securely.

Install the oil cooler seal ring **1** to the lower crankcase, making sure that the seal ring is fully seated in the groove.

Fasten the oil rail cover plate assembly **3** to the lower crankcase using M6 x 18 bolts **2**, tighten the bolts diagonally.

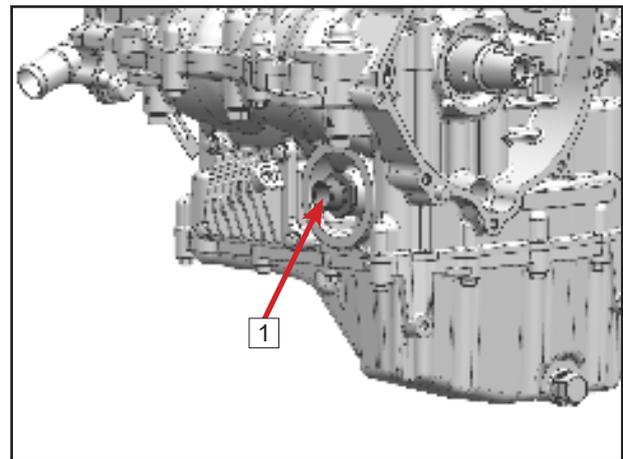
Oil Rail Cover Plate Bolt Torque
10N•m



13.7.13 Oil Filter Installation

Install the oil filter installation bolt **1** to the lower crankcase.

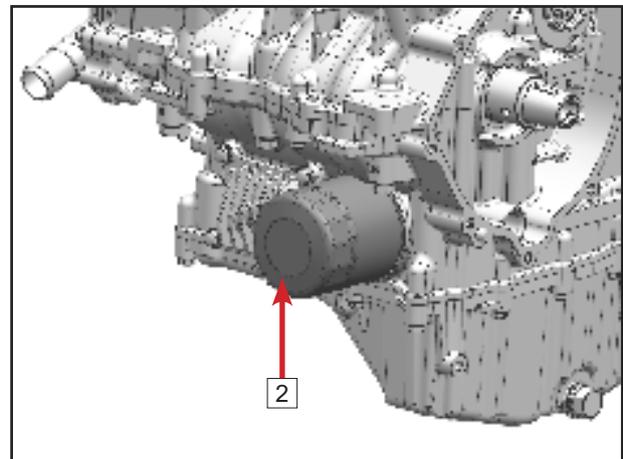
Oil Filter Installation Bolt Torque
25N•m



Evenly daub appropriate amount of oil on the sealing ring of the oil filter **2**.

Install the oil filter **2** on the lower crankcase.

Oil Filter Torque
17N•m



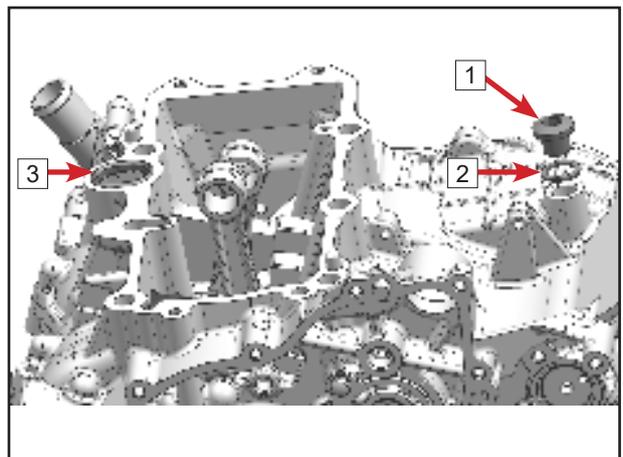
13.7.14 Cylinder Body and Piston Parts Installation

The M14×1.25×12 bolt **1** is fitted with gasket 14 **2** and then installed on the upper crankcase.

M14×1.25×12 Bolt Torque
25N•m

Check and confirm that there is no damage to the sealing ring **3** of the upper nozzle.

The upper nozzle sealing ring **3** (chamfering side up) is installed on the upper crankcase.

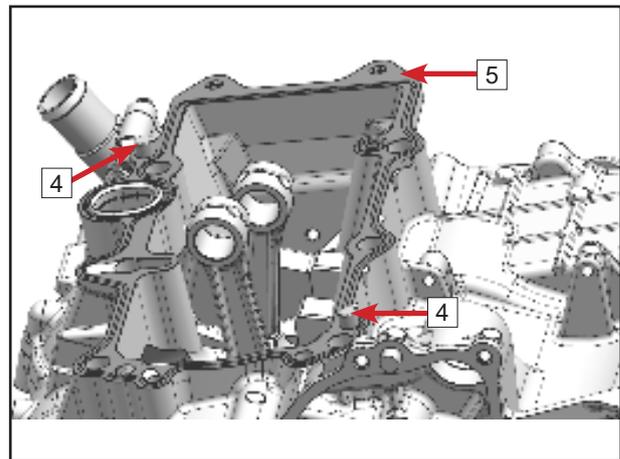


Check and confirm that $\Phi 8 \times 12$ locating pin **4** is not lost.

The cylinder body gasket **5** is mounted on the upper crankcase.

NOTE

Cylinder body gaskets should not be used twice and must be replaced.



Rotate the crankshaft, adjust the small head of one connecting rod to the highest point.

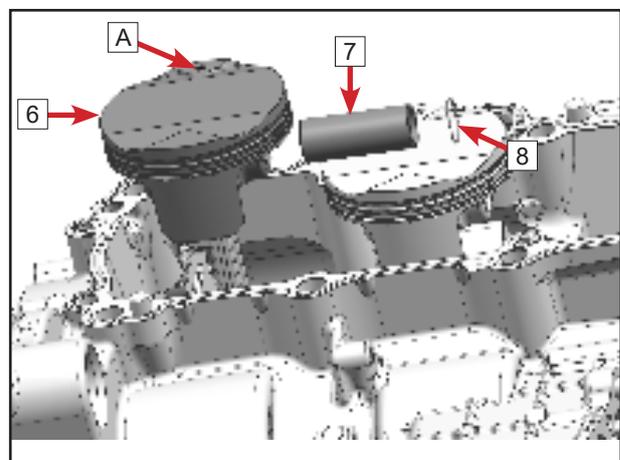
Apply proper amount of oil evenly on the surface of the piston pin hole and the outer surface of the piston pin.

Pass the piston pin **7** through the piston pin hole and the small head hole of the connecting rod, and install the piston parts **6** on the connecting rod.

The piston pin retaining ring **8** on the other side shall be assembled with needle-nose pliers, and the retaining ring shall be fully slotted, and the gap of the retaining ring shall be staggered with the piston gap. Assemble another piston part in the same manner.

NOTE

When assembling, the pit **A on the top of the piston shall be toward the exhaust side. The piston pin retaining ring shall not be used twice and must be replaced with a new one.**



In order to facilitate the piston into the cylinder body [9], evenly apply an amount of oil in the bottom 20mm range of the cylinder hole.

Press the piston ring of one of the pistons by hand and insert the ring completely into the cylinder body [9].

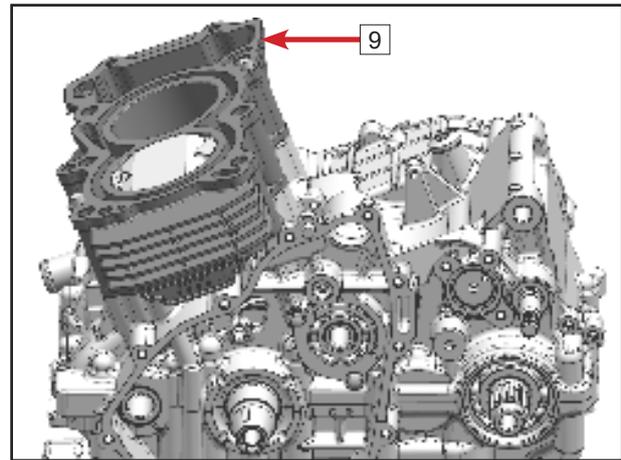
Rotate the crankshaft until the piston of the other cylinder is easily assembled.

Insert another piston part into the cylinder body [9] in the same manner.

Align the positioning hole of the cylinder body [9] with $\Phi 8 \times 12$ positioning pin, and install the cylinder body [9] on the upper crankcase.

Press the cylinder body, turn the crankshaft should be flexible.

Use dust-free paper to remove oil from the top of the piston.



When assembling, pay attention to the following details:

The piston and cylinder body must be assembled in pairs according to the requirements in the table below.

Cylinder Body Mark	Piston Mark
I	I
II	II

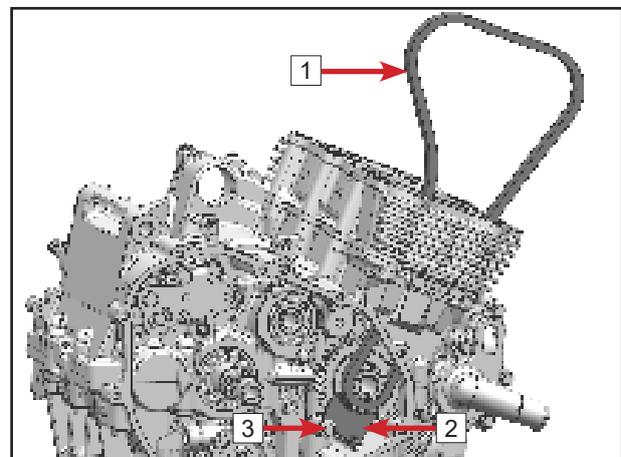
Each engine must be fitted with pistons in the same weight group as described in the section 13.6.5.

13.7.15 Timing Chain Installation

Put the timing chain assembly [1] from the chain chamber of the cylinder block, and hang it on the crankshaft sprocket.

Pass the limit hole on the timing chain tray [2] through the limit column on the lower crankcase.

Install M6x12 bolt [3] to fix the timing chain tray [2] to the lower crankcase.

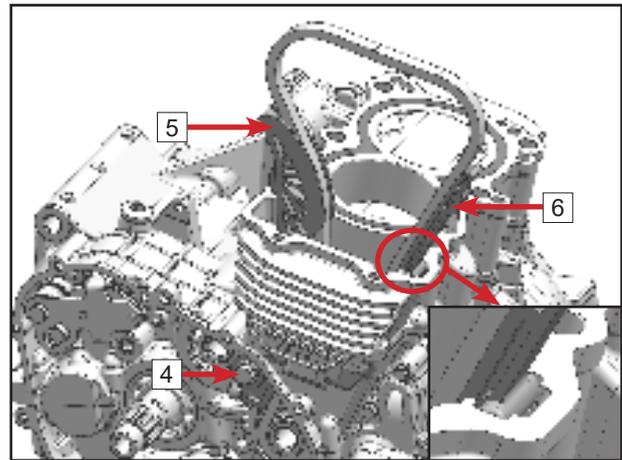


Timing Chain Tray Bolt Torque
10N•m

Install thread pin shaft [4], the tension plate [5] is fixed on the upper crankcase.

Thread Pin Shaft Torque
20N•m

Install the chain guide [6] in place.



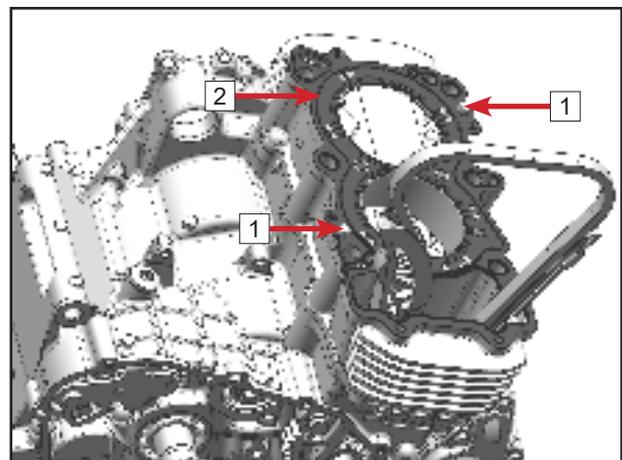
13.7.16 Cylinder Head Installation

Clean the upper plane of the cylinder body with dust-free paper.

Check and confirm that $\Phi 8 \times 12$ locating pin [1] is not lost.

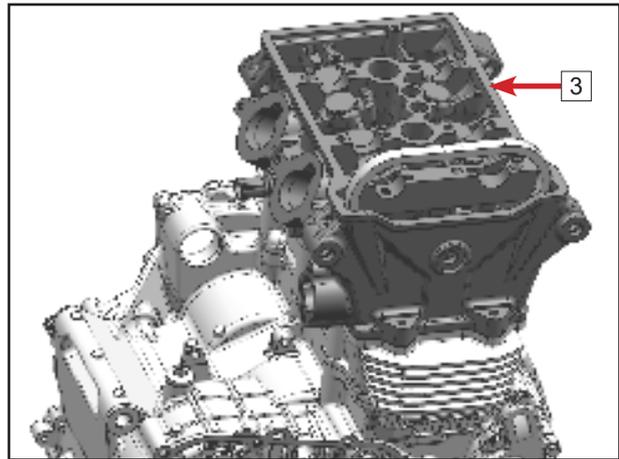
The cylinder head gasket assembly [2] is mounted on the cylinder body.

NOTE
The cylinder head gasket assembly must not be reused and must be replaced.

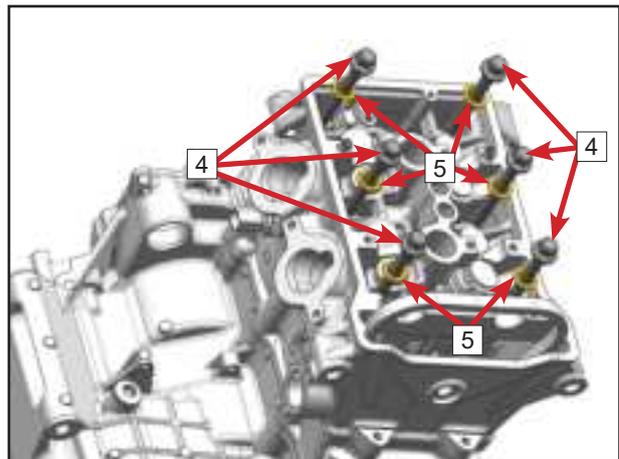


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Clean the lower plane of the cylinder head assembly with dust-free paper.
Align the positioning hole of the cylinder head assembly 3 with $\Phi 8 \times 12$ positioning pin, and install the cylinder head assembly 3 on the cylinder body.

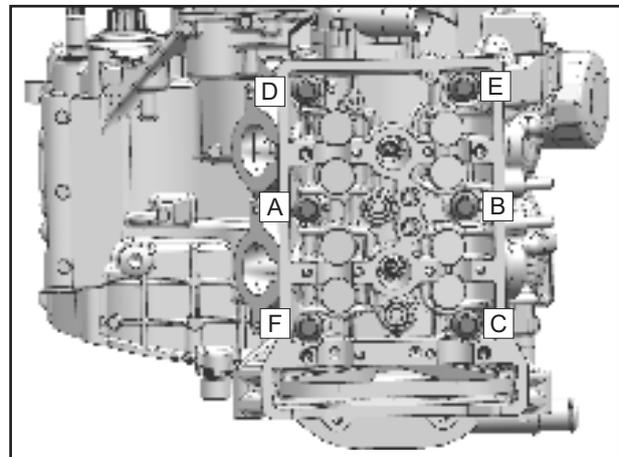


Apply proper amount of oil and MoS_2 grease mixture (weight ratio 10:1) evenly on the thread part of M10×150 cylinder head bolts 4.
Insert the M10×150 cylinder head bolt 4 through the 10.5×19×2.3 washer 5 into the cylinder head mounting hole.



Tighten the M10×150 cylinder head bolts 4 twice in sequence according to the order of A~F, the torque is shown in the table below.

M10×150 Cylinder Head Bolt Torque		
New Bolt	1	20N•m
	2	54N•m
Old Bolt	1	20N•m
	2	49N•m

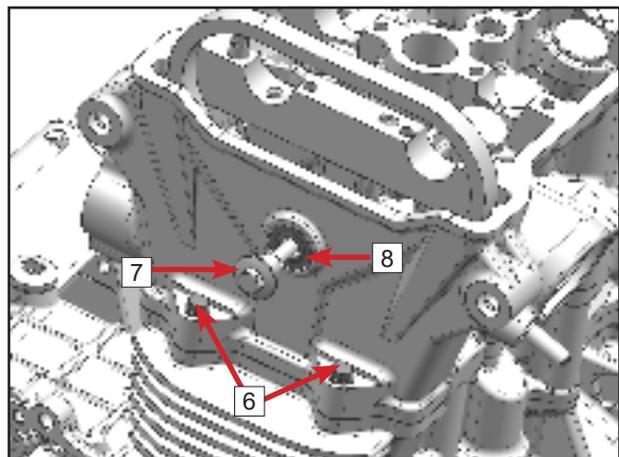


Install M6×90 bolt 6.

M6×90 Cylinder Head Bolt Torque
10N•m

Install the cylinder head shock absorbing bolts 7 through the cylinder head cover bolt sealing ring 8 (with one side of sealing belt facing inward) and timing chain assembly to the cylinder head.

Cylinder Head Shock Absorbing Bolt Torque
10N•m



13.7.17 Magneto Rotor Assembly Installation

Apply 567 thread sealant evenly on the thread part of the main oil passage plug **1**. Install the main oil passage plug **1** to the lower crankcase.

Main Oil Passage Plug Torque
20N•m

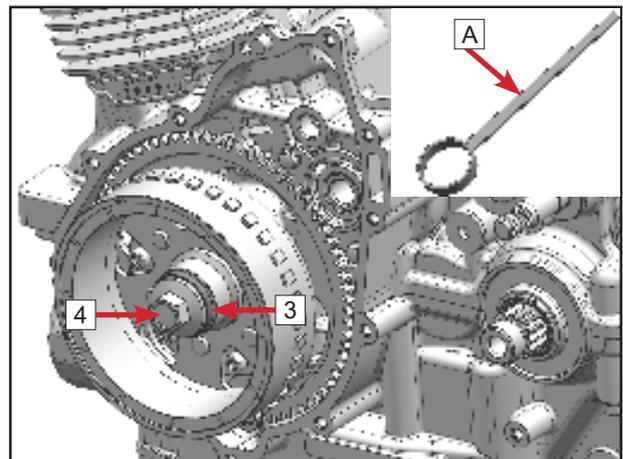
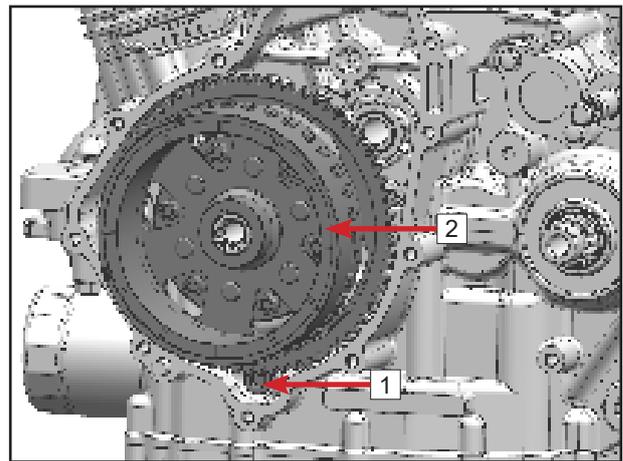
Clean the conical hole of the magneto rotor and the conical surface of the crankshaft with dust-free paper.

Align the keyway of the magneto rotor with the semicircular keys on the crankshaft, and install the magneto rotor assembly **2** on the crankshaft.

Fix the magneto rotor with the magneto rotor stop fixture **A** (0SQ0-031000-922-001).

Install 12.5×33×5 gasket **3** (with large chamfering side facing bolt flange) and M12×1.25×40 bolt **4**, fix magneto rotor to crankshaft.

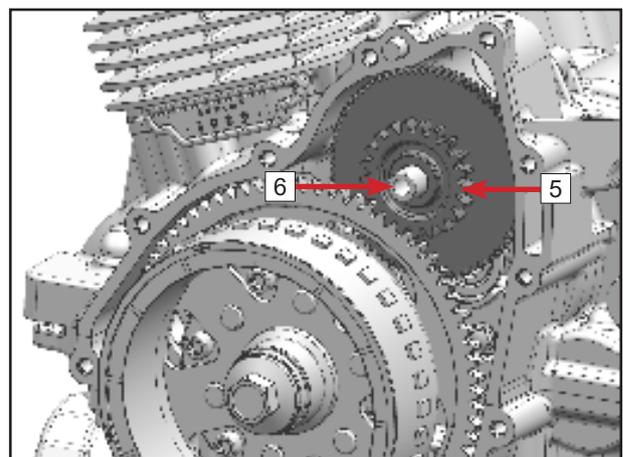
Magneto Rotor Bolt Torque
155N•m



Tilt the double gear **5** into the crankcase, and make the teeth of the double gear and the teeth of the starting gear meshing.

Evenly daub an appropriate amount of oil on the outer surface of the intermediate gear shaft **6**.

Insert the intermediate gear shaft **6** into the holes in the double gear **5** and crankcase.



13.7.18 LH Side Cover Installation

Check if $\Phi 8 \times 12$ locating pin **1** is lost.

Wipe the closing surface of the crankcase and the left cover with dust-free paper to ensure that the closing surface is clean and dry.

In the rubber block groove inside the stator of the magneto daub an appropriate amount of KB598 plane sealant, the rubber block clamp to the left cover.

KB598 plane sealant is coated on the box surface of the left cover, the diameter of the glue line is (1.5 ± 0.5) mm, the glue line should be continuous and uniform, and the glue track is shown in the black area on the right.

Align the positioning hole on the left cover with $\Phi 8 \times 12$ positioning pin on the crankcase, and install the left cover assembly **2** to the crankcase.

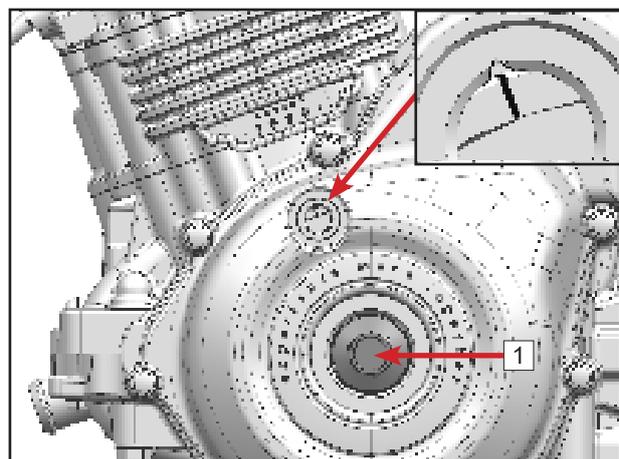
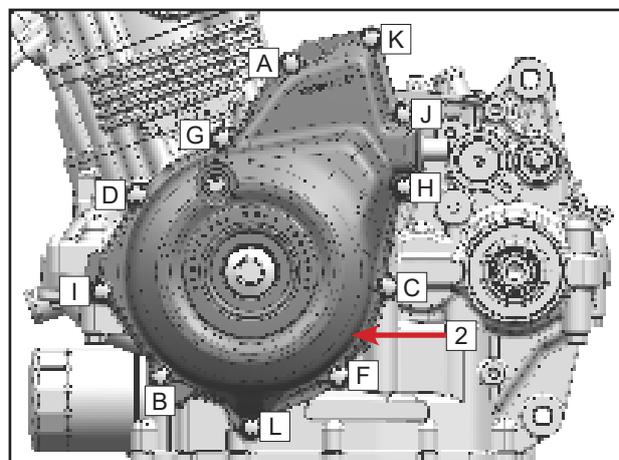
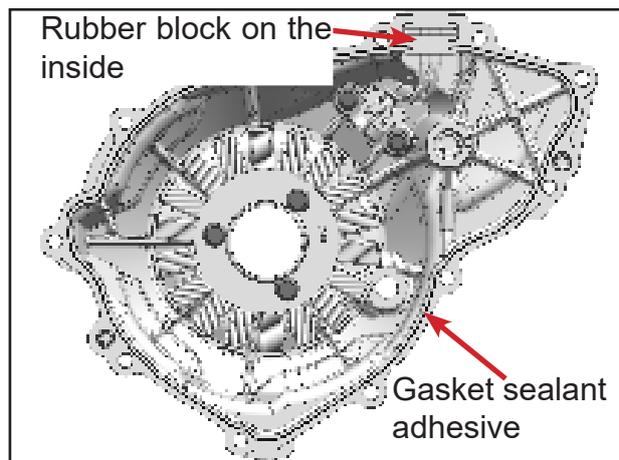
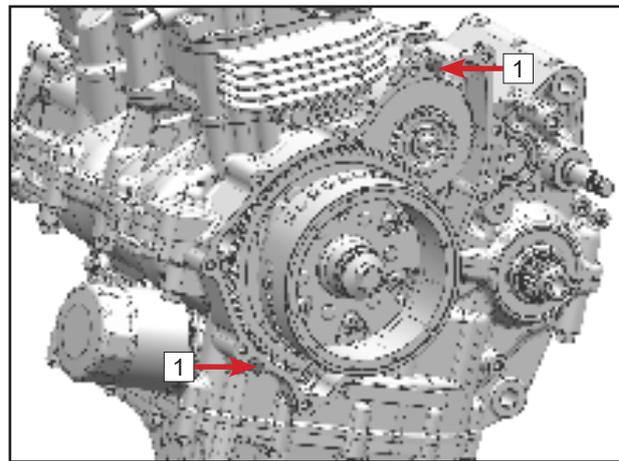
Install and tighten M6x30 bolts to fix the left cover in the order of **A** ~ **L**.

Left Cover Bolt Torque
10N•m

NOTE
It should be controlled within 5 minutes from the beginning of gluing to the completion of bolt tightening.

13.7.19 Intake and Exhaust Camshaft Installation

Rotate the crankshaft **1** counterclockwise to align the assembly mark "I" on the magneto rotor with the notch center of the timing observation hole on the left cover.



Evenly daub appropriate amount of oil on the supporting journal of the intake camshaft assembly [2] and exhaust camshaft assembly [3].

The timing sprocket of the intake camshaft assembly [2] and exhaust camshaft assembly [3] is mounted on the cylinder head after hanging into the chain.

NOTE

During assembly, the "IN" line on the intake timing sprocket is parallel to the plane on the cylinder head, and the "EX" line on the exhaust timing sprocket is parallel to the plane on the cylinder head, as shown in the figure on the right.

Check if $\Phi 8 \times 14$ location pin [4] is lost.

The intake camshaft seat assembly [5] and exhaust camshaft seat [6] are mounted on the cylinder head.

NOTE

Intake and exhaust camshaft seats and cylinder heads shall be assembled with the same code mark above.

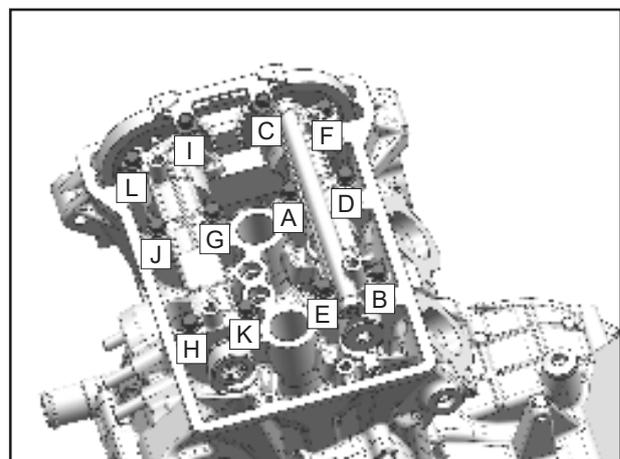
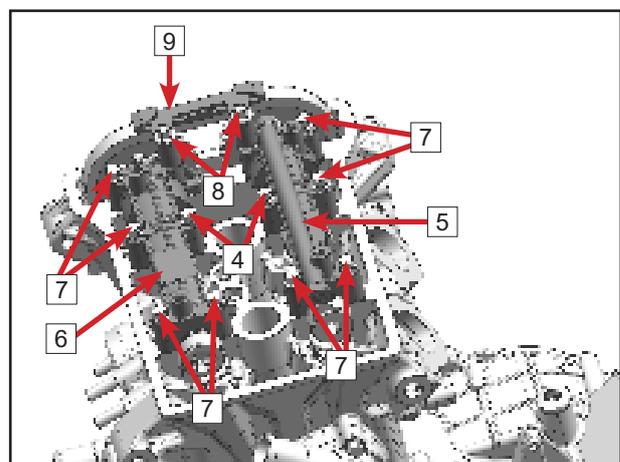
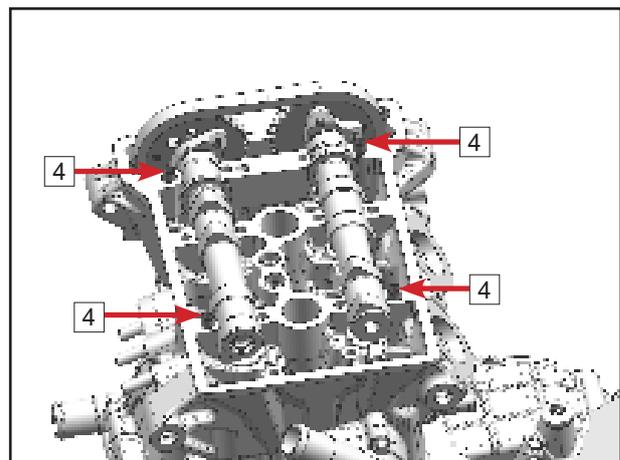
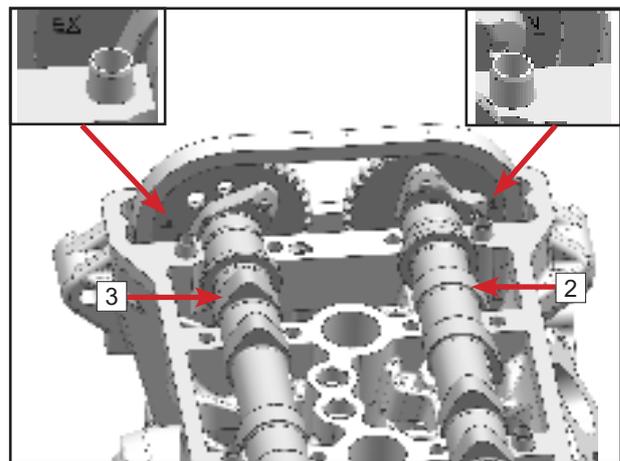
Install M6×45 bolt [7], M6×65 bolt [8] and guide chain block [9].

NOTE: According to the order of A ~ L, tighten the camshaft seat bolt three times in turn, the torque is shown in the following table.

Camshaft Seat Bolt Torque	
First Time	5N•m
Second Time	8N•m
Third Time	12N•m

Adjust the valve clearance in the cooling state (refer to section 13.6.3).

Valve Clearance (Cold Engine)	
Intake Valve	0.10 mm ~ 0.15 mm
Exhaust Valve	0.25 mm ~ 0.31 mm



13.7.20 Hydraulic Tensioner Installation

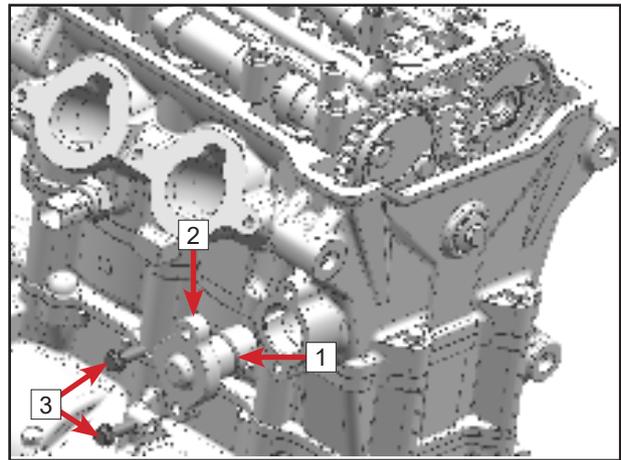
Evenly daub proper amount of oil on the surface of the tensioner sealing ring [1], the tensioner mounting hole, the tensioner assembly [2] and the part in contact with the tensioner plate.

The tensioner sealing ring [1] is loaded into the sealing groove of the tensioner assembly [2].

Fix the tensioner assembly [2] to the cylinder head with M6x20 bolts [3].

Tensioner Bolt Torque
10N•m

Use a suitable tool (such as a screwdriver) to press the tension plate towards the tensioner side so that the tension plate presses the tensioner plunger, the plunger unlocks and pops out, ensuring that the timing chain is reliably tensioned.



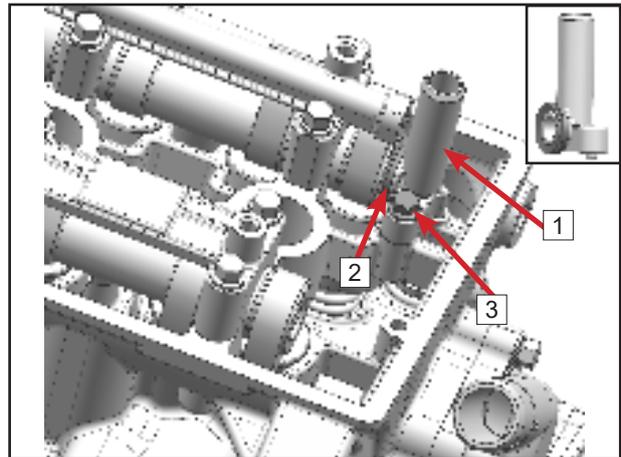
13.7.21 Cylinder Head Cover Installation

Apply proper amount of oil evenly on the surface matching the transition joint assembly [1] and the end oil seal [2].

Install the end oil seal [2] on the joint assembly [1], the oil seal lip toward the camshaft.

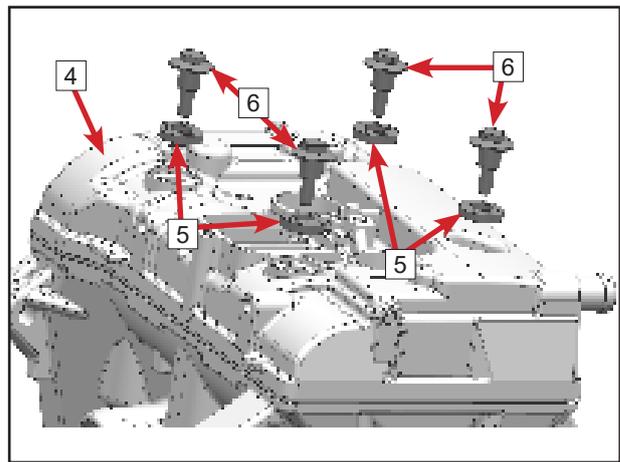
Daub an appropriate amount of oil evenly on the contact surface between the intake camshaft and the end oil seal.

Fix the transition joint assembly [1] to the cylinder head with M6x20 bolt [3] (torque 10N•m), and the lip of the end face oil seal [2] should fit well with the end face of the camshaft.



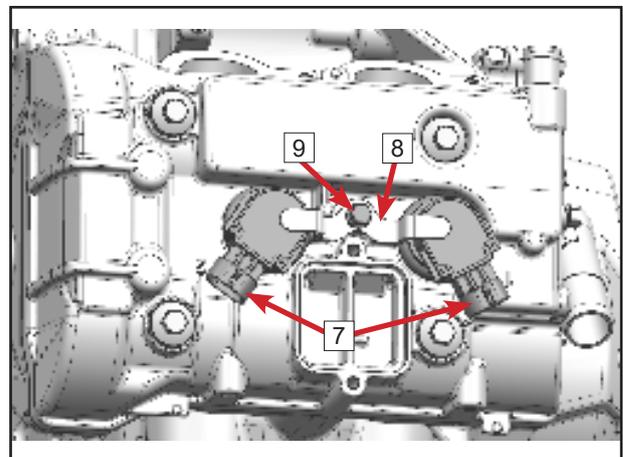
The cylinder head cover assembly **4** is mounted on the cylinder head. Install cylinder head cover bolt seal ring **5** (with sealing belt side down) and cylinder head cover bolt **6** (diagonal cross tightening).

Cylinder Head Cover Bolt Torque
10N•m



Insert the ignition coil **7** (the orientation and position of the connector are shown in the picture on the right) into the corresponding position of the cylinder cover and press the assembly into place. The pressure plate **8** is fixed to the cylinder cover with M6x12 bolt **9**, and the ignition coil **7** is pressed tightly.

Ignition Coil Pressure Plate Bolt Torque
10N•m



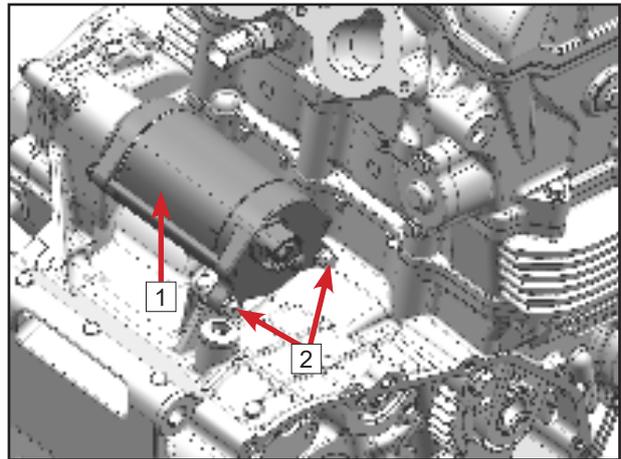
13.7.22 Starter Motor Installation

Evenly daub an appropriate amount of oil on the surface of the sealing ring of the starter motor **1** and the crankcase mounting hole.

Make the gear of the starter motor **1** engage with the double gear, and install the starter motor **1** on the crankcase.

Install M6x25 bolts **2**.

Starter Motor Bolt Torque
10N•m



13.7.23 Clutch Installation

NOTE

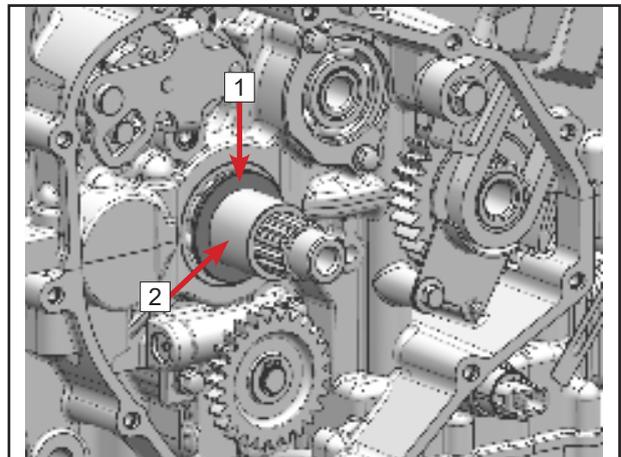
Assembly clutch and crankshaft in pairs according to the following.

Clutch Grouping Mark	Crankshaft Grouping Mark
A	B
B	A

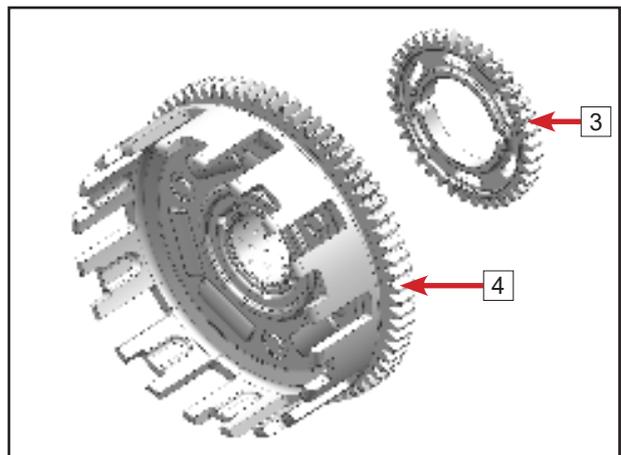
The grouping of clutch refers to chapter 13.6.8.

The grouping of crankshaft refers to chapter 13.6.1.1.

Install 25.2×46×5.8 gasket **1** (big end outward) and clutch sleeve **2** (evenly apply proper amount of oil on the inner ring).

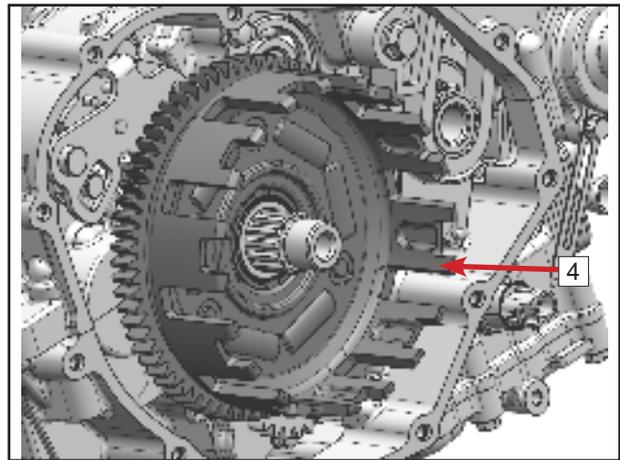


Install the driving gear **3** of oil pump on the primary driven gear **4**.

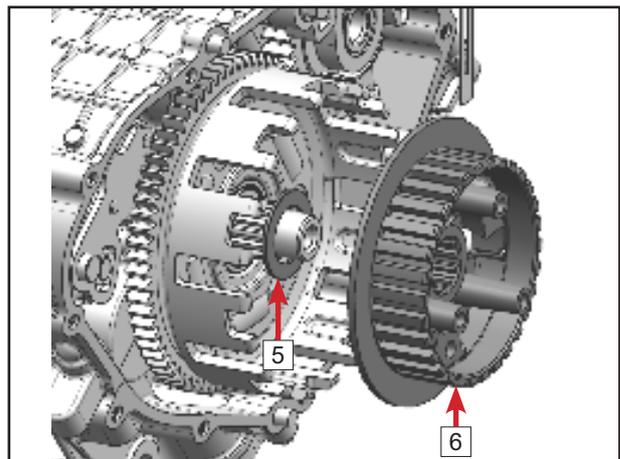


Evenly daub an appropriate amount of oil on the surface of the bushing of the primary driven gear [4].

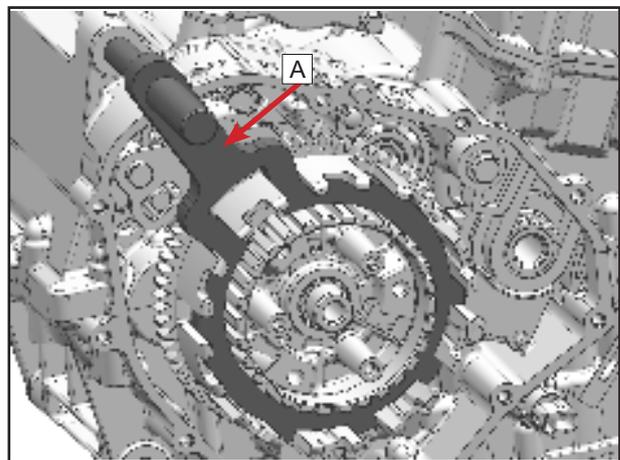
Assemble the primary driven gear [4] on the main shaft.



In turn put the 25.2×39×2 washer [5] and central sleeve [6] on the main shaft.

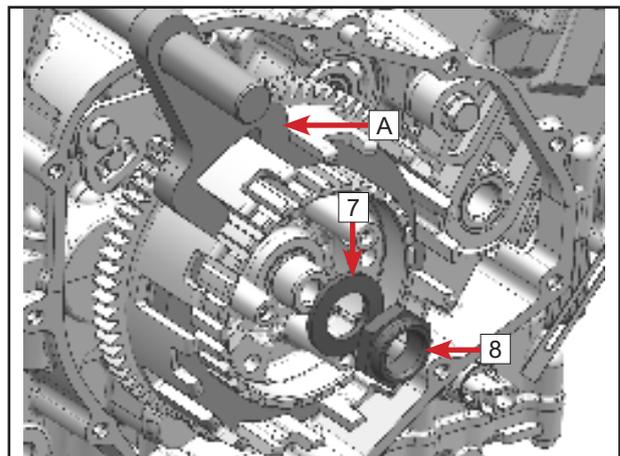


Use the clutch master/slave hub stop gear [A] (0SQ0-050000-922-001) to fix the central sleeve.



Install an elastic washer 20 [7] (the small end of the cone facing the M20×1.5 nut [8]). Install M20×1.5 nut [8] and fix primary driven gear.

Clutch Nut Torque
125N•m



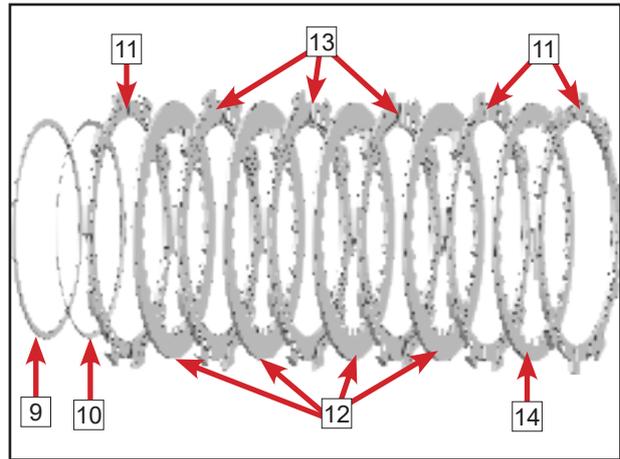
Remove the clutch main and slave hub stop gear [A].

CFMOTO

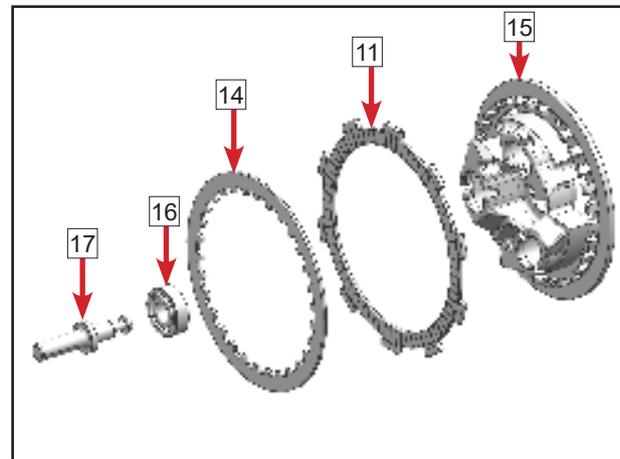
In order to install the disc spring seat **9** in the central sleeve, disc spring **10**, lining disc assembly II **11**, driven disc II **12**, lining disc assembly I **13**, driven disc II **12**, lining disc assembly I **13**, driven disc II **12**, lining disc assembly I **13**, driven disc II **12**, lining disc assembly II **11**.

NOTE

The small end of the disc spring cone faces inward (magneto side) to assemble. Lining disc I is wider than lining disc II. Driven disc II is wider than driven disc I.

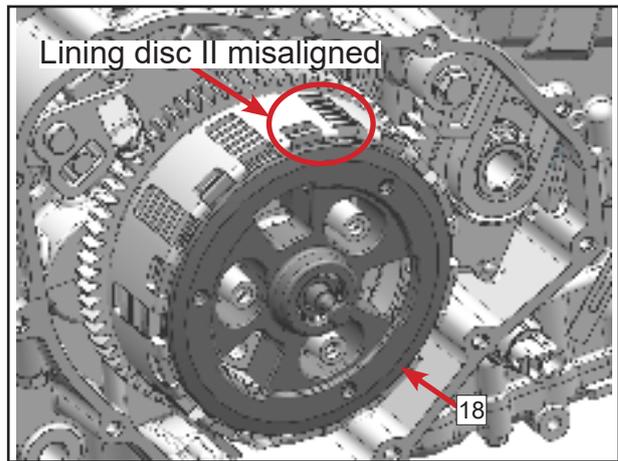


In turn load the lining disc II **11**、driven disc I **14** onto pressure disc **15**. Load 6001 rolling bearing **16** onto the bearing hole of the pressure disc **15**, the marked face of the bearing is outwards (magneto side). Load the pull rod **17** into the 6001 rolling bearing **16**.

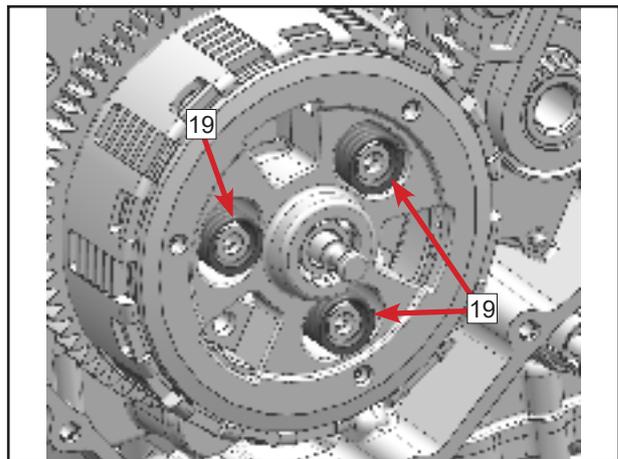


Load the pressing plate 18 into the central sleeve.

NOTE
The outermost lining disc assembly II shall be misaligned.

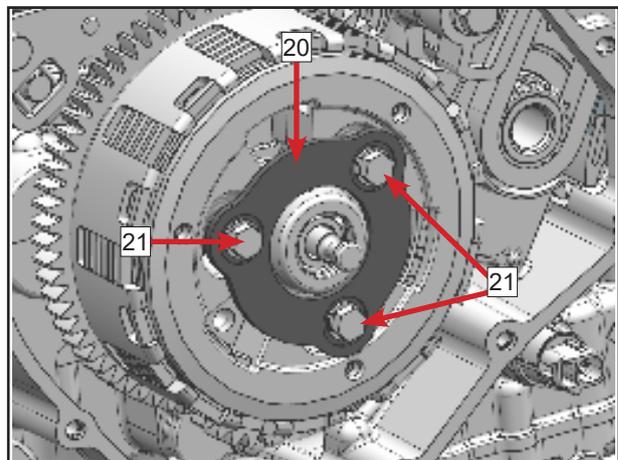


Install clutch spring 19.



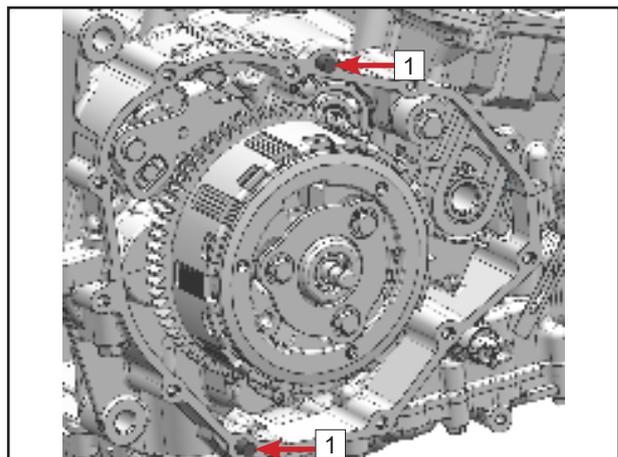
Install M6×35 bolt 21 to fix clutch spring pressure plate 20.

Clutch Spring Pressure Plate Bolt Torque
10N•m



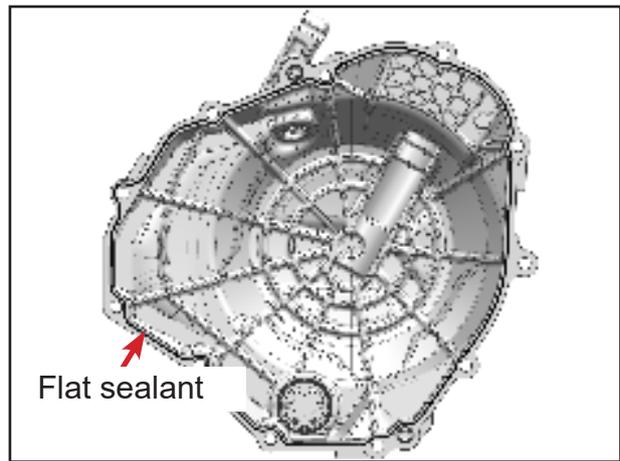
13.7.24 RH Side Cover Installation

Check if $\Phi 8 \times 12$ locating pin 1 is lost.



Wipe the closing surface of the crankcase and the RH side cover with dust-free paper to ensure that the closing surface is clean and dry.

KB598 flat sealant is coated on the closing surface of the RH cover, the diameter of the glue line is (1.5 ± 0.5) mm, the glue line should be continuous and uniform, and the glue track is shown in the black area on the right.



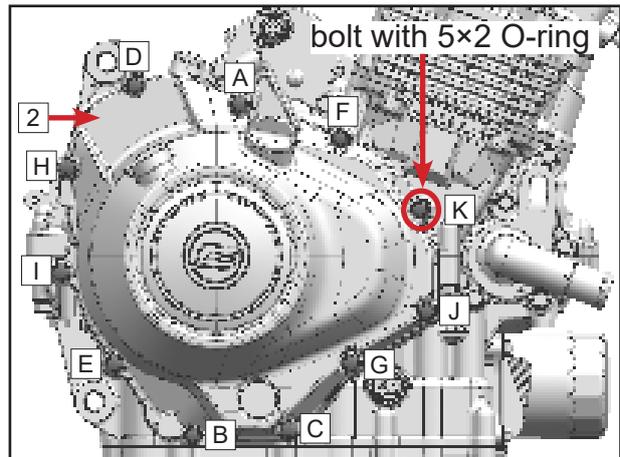
Align the positioning hole on the RH cover with $\Phi 8 \times 12$ positioning pin on the crankcase, and install the RH cover [2] on the crankcase.

Install the M6x25 bolts to fix the RH cover in the sequence of [A] ~ [K].

RH Cover Bolt Torque
10N·m

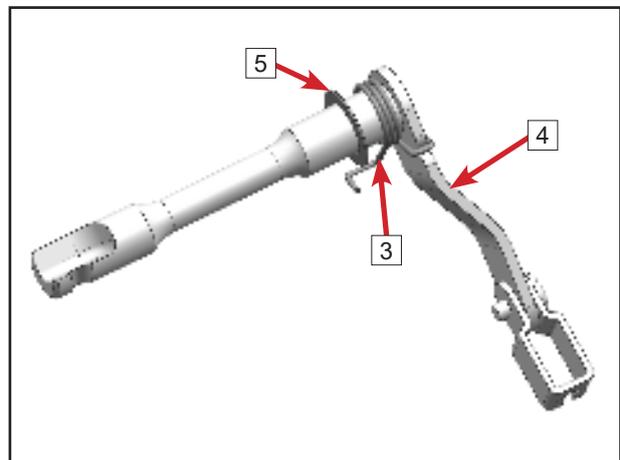
NOTE

It should be controlled within 5 minutes from the beginning of gluing to the completion of bolt tightening.



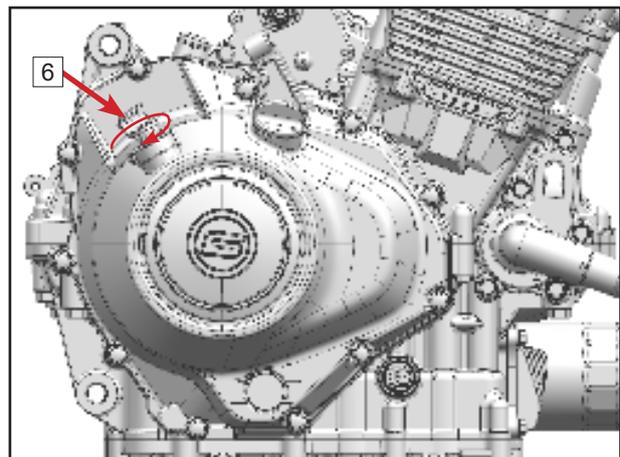
The return spring [3] of the clutch lever is mounted on the clutch control shaft, and the end of the spring is clamped into the gap of the clutch control arm [4].

Install the 12.5x18.5x0.6 washer [5] on the clutch control shaft.



The clutch control shaft [6] is mounted on the RH cover, and the other end of the clutch control lever return spring [3] is hung on the RH cover.

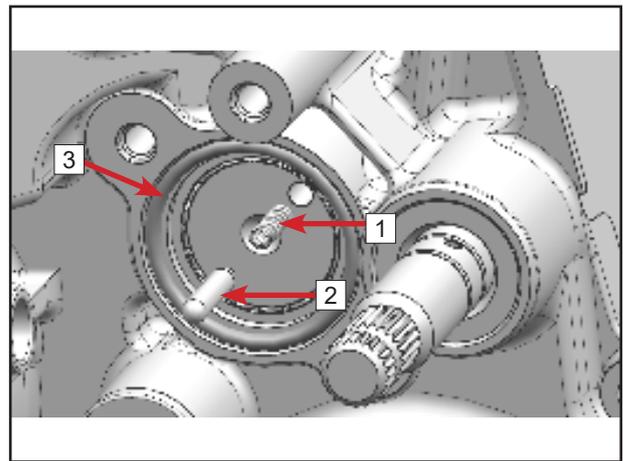
Rotate the clutch control shaft [6] clockwise to feel it fit the clutch pull rod.



13.7.25 Gear Sensor Installation

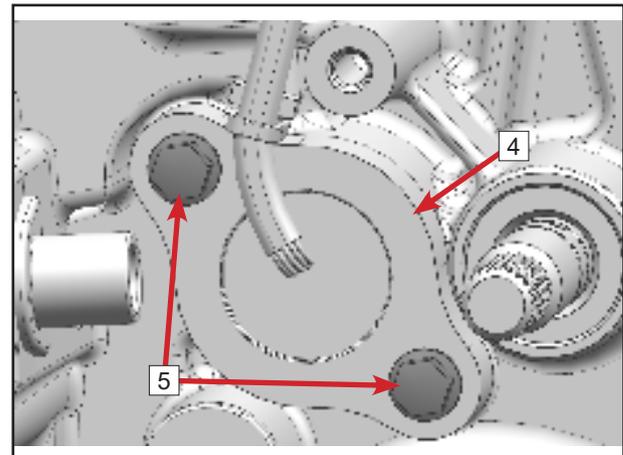
In turn, the contact spring [1] and the ball contact [2] are loaded into the corresponding hole of the shift drum.

Apply proper amount of oil on 31.5× 2.5 O-ring [3] and put it into the corresponding hole of the upper crankcase.



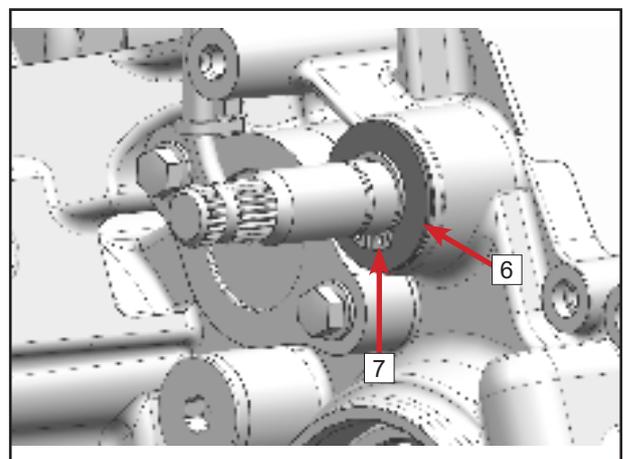
The gear sensor [4] (with cylindrical surface and end face coated with appropriate amount of oil) mounted on the crankcase.

Install M6x25 bolts [5] (the thread part is coated with 243 thread locking glue) to fix the gear sensor assembly [4].



Gear Sensor Bolt Torque
10N•m

In turn install the 14×28×1 washer [6] and Φ14 elastic circlip for shaft [7] to the shift shaft.

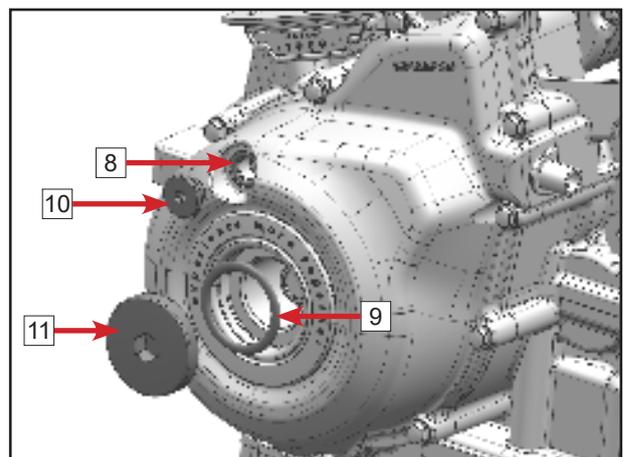


NOTE
Φ14 elastic circlip for shaft can not be used twice, must be replaced with a new one, must be completely into the groove.

Check if 13×2 O-ring [8] and 35×3.5 O-ring [9] are damaged.

Apply an appropriate amount of oil to the 13×2 O-ring [8] and put it into the corresponding hole on the LH cover.

Install the timing observation hole cover [10] on the LH cover.



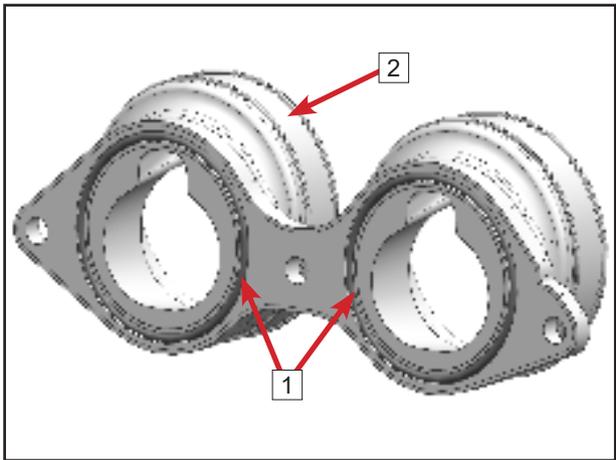
Timing Observation Hole Cover Torque
4N•m

Apply proper amount of oil to the 35× 3.5 O-ring [9] and install it on the filter cover [11]. Install the strainer cover [11] on the LH cover.

Strainer Cover Torque
10N•m

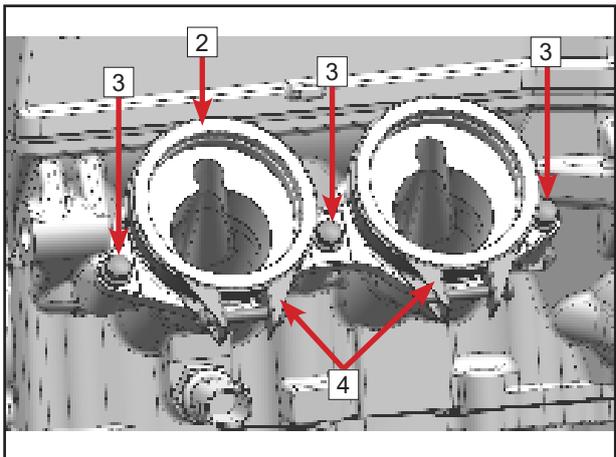
13.7.26 Throttle and Fuel Pipe Assembly Installation

The 46.2×2 O-ring **1** is loaded into the sealing groove of the throttle body connecting pipe **2**.



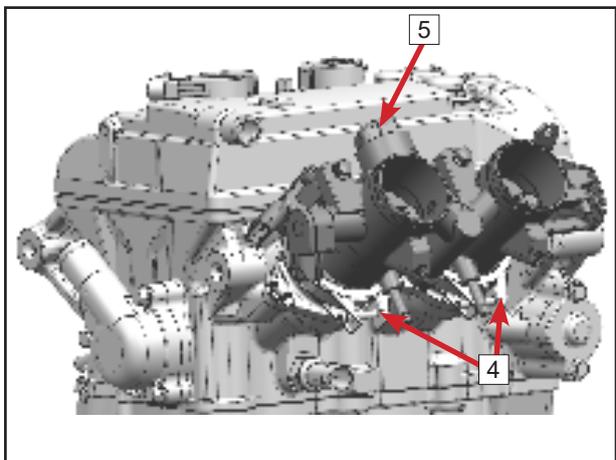
The throttle body connecting tube assembly **2** is fixed to the cylinder head with M6x18 bolts **3**.

Throttle Body Connecting Tube Bolt Torque
10N•m



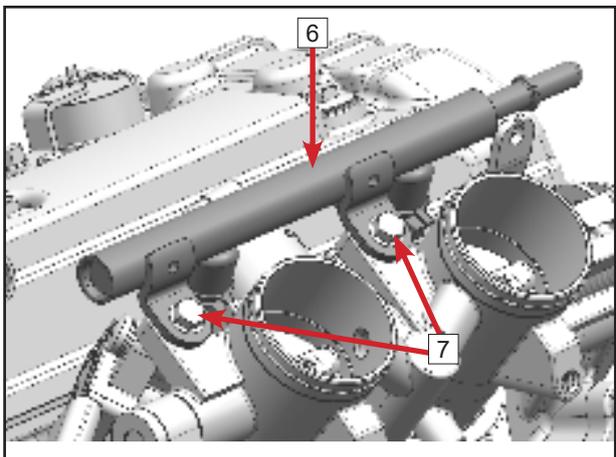
Clamp 62 **4** (direction as shown in the figure, not tightened) on the throttle body connecting pipe combination **2**.

The throttle body assembly **5** is installed on the throttle body connecting pipe assembly.
Tighten clamp 62 **4**.



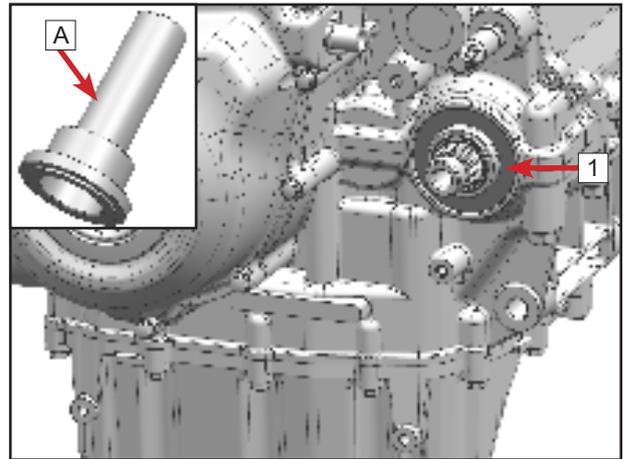
The fuel pipe assembly **6** is installed on the throttle body assembly.
Install M6x16 bolts **7** to secure the fuel pipe assembly **6**.

Fuel Pipe Assembly Bolt Torque
10N•m



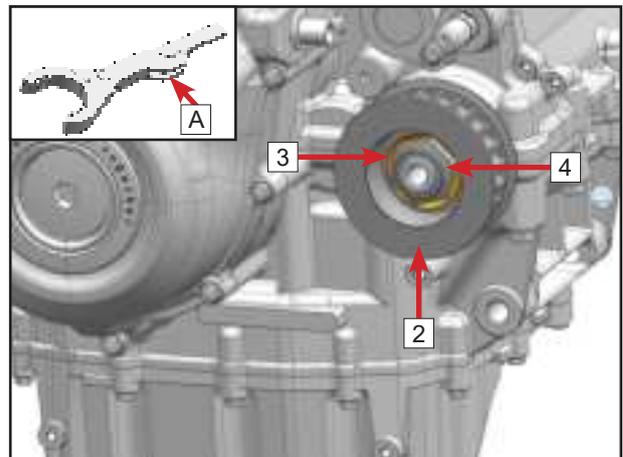
13.7.27 Drive Pulley Installation

Use the countershaft oil seal punch **A** (0SQ0-010001-923-001) to put 40×58×8 countershaft oil seal **1** (lip with appropriate amount of grease) into the crankcase hole.



In turn install drive pulley **2** and lock retainer **3** to countershaft.

Use output pulley stopping tool **A** (0SQD-062040-922-002) to secure drive pulley **2**. Install M20×1.5 nut **4**.



Drive Pulley Nut Torque
125N•m

13.7.28 Oil Filling, Oil Level Inspection, Oil Pressure Inspection

Oil filling

Unscrew the filler plug **1**, inject oil, and then tighten the filler plug.

Oil filling amount:

Change oil and oil filter: 2.5L

Total oil (dry crankcase) : 2.7L

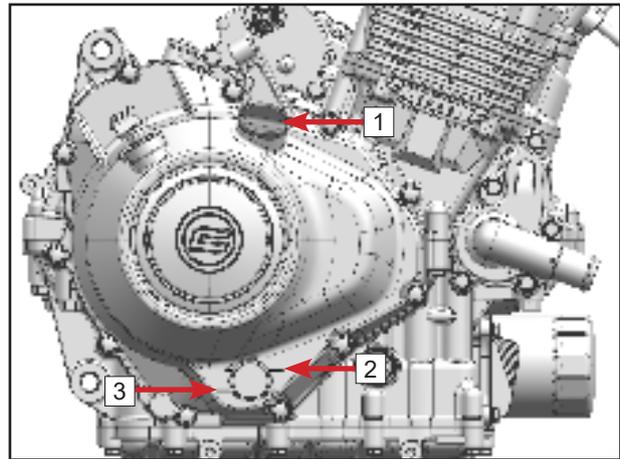
Oil level inspection

Keep the engine in a horizontal position.

Start the engine and let it run at idle for several minutes.

Turn off the engine and wait for a few minutes until all the oil flows back into the oil pan.

Observe the oil level from the oil level observation mirror, the oil level should be between the upper line **2** and lower line **3**. If the oil level is lower than the lower line **3**, the oil should be appropriately increased until the oil volume is appropriate.



NOTE

Strictly follow the above steps, otherwise the wrong amount of oil will be displayed. The engine must be in a horizontal position.

Oil pressure inspection

Remove the engine oil pressure switch.

Install box oil hole connector (0SQ0-000000-922-014) and oil pressure gauge.

Start the engine, check the engine oil pressure.

Engine oil temperature 90°C	0.08~0.12MPa
Engine idle	

If the oil pressure does not meet the requirements, please check whether the oil circuit is blocked, whether the oil pump is worn.

NOTE: The temperature of the engine is very high after running for a period of time. Please take protective measures to avoid scalding.

WARNING

Carry out operation in well-ventilated area.

Handlebar and Triple Clamps

14.1 Handlebar Switch	2
14.1.1 LH Handlebar Switch	2
14.1.2 RH Handlebar Switch	2
14.2 Throttle Handle	2
14.3 Handlebar Inspection	4
14.3.1 Clutch Handle Play Inspection.....	4
14.3.2 Clutch Cable Free Play Adjustment.....	4
14.4 Handlebar Interference Inspection (Double Seats)	4
14.5 Handlebar Interference Inspection (Single Seats)	5
14.6 Handlebar Maintenance	5
14.6.1 Throttle Cable Free Play	5
14.7 Triple Clamps Front Fork Pipe	6

Handlebar and Triple Clamps

14.1 Handlebar Switch

14.1.1 LH Handlebar Switch

Removal

Remove screws [1].

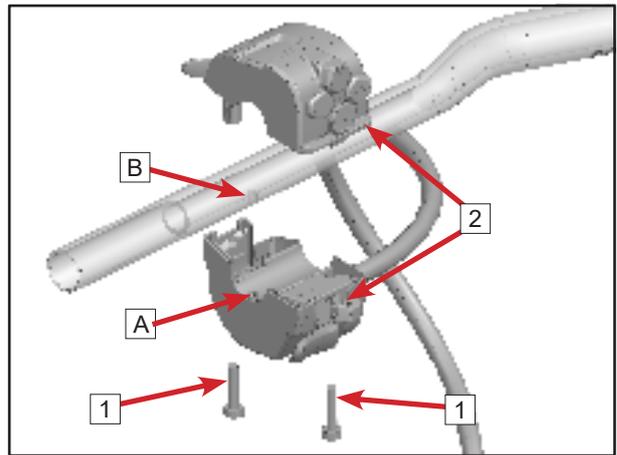
Remove switch [2].

Installation

Installation is in reverse order of removal.

NOTE:

When installing the switch to the handlebar, there is a fixing device in the switch. After connecting device A to the handlebar fixing point B, tighten the bolt.



14.1.2 RH Handlebar Switch

Removal

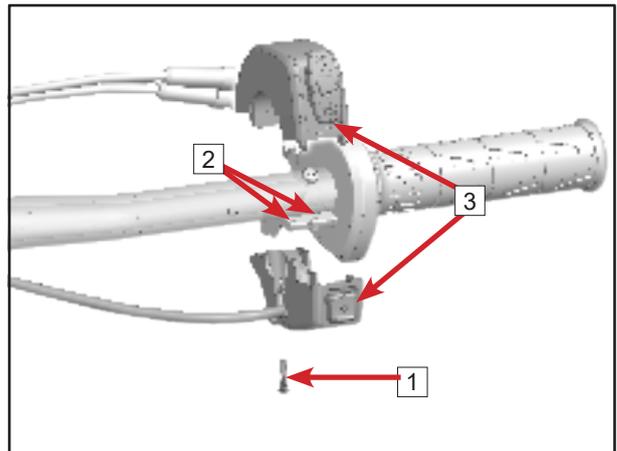
Remove bolts [1].

Remove screws [2].

Remove RH handlebar switch [3].

Installation

Installation is in reverse order of removal.



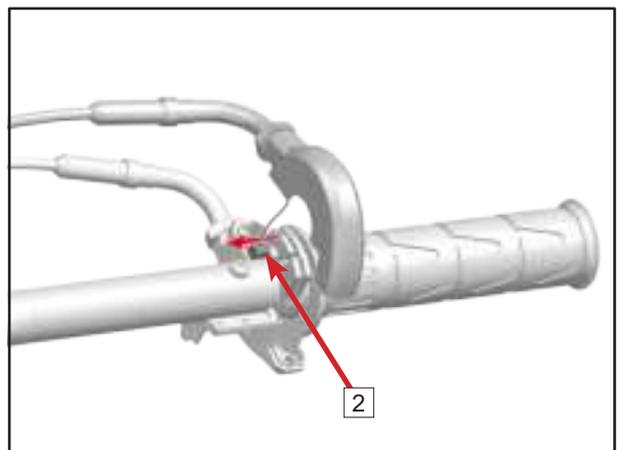
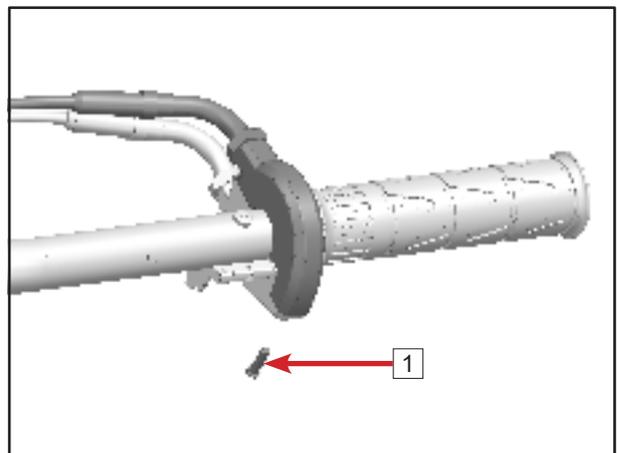
14.2 Throttle Handle

Removal

Remove RH reflector assembly.

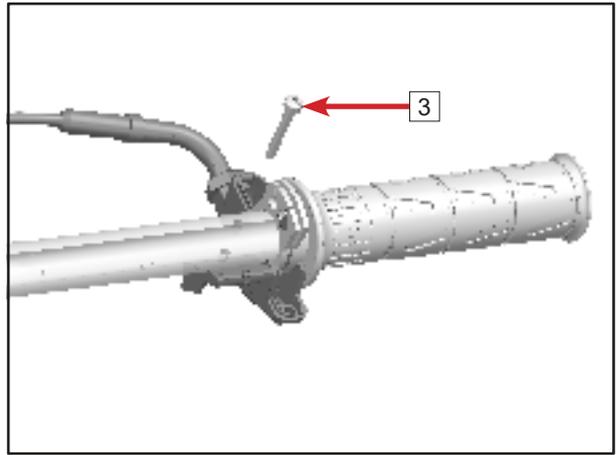
Remove bolt [1].

Remove throttle opening cable [2].

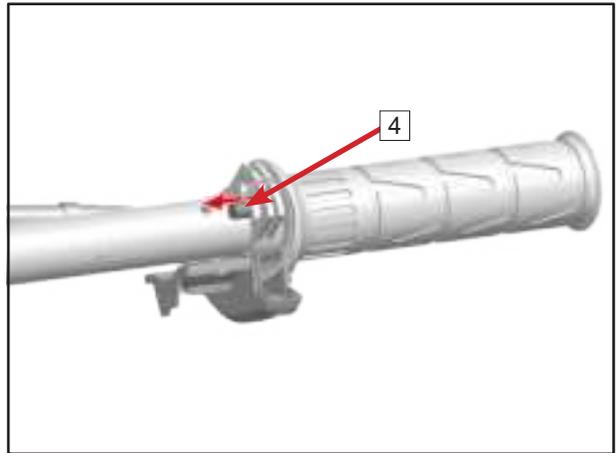


Handlebar and Triple Clamps

Remove bolt **3**.



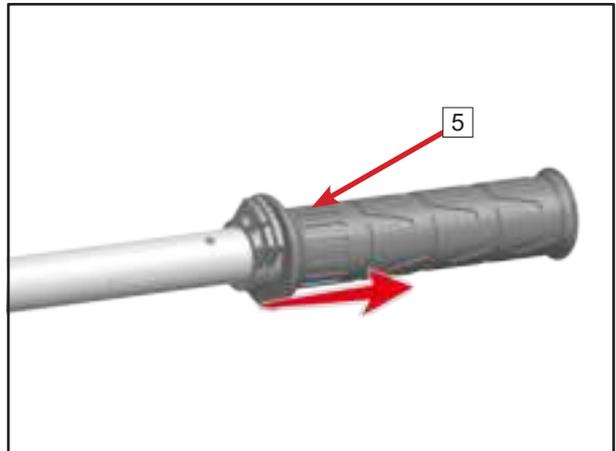
Remove throttle return cable **4**.



Remove throttle handle sleeve **5**.

Installation

Installation is in reverse order of removal.



Handlebar and Triple Clamps

14.3 Handlebar Inspection

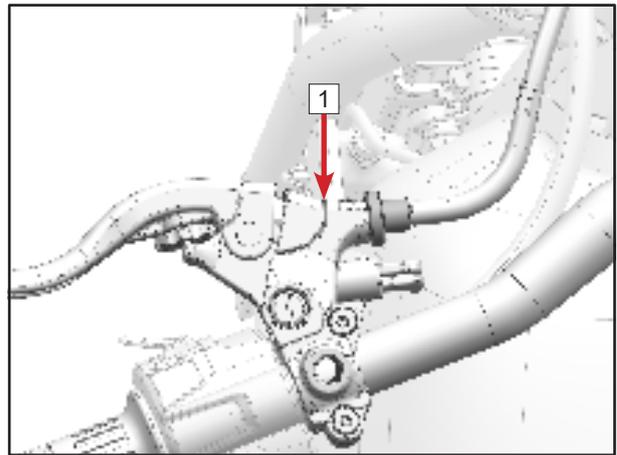
14.3.1 Clutch Handle Play Inspection

Check whether the return of the clutch handle is smooth.

Check the free play [1] of the clutch handle [1].

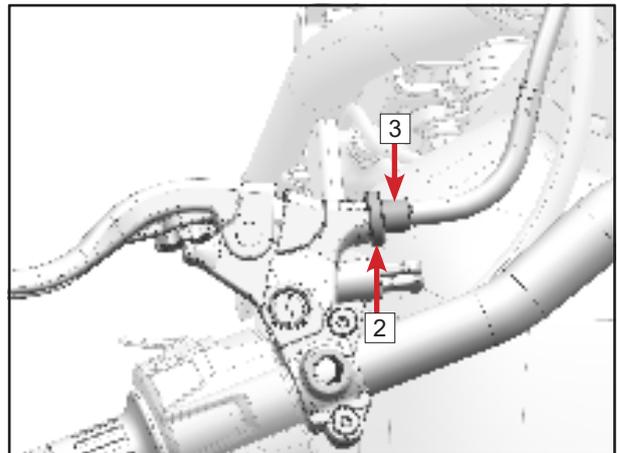
Free play: Slowly pinch the clutch lever until you feel obvious resistance, between which is the clutch lever free play.

The clearance of free lever at 1 should be maintained at 2mm.

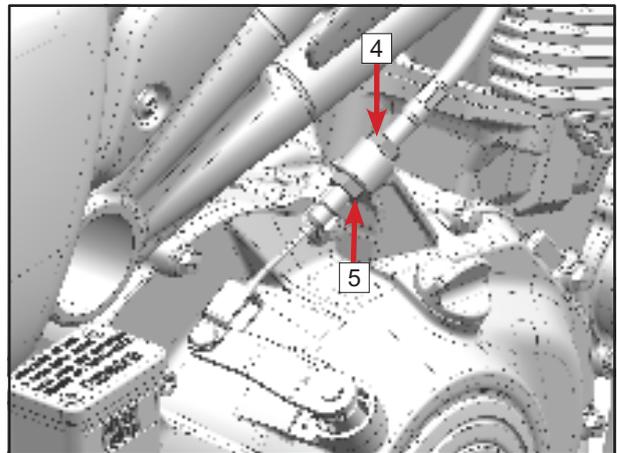


14.3.2 Clutch Cable Free Play Adjustment

When the handle end is fine-tuned, loosen the lock nut [2], rotate the adjusting nut [3] to adjust, and tighten the lock nut [2].



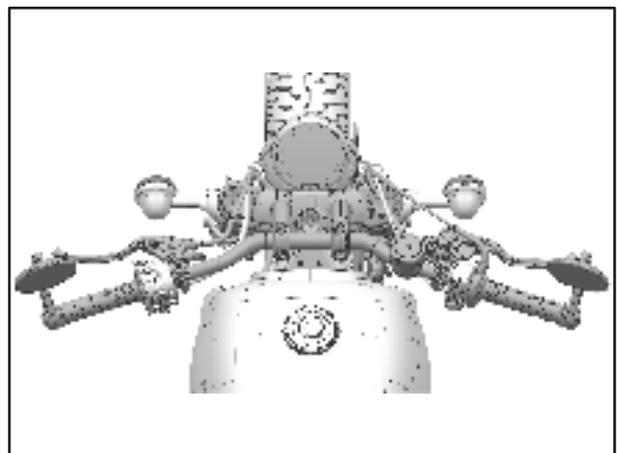
When the engine end is being adjusted, loosen the lock nut [5], rotate the adjusting nut [4] to adjust, and tighten the lock nut [5].



14.4 Handlebar Interference Inspection (Double Seats)

Swing the handle from side to side to check that all types of cables are not interfering with the front wheel.

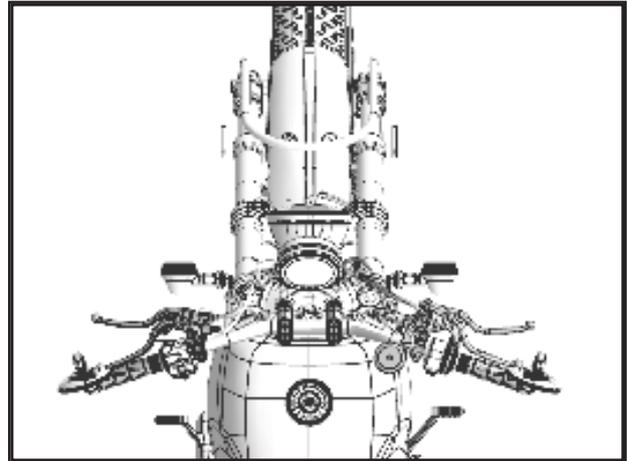
Check whether the handle interferes with the fuel tank at maximum steering.



14.5 Handlebar Interference Inspection (Single Seats)

Swing the handle from side to side to check that all types of cables are not interfering with the front wheel.

Check whether the handle interferes with the fuel tank at maximum steering.



14.6 Handlebar Maintenance

14.6.1 Throttle Cable Free Play

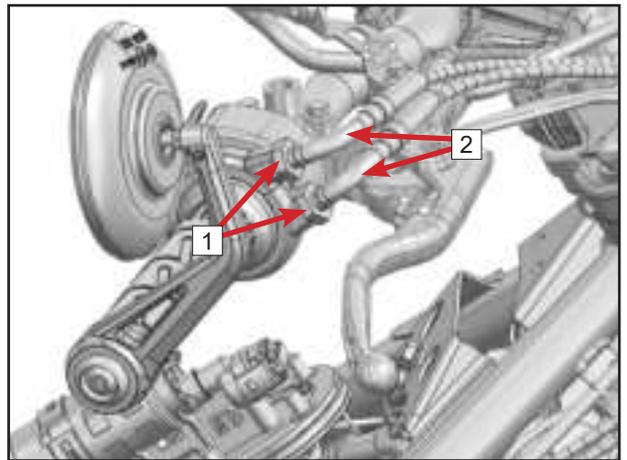
Check whether the throttle handle refuel and return is smooth.

Check throttle cable free play.

Free play: 2mm~5mm

Adjust throttle cable

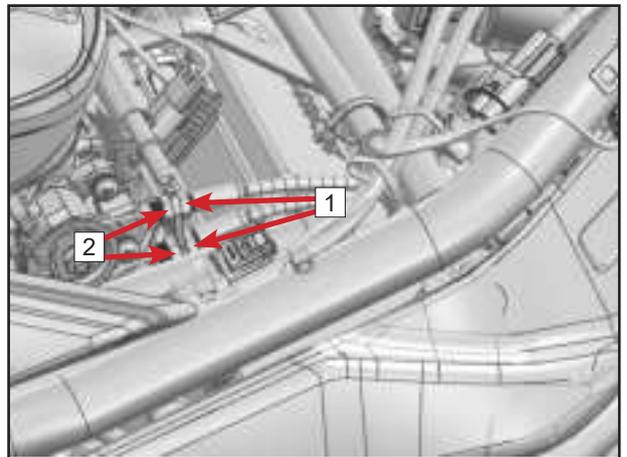
When fine-tuning the grip end: remove the anti-dust sleeve, loosen the lock nut **1**, rotate the adjusting nut **2** to adjust, and tighten the lock nut after adjustment **1**.



Pre-work

Remove related body covering parts.

When the engine end is in major adjustment: loosen the nuts **2**, adjust the adjustment nuts **1** to the appropriate position, and tighten the nuts **2**.



Handlebar and Triple Clamps

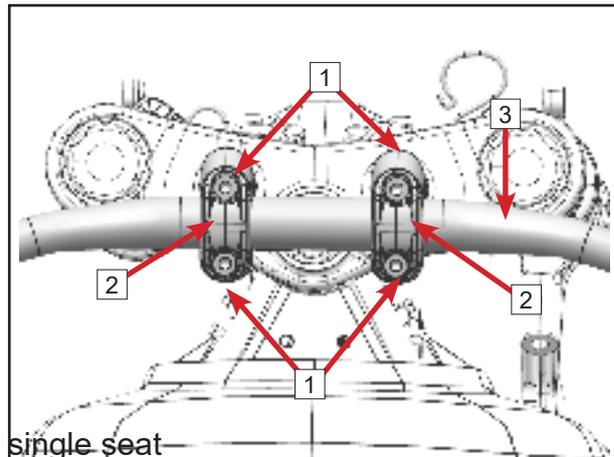
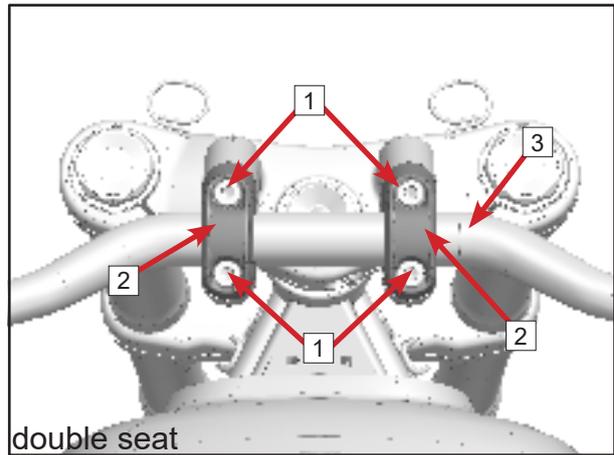
14.7 Triple Clamps Front Fork Pipe

Removal

Remove bolts [1].

Remove handlebar press cover [2].

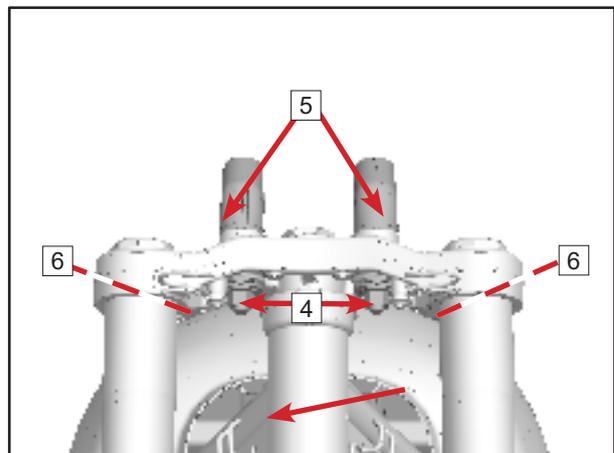
Remove handlebar pipe [3].



Remove upper triple clamp lower nuts and gaskets [4].

Remove handlebar pipe bracket [5].

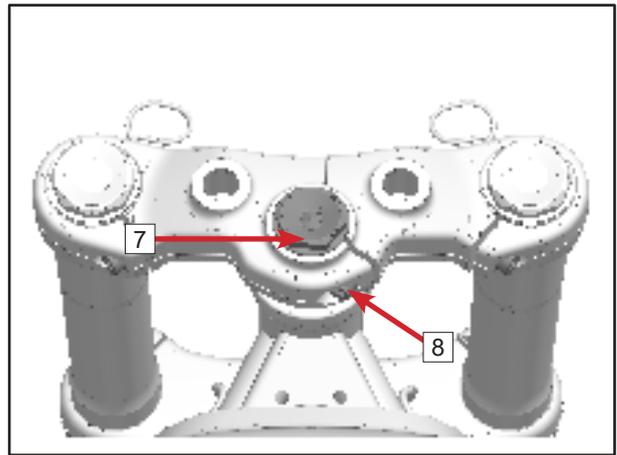
Remove upper triple clamp shock absorber bolts [6].



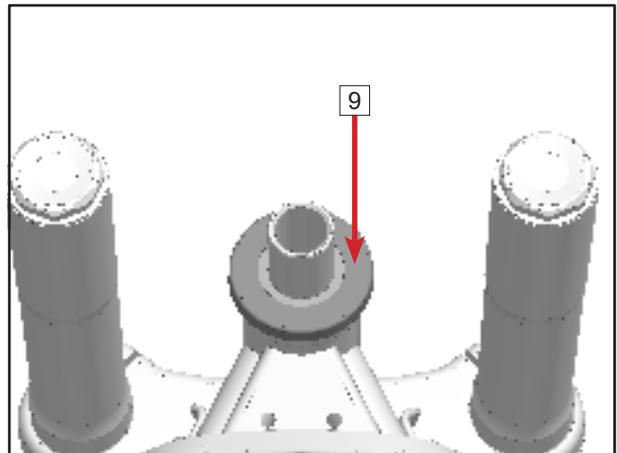
Handlebar and Triple Clamps

Remove nut **7**.

Remove bolt **8**.



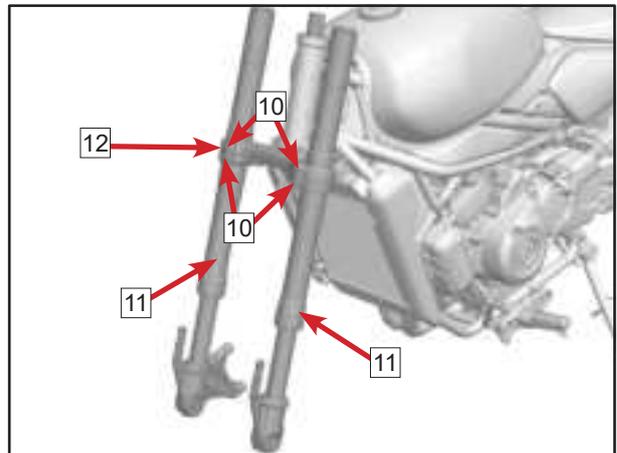
Remove dust cover and dust ring assembly **9**.



Remove bolts **10**.

Remove LH and RH front shock absorbers **11**.

Remove lower triple clamp **12**.



Installation

Installation is in reverse order of removal.

Inspection

Inspect upper and lower steering bearing assembly **1** whether complete or worn, replace if incomplete or worn.

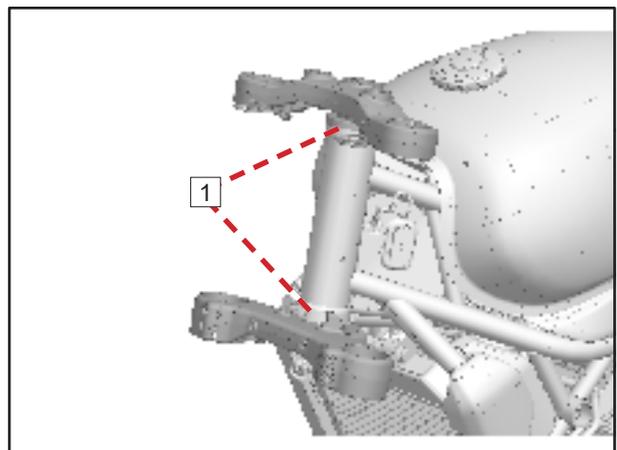
Inspect whether the bearing steel bowl has cracks or abnormal wear, replace if any.

Installation

Installation is in reverse order of removal.

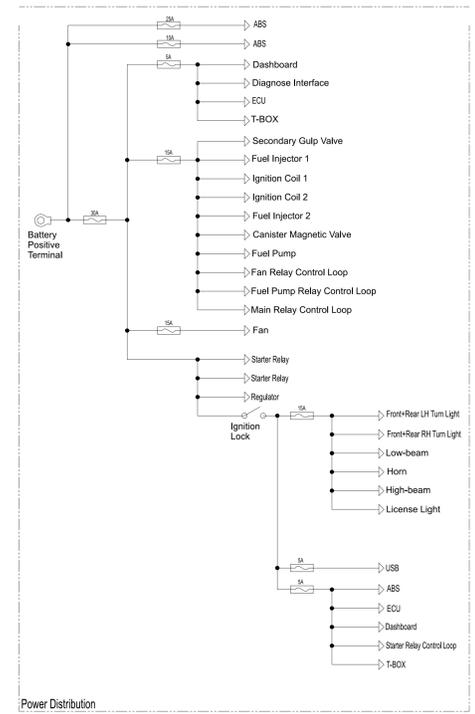
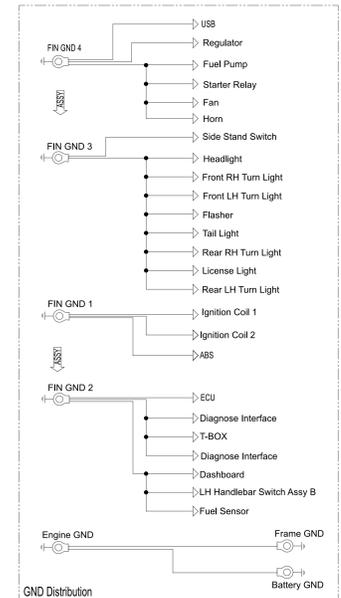
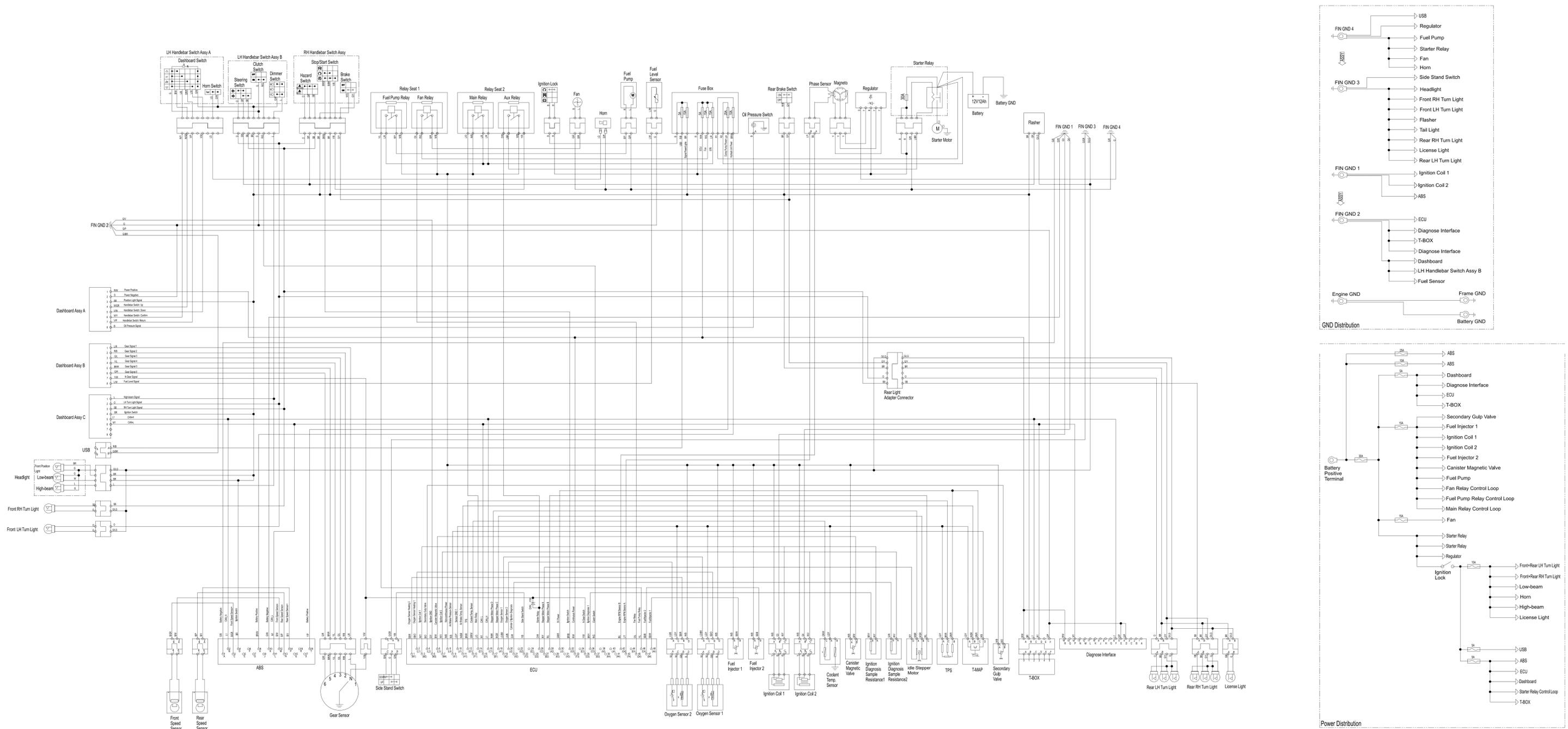
Steering column lock nut torque value: 25 N•m

Upper triple clamp lock screw torque value: 20 N•m



NOTE: When installing and replacing, apply sufficient grease in the bearing steel bowl.

Wire Diagram



B	BLACK	()	P	PINK	()
L	BLUE	()	LG	LIGHT GREEN	()
BR	BROWN	()	V	VIOLET	()
G	GREEN	()	GR	GRAY	()
Y	YELLOW	()	SB	SKY BLUE	()
W	WHITE	()	O	ORANGE	()
R	RED	()			

COLOR TABLE

