Project name: Service Manual for Engine

LXFD0901-054

Loncin Engine co. ltd.March 2023

Foreword

There are more and more motorcycles getting onto market with each passing day, and new structure and technologies are also adopted. For all the Loncin users and service workers know well about the maintenance, adjustment and repair for engine KEL900, we made this service manual and hope which bring you more convenience when you need them.

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Content list

1. Summary

Rules for maintenance

1. Please adopt the Loncin motor co.ltd. produced or suggested spare parts, lubricant or other auxiliary materials when maintenance is necessary. In case materials were adopted fail to meet Loncin standard, it may damage your motorcycle.

2. When maintenance is necessary, please adopt the tools, bolt, nut and screw in metric standard, the ones out of metric standard such as imperial standard are not allowed, because they are not interchangeable to metric ones.

3. When parts were replaced or re-assembled, please also replace their washer, o-ring, split pin and locking piece.

4. Please fasten the bolt or nut with bigger diameter or inside first, then fasten the rest in alternative angle sequence, unless there is another specially stipulated sequence.

5. Wash up the removed parts by cleanser. Coat the moving surface with lubricant before re-assembling.

6. When re-assembled, please check and confirm the correct re-assembly and proper operation, turn, move and operate them for checking.

7. Dispose the used oil, lubricant, pollutants and abandoned parts by strictly following laws and other state regulations.

Specification

General specification

	Item	Data
Engine	Type	LX286MX
	Displacement	895ml
	Cylinder arrangement and angle	Left: 1, Right: 2; 15°
	Bore×Stroke	86×77mm
	Combustion chamber capacity	26.1 ml
	Compression ratio	13.1: 1
	Max. power and its rotation	72Kw/8500rpm
	Max. torque and its rotation	91N·m/7000rpm
	Air valve device	DOHC
	Lubrication system	Forced pressure +Splashing lubrication
	Cooling system	Water cooling
	Engine net weight	65kg
Transmission system	Clutch	Multiple wet layers
	Gear box	International 6 gears
	Primay transmission ratio	1.821
	End transmission ratio	2.588
	Gear transmission ratio	1st: 2.833 2nd: 2.067 3rd: 1.600 4th: 1.308 5th: 1.103 6th: 0.968
	Gearshift method	1-N-2-3-4-5-6
Electrical system	Ignition system	FGM-FI 1-2
	Starting system	Complete electric starting
	Lighting system	Battery
	Spark plug specification	LMAR9J-9E (NGK)
	Spark plug clearance	0.8-0.9mm
	Rectifier regulator	3 phases complete wave regulator

Cooling system specification

Items		Specification
Coolant capacity	Heat radiator and engine	1.5 L
	Sub tank	0.38 L
Relief pressure for heat radiator cover		120-150kPa
Thermostat	Initial temperature	83-87℃
	Complete temperature	95℃
	Valve rise	7mm
Coolant we suggested		GLYSANTIN G48-24
Standard thickness of coolant		Mixture with distilled water by 1:1

Lubrication system specification Unit: mm

Items		Standard	Maintenance limit
Oil capacity	When oil replaced	2.7 L	—
	When oil filter replaced	3.0 L	—
	When engine broke up	3.2 L	—
Oil we suggest		The engine oil we suggest: 5W-40 API quality grade: SL or higher (Please don't adopt energy saving oil which marked up on API service label) JASO T903 Standard: MA2 Viscosity: SAE 5W-40	—
Oil pump rotor	Clearance between impeller tips	0.15	0.20
	Middle clearance	0.15-0.21	0.35
	Clearance between sides	0.02-0.09	0.12

Specification for cylinder head/Valves Unit：mm

Items			Standard	Maintenance limit
Pressure in cylinder of electrical starting			450-600kPa	—
Valve clearance		Air inlet	0.11-0.20	—
		Air exhaust	0.26-0.35	—
Swinging arm and its shaft	Inner diameter of arm	In/Exhaust	8.013-8.028	8.033
	Outer diameter of shaft	In/Exhaust	7.986-7.995	7.981
	Clearance between arm and shaft	In/Exhaust	0.018-0.042	0.047
Camshaft	Height of protrusion	Air inlet	36.226-36.288	36.206
		Air exhaust	36.050-36.112	36.030
	Clearance between journal and hole		0.020-0.056	0.07
	Runout		—	0.01
Valve and its guiding tube	Rod diameter of valve	Air inlet	4.966-4.980	4.956
		Air exhaust	4.956-4.970	4.946
	Inner diameter of valve guiding tube	In/Exhaust	5.000-5.012	5.04
	Clearance between valve rod and its guiding tube	Air inlet	0.02-0.046	0.07
		Air exhaust	0.03-0.056	0.08
	Height of guiding tube	In/Exhaust	12.60-13.20	—
	Width of gate line for base ring	Air inlet	1.00-1.10	1.5
		Air exhaust	1.10-1.20	1.6
Free length of valve spring			46.30	45.1
Flatness of cylinder head		0.05		0.10

Specification for clutch operation system Unit: mm

Items	Standard	Maintenance limit
Free travel for clutch lever	10-20	—

Specification for magneto and starting clutch Unit: mm

Items	Standard	Maintenance limit
Outer diameter for shaft jacket of starting plate shaped gear	51.705-51.718	51.685
Outer diameter for outer case of starting clutch	68.364-68.390	68.400

Specification for case body and transmission system Unit: mm

Items			Standard	Maintenance limit
Transmission mechanism	Diameter of inner hole on gear	Main shaft 6 and 5	30.000-30.013	30.03
		Countershaft 1, 2, 3 and 4	34.000-34.016	34.03
	Width for needle bearing	Main shaft 6 and 5	12.45-12.80	12.4
		Countershaft 1, 2, 3 and 4	12.45-12.80	12.4
	Shaft diameter for main shaft	Match up with needle bearing of main shaft 6 and 5	25.982-25.993	25.97
		Match up with needle bearing of countershaft 1, 2, 3, and 4	29.980-27.993	29.96
Gearshift	Shaft diameter of gearshift shaft		11.967-11.994	11.96

fork and its shaft	Inner diameter of gearshift turning fork		12.016-12.043	12.06
	Thickness for fork tip		4.85-4.95	4.8
	Opening diameter of turning fork	Left and right fork	46.55-46.85	46.9
		Middle fork	34.05-34.35	34.4
Opening on gear	Width of opening	Main shaft 3-4	5.05-5.13	5.2
		Counter shaft 5 and 6	5.05-5.13	5.2
	Diameter	Main shaft 3-4	33.85-33.95	33.7
	Diameter	Counter shaft 5 and 6	45.85-45.95	45.7

Specification for crankshaft, piston, cylinder hole and balancing shaft Unit：mm

Items		Standard	Maintenance limit
Crankshaft	Clearance at bigger end of connecting rod	0.10-0.25	0.27
	Clearance between shaft pad on bigger end of connective rod and the shaft	0.034-0.059	0.065
	Clearance between journal of crankshaft and shaft pad	0.030-0.058	0.065
	Runout	—	0.035
Cylinder	Cylinder bore	85.994-86.006	86.05
	Roundness loss	—	0.10
	Taper	—	0.10
	Cylindricity	—	0.10
Piston, piston pin and piston rings	Diameter of basic circle for piston	85.956-85.974	85.90
	Diameter for pin’s hole	19.008-19.013	19.02
	Diameter of piston pin	18.992-19.000	18.98
	Clearance between piston and its pin	0.008-0.021	0.04

	Closing clearance of piston ring	1st ring	0.15-0.30	0.4
		2nd ring	0.20-0.40	0.5
		Oil ring	0.20-0.70	1.0
	Clearance between piston ring and its groove	Clearance between 1st ring and its groove	0.030-0.070	0.10
		Clearance between 2nd ring and its groove	0.020-0.060	0.08
Clearance for cylinder matching			0.020-0.050	0.10
Smaller end of connecting rod and its inner diameter			19.017-19.027	19.035
Matching clearance between connecting rod and its pin			0.017-0.035	0.05

Torque

Standard torque

Fastening piece type	Torque N.m
Bolt 5mm	6
Bolt 6mm	10
Bolt 7mm	20
Bolt 8mm	25
Bolt 10mm	35
Bolt 12mm	70

Engine torque

Items	Qty.	Thread diameter mm	Torque N.m	Note
Installation screw	4	5	1.1	

for air filter				
Screw for air filter element	4	5	1.5	
Spark plug	2	10	12	
Screw plug for swinging arm shaft	2	10	15	Replace washer for a new one
View hole cap	1	24	10	Coat seal ring with grease of MP3
Oil drainage screw plug on oil bottom case	1	16	25	Replace washer for a new one
Oil drainage screw plug for oil tray	1	10	10	Replace washer for a new one
Secondary oil filter	1	18	11	
Tube joint of secondary oil filter	1	20	35	

Cooling system

Items	Qty.	Thread diameter mm	Torque N.m	Note
Bolt on cover of fan’ s motor	4	6	8.5	
Screw of fan’ s motor	3	4	2.8	
Nut of fan	1	3	1.1	Coat thread with sealant
Installation bolt for water pump	1	6	15	
Bolt on water pump cover	8	6	10	
Water drainage bolt	1	5	6	

Bolt of thermostat cover	3	6	10	

Cylinder head and valve

Items	Qty.	Thread diameter mm	Torque N.m	Note
Bolt of M9 on cylinder head	6	9	5+15+90 °+90°	Coat thread and base surface with oil
Bolt of M6 on cylinder head	2	6	10	
Bolt for bracket of camshaft	12	7	5+15	Coat thread and base surface with oil
Screw plug for swinging arm shaft	2	10	10	
Bolt of cylinder head cover	4	6	10	Coat contact surface of plate end with oil
Noise reduction bolt	1	6	10	

Clutch and gearshift device

Items	Qty.	Thread diameter mm	Torque N.m	Note
Central nut for clutch	1	20	190	Coat nut with glue, knock side when it fastened
Pressing plate bolt for clutch	3	6	10	Coat thread and base surface with oil
Bolt for deviation locating plate	1	6	10	
Bolt for gear box	6	7	18	

cover				
Bolt for smaller flying sprocket wheel	1	10	50	Coat thread with Loctite 243
Bolt for heat exchanger between oil and water	4	6	10	Coat thread with Loctite
Bolt for right crankcase cover	11	7	20	

Lubrication system

Bolt for oil bottom case	15	6	10	
Bolt for oil collection tray	7	6	10	
Bolt for primary filter	2	6	10	
Bolt for oil pump	3	6	10	
Bolt for sprocket wheel cover of oi pump	4	6	10	
Bolt for oil outlet tube/Oil absorption tube	2	6	10	
Bolt for oil nozzle	2	6	10	

Magneto and starting clutch

Items	Qty.	Thread diameter mm	Torque N.m	Note
Fastening bolt for	6	8	35	Coat bolt with Loctite

starting clutch				
Bolt for rotor of magneto	1	14	150	
Bolt for stator of magneto	3	6	10	Coat bolt with Loctite
Fixing bolt for trigger	1	6	10	
Bolt for limiting plate of plate shaped gear	1	6	10	
Bolt for left crankcase cover	11	6	12	Coat thread with sealant

Crankcase

Items	Qty.	Thread diameter mm	Torque N.m	Note
Bolt for shaft pad cover	2	7	17	
Bolt for shaft jacket of rear balancing shaft	1	9	15+120°	
Bolt 10mm for crankcase	6	10	10+80°	
Bolt 8mm for crankcase	10	8	5+80°	
Bolt 6mm for crankcase	7	6	10	

Crankshaft, piston, cylinder body and balancing shaft

Items	Qty.	Thread diameter mm	Torque N.m	Note

Nut for cover of connective rod	4	8	33	Coat thread and base surface with oil
Check plate of balancing shaft/Bearing of main shaft	4	6	12	Coat thread with sealant

Position for lubrication and sealing

Engine

Material		Position	Note
Sealant	3-0115 Dow Corning	Contact surface of crankcase Gasket for cylinder head cover Combination surface of oil bottom case Contact surface of oil collective tray Contact surface of sprocket wheel cover for oil	
Oil in engine		Complete surface of inner and outer rotor of oil pump Complete surface for swinging arm shaft Working surface for swinging arm Sliding surface of rod end of valve rod Complete surface of timing chain Surface for journal of camshaft and the cam Inner surface of cylinder hole Outer surface of piston, piston pin’s hole and groove of piston ring Outer surface of piston pin Complete surface of piston ring	

	Complete surface of clutch friction plate Sliding surface of clutch pushing rod Rod part of gearshift spindle and turning plate Complete surface of double gear shaft Complete surface of starting clutch Complete surface of gearshift fork shaft Inner surface of shaft pad on bigger end of connective rod of crankshaft Inner hole for smaller end of connective rod for crankshaft Gear(Primary, crankcase, starting deceleration) Sliding surface of plate shaped gear Turning area of each bearing Surface for each o-ring Hole for camshaft on cylinder head	
Multi-functional lubricant	Seal ring for starting motor Seal ring for magneto sensor Sensor for crankshaft position View window cap Oil gauge	
Degreaser	All the contact surface for sealing	

2. Maintenance

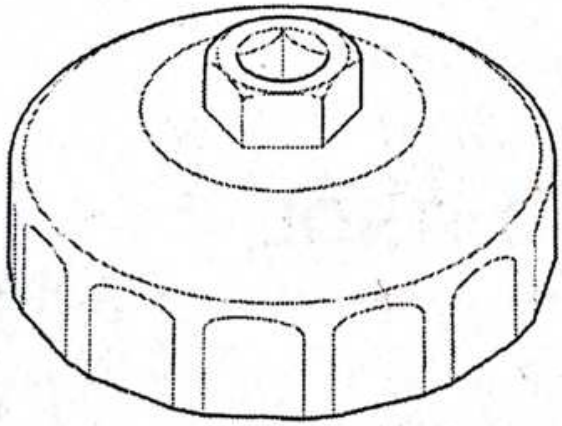
Maintenance information

Summary

- Please lay motorcycle on horizontal ground before all the operations.

Tool

Cap-shaped wrench for secondary oil filter



Cap-shaped wrench for secondary oil filter

Specification for maintenance

Please inspect according to <Periodic Maintenance table> in User Manual.

I: Inspection, clean it up, adjust, lubricate or replace when it was necessary. C: Clean up. A: Adjust. L: Lubricate.

The maintenance below need you know something about machinery. Some items (Especially with mark * and **), they may need more skill or tools and information.

Form list for periodic maintenance

Ref. No.	Period / Items	X1000km	1	5	10	15	20	25	30
		Month	1	6	12	18	24	30	36
*1	Spark plug						R		
*2	Oil in engine		R	R	R	I	R	I	R
*3	Secondary oil filter		R	R	R	R	R	R	R
*4	Valve clearance						I		
*5	Coolant		I	I	I	I	R	I	I
*6	Cooling system			I	I	I	I	I	I
*8	Fuel tube			I	I	I	I	I	I
9	Breathing tube of crankcase			C	C	C	C	C	C
10	Clutch system		I	I	I	I	I	I	I

Caution: 1. More frequent maintenance is necessary in case usually drive under dusty or wet conditions.。

2. *Means special tools, data or skill is necessary, which needs be done by Loncin dealer.

Breathing tube of crankcase

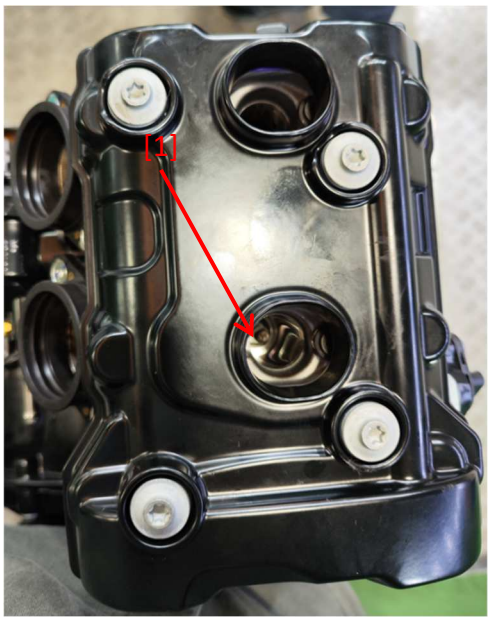
Caution:

- When driving in rain or under full speed, when washed or oppositely put the motorcycle, the more maintenance is needed. Check the sediment in breathing tube by viewing its transparent part. Pull off plug [1] of cleaning tube for air filter, guide sediment into suitable container, the get tube plug in place once again.
-

Remove fuel tank and firmly hold it.
Check and confirm if there is crack, aging, damage or flexibility on waste gas tube [1] of crankcase.
Replace waste gas tube for a new one if it is necessary.
Re-assemble fuel tank.
Diagram of supplement from Project teamfor complete motorcycle.

Spark plug

Remove fuel tank.
Remove spark plug [1].
Caution:
Before removing the spark plug, blow the surroundings of its base by ar gun, meanwhile making sure there is not any dust dropped into combustion chamber.
Check and confirm if there is crakck or damage on insulator, also confirm if there is damage, dirt or color changing on termina, please replace the spark plug if it is necessary.



Check spark plug:
Clean up the terminal of spark plug by its cleaner for it only or iron wire.
Check the clearance between central terminal and the side terminal by feeler gauge.
Clearance for spark plug: 0.80-0.90mm
In case it is necessary, get the side terminal bent to adjust the clearance.
Assemble spark plug and turn it to cylinder head, then turn it to given torque.
Torque: 12N • m
Assemble the fuel tank.

Valve clearance

Inspection

Caution: when the engine is cold (Under 35℃).

- Please check and adjust valve clearance

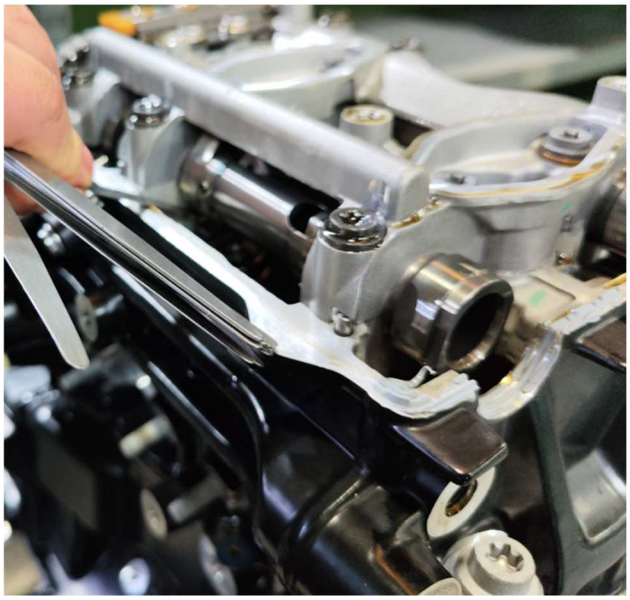
Remove the parts below:

- Cylinder head cover
- View hole cap and o-ring.

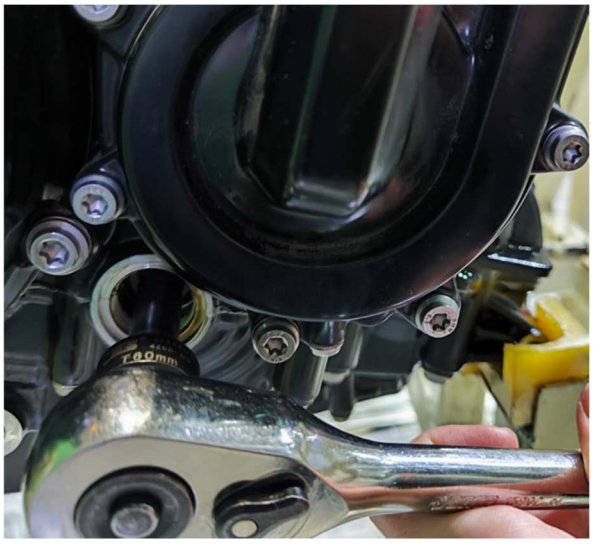
Turn the crankshaft clockwise by socket spline wrench of T60, get the basic circle for camshaft of air intake/exhaust for left cylinder align to swinging arm of valve, the check each valve clearance when they are aligning.

。

· Insert the feeler gauge with standard specification into basic circle of camshaft of swinging arm between air intake and exhaust valve on left cylinder, then check the clearance for 4 air valves for left cylinder and take them into record. The clearance for air intake valve is: 0.11-0.20mm, the clearance for air exhaust valve is 0.26-0.35mm. Caution: When checking the clearance for air exhaust valve, please lift up the pressure relief valve.。

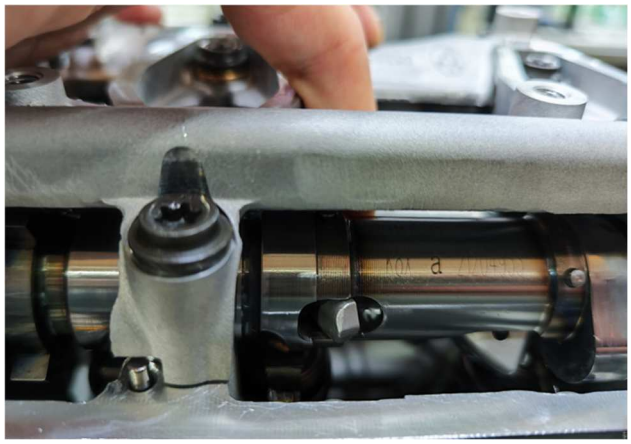


Under condition, keep turning crankshaft clockwise, until the basic circle of camshaft for air intake/exhaust of right side cylinder aligned to swinging arm of valve, then check each valve clearance when aligning.



·Insert the feeler gauge with standard specification between journal of camshaft of air intake/exhaust valve and tappet, the check the clearance for 4 air valves for air intake and exhaust valve for right side cylinder and take them into record. The standard clearance for air intake valve is: 0.11-0.20mm. The standard clearance for exhaust valve is 0.26-0.35mm. Caution: When check clearance for air exhaust valve, please lift up the pressure relief valve.

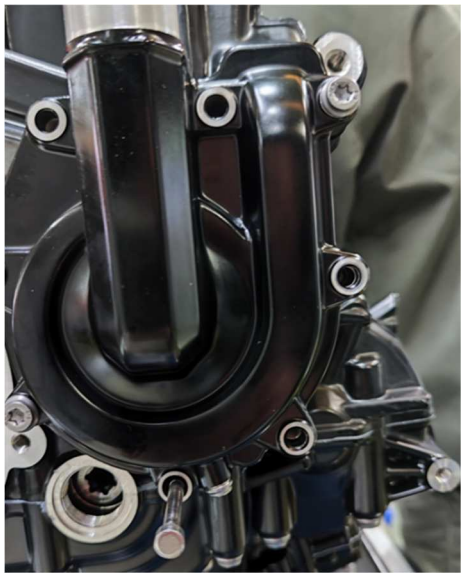
Caution: Take clearance for each valve into record for selection for washer when adjustment for valve is necessary.



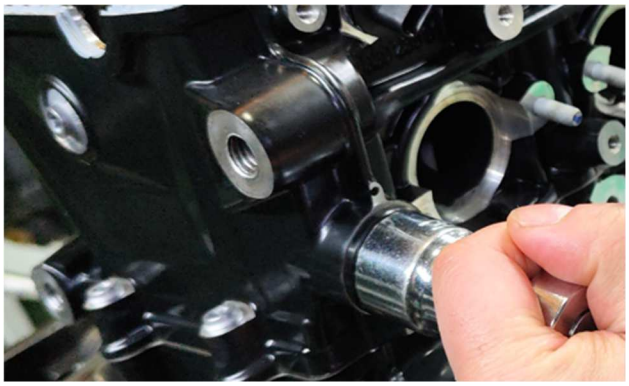
Adjustment

In case the valve clearance is out of range above, please remove the bracket of camshaft and remove it, then open swinging arm for valve, then absorb the adjustment washer for valve out by magnetive bar, replace the adjustment washer for valve for a suitable one then adjust the valve clearance into stipulated range, whose details is as below:

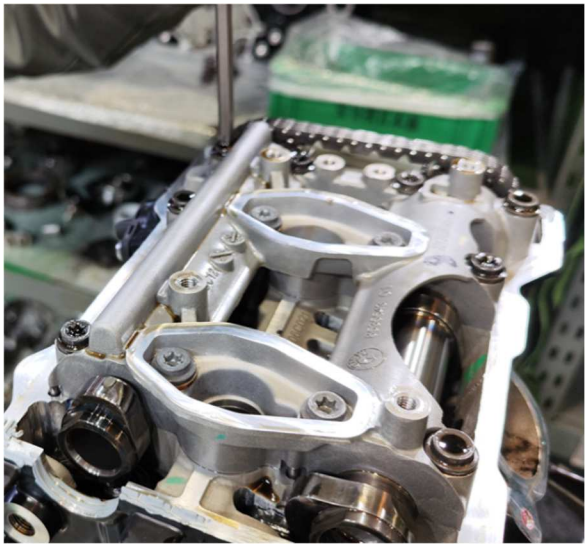
1) Turn the crankshaft clockwise, until the hole of timing gear of crankshaft align to the lowest hole of bolt of water pump cap, meanshile get scale mark of end surface of driven sprocket wheel of camshaft for air intake/exhaust valve parallel to installation surface of cylinder head cover and get the laser marking number upside down, insert positioning pin into lowest hole for bolt of water pump cover, the lock up crankshaft. At this moment, the engine is in the “Condition for Installation”.



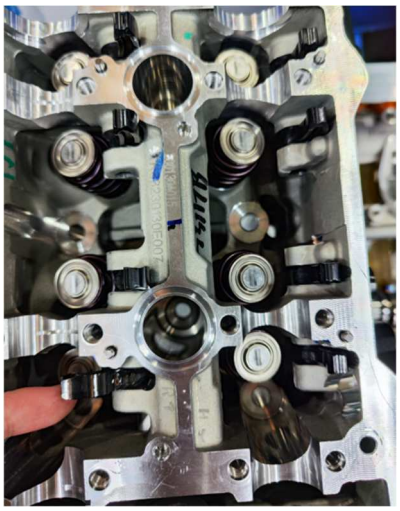
2) Remove covering plate for tensioner, then remove the hydraulic tensioner.



3) Remove upper guiding plate for chain, bolt for bracket of camshaft and the camshaft itself;



4) Open the valve swinging arm and remove adjustment washer, then replace the washer for a more suitable one.



Measure thickness for washer [1] and take it into record.

Caution:

- There are washers of 89 different thickness for selection, whose difference for thickness between adjacent two are 0.01mm （1.72-2.60mm）

Calculate thickness for new washer by equality below:

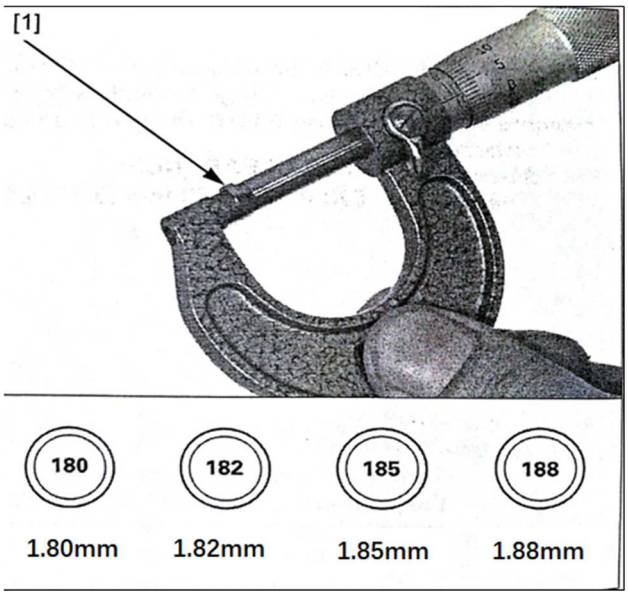
A=(B-C)+D

A：Thickness for new washer

B：Take valve clearance into record

C：Fix the midpoint of valve clearance

D：The thickness for removed washer



Caution:

- Measure by micro gauge to make sure the correct thickness of washer.
- In case the calculated result is more than 2.6mm due to the carbon buildup, please trim the surface of valve base.
- Please avoid washer dropping into crankcase of spark plug hole.
- Mark up all the washers to make sure the correct re-assembly.

Take washer out by magnetive piece will be easier.

5) Close the swingingarm, assemble camshafg and its bracket, then fasten it by bolt with fastening torque of **15N • m**. Caution: Coat journal with suitable lubricant before assembling camshaft.

6) Assemble upperguidingplate for chain with fastening torque of **10N.m**Assemble hydraunlictensioner and its covering plate with fastening torque of **15N•m**。

7) Finally turn and assemble crankshaft to left and right cylinder for timing by method above, then measure valve clearance once again.

8) Re-assemble cylinder head cover, view hole cap and bolt for water pump in place, please replace washer for the bolt for

a new one.

Oil in engine

Check oil level

Put the motorcycle on horizontal ground and get main stand opened.
Start engine and male it idly run until cooling fan begin working, then idly run for 1 minute.
Stop engine and wait for 5 minute to make sure oil returned.
Clean up surrounding of oil filling-up port.

Turn and remove oil gauge and wipe it up by industrial tissue, then insert the oil gauge in and turn by 1 round, then remove it to check oil level.。

In case the oil level is lower than the lowest mark [1], fill up with appointed oil to the place upper than middle height of crankcase.。

The appointed oil:

SL 5W-40

APIquality grade: SL or higher（Don’t adopt the oil mark up with energy saving of service label of API）
JASO T903 Standard:MA2
Viscosity：SAE5W-40
Check if the o-ring for oil gauge is in good condition, please replace it for a new one when it is necessary.
Coat the surface of o-ring with multi-functional lubricant.
Re-assemble oil gauge.

Replacement for oil

Heat the engine.

Stop engine, turn and remove oil gauge [1], remove oil drainage bolt [2] and washer [2] on oil botton case, then drain off the oil. When oil stopped flowing out, remove oil drainage bolt [3] for oil tray.。

When oil completely drained off, assemble oil drainage bolt for oil tray and oil bottom case, then replace the washer for a new one.

Fasten the oil drainage bolt for oil tray to given torque.

Torque：10 N • m

Fasten the oil drainage bolt on oil bottom case to given torque.

Torque：25 N • m

Fill up crankcase with appointed oil until it is full.

Oil capacity:

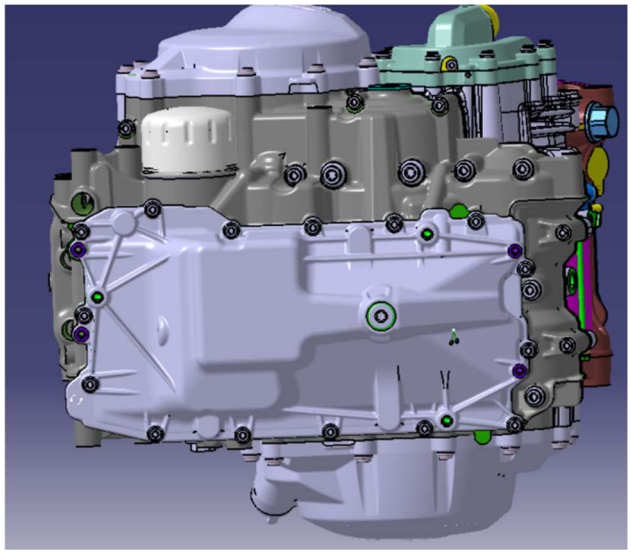
When drained off: 2.7L

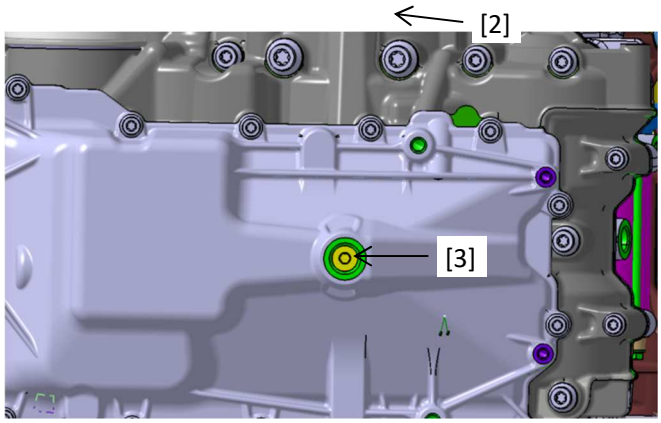
When secondary oil filter replaced: 3.0L

When broke up: 3.2L

When filling-up finished, please check oil level.

Make sure there is not any oil leaks.





Secondary oil filter

Drain off oil.

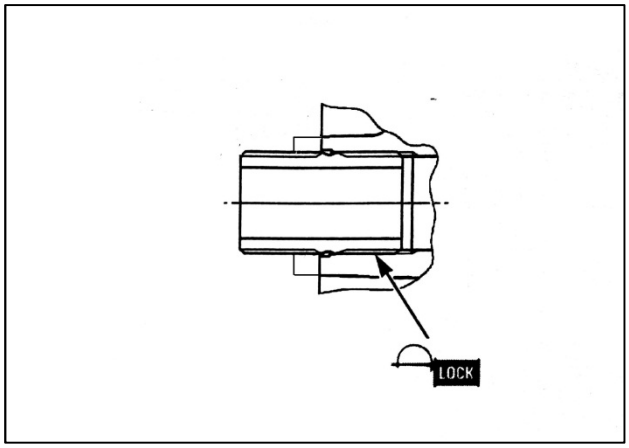
Remove secondary oil filter [1] by special tool.

Tool:

[2] Cap-shaped wrench for secondary oil filter

Confirm the tube joint of secondary oil filter and fasten it to given torque.

Torque: 28N • m



Coat threaded part of new secondary oil filter [1] and o-ring with oil.

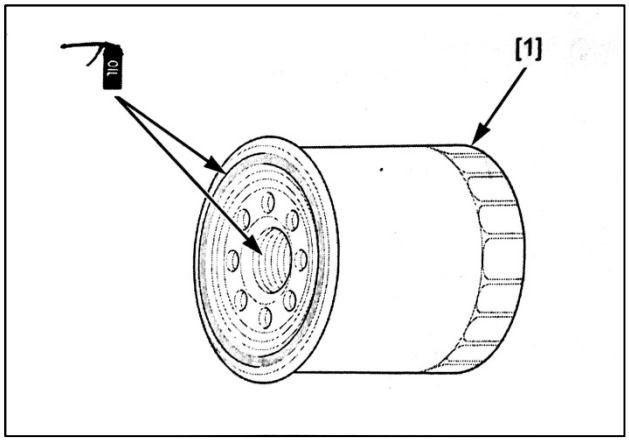
Assemble secondary oil filter and fasten it to given torque.

Tool:

[2] Cap-shaped wrench for oil filter

Torque: 11 N • m

Fill engine up with appointed oil until it is full.



Engine idling

Caution:

- When all engine maintenance are finished and confirmed they are in given range, then check idling problems.
- Before checking idling, inspect items below:
  - Malfunction indicating light is not flashing

- Condition of spark plug
- Condition for element of air filter
- Throttle switch and free play for throttle lever.

- The ilding malfunctions could be precisely checked only when engine is hot.

Start engine, heat it to normal working temperature, then idly run it and check is idling.

Check idling.

Idling: 1250±100

In case the ilding is out of maintenance limit, please check the parts below:

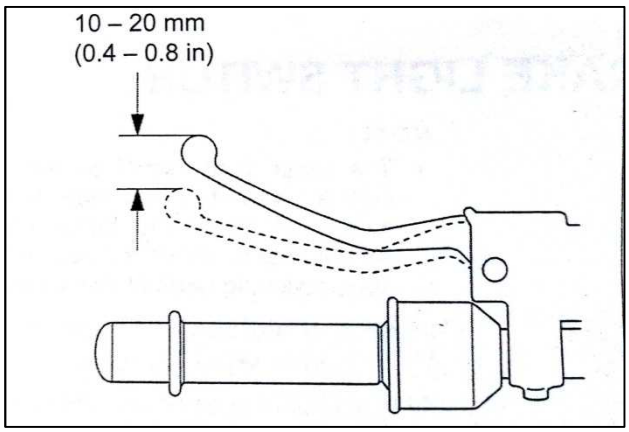
- Malfunction on engine end or air intake
- Operation for idling control valve
- In case the idling malfunction could not be fixed, please contact 4S station with authorization.。

Clutch

Check if there is distortion or damage of clutch cable. Lubricate it if it is necessary.

Check free play of clutch lever and its end part.

Free play:10-20mm

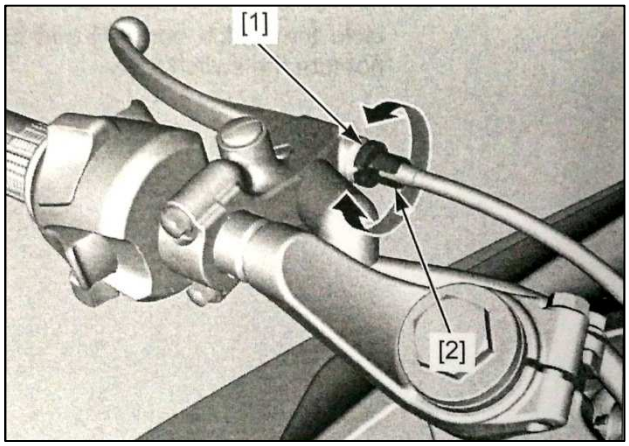


The tiny adjustment could be done by the adjustor on clutch lever.

Loosen locking nut [1]，turn the adjustor according demands.

Hold adjustor, meanwhile fastening locking nut.

In case get passed line range of adjust, the precise free play could not be got, at this moment, please adjust the main adjustor.



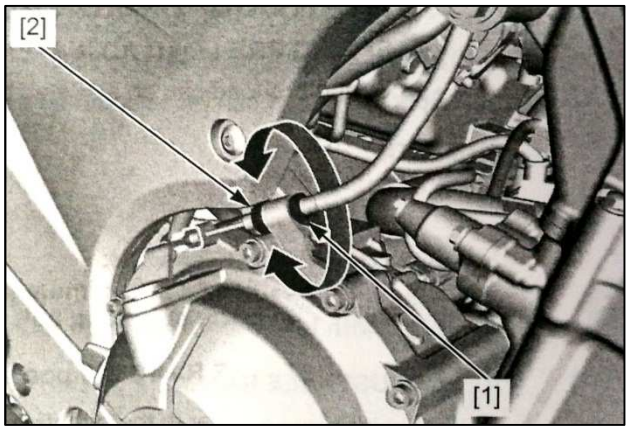
Main adjustment is through adjusting the nut [1] on operation arm for clutch.

Loosen locking nut[1], turn the adjustor according to demands.

Hold adjustor, meanwhile fastening the locking nut.

In case failed to get correct free play of clutch, or the clutch is skidding when driving,

please separate and check clutch.



3. Cooling system

Maintenance information

Summary

△, ! Warning
Please don’ t remove the cover of heat radiator when the engine and radiator completely cooled down, otherwise the coolant may inject or splash out and get your injured.

Caution:

The coolant with silicate solvent of anti-corrosion may accelerate the wear-out of seal ring on water pump and block up the passage of heat radiator.

Use the running water may damage the engine

- Fill up the sub tank with coolant, except filling up of draining off, please don’ t remove the cover of heat radiator.
- The engine needn’ t be removed from frame when maintaining the cooling system.
- The coolant touches the painting surface is not allowed.
- Check the leakage when the cooling system was maintained by the tester of cooling system.
- Check by coolant temperature indicator/Water temperature sensor.
- Check the relay of cooling fan’ s controller.

Cooling system specification

Items	Speicification

Coolant capacity	Heat radiator and engine	1.5 L
	Tank	0.38 L
Relief pressure for heat radiator		120-150kPa
Thermostat	Initial temperature	83-87℃
	Complete temperature	95℃
	Valve rise	Not smaller than 7mm
Coolant we suggest		GLYSANTIN G48-24
Standard thickness for coolant		Mixture with distilled water by ratio of 1:1

Troubleshooting

Too high the engine temperature

- Malfunction in coolant temperature indicator/Water temperature sensor
- The thermal valve failed to be opened
- Malfunction on heat radiator’ s cover
- Coolant is not enough
- Passage, soft hose and water tube of heat radiator blocked up
- Air got into circulation system
- Malfunction in motor of cooling fan
- Malfunction in relay of cooling fan’ s controller
- Malfunction in water pump

Too low the engine temperature

- Malfunction in coolant temperature indicator/Water temperature sensor
- The thermal valve was opened

- Malfunction in relay of cooling fan’s controller

Coolant leakage

- Defect on machinery structure of water pump
- O-ring gets aged
- Malfunction on cover of heat radiator
- Gasket of cylinder head gets damaged or aged
- The joint of soft hose or tube clamp get loose
- Soft hose gets damaged or aged
- Heat radiator is broken
- The cover of thermostat or tube joint of water pump’s cover is flexible.

System procedure mode

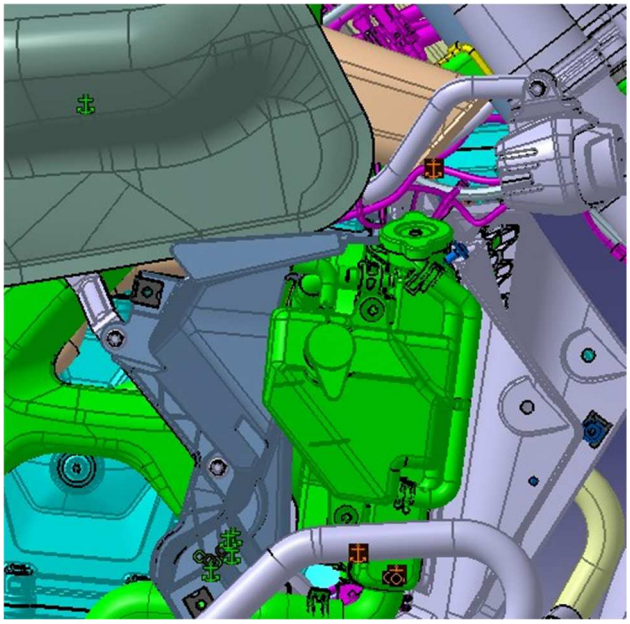
Diagram of supplement by Complete Motorcycle Project Team

Cooling system test

Pressure test for heat radiator cover/System

Remove decorative component for right windshield of fuel tank.

Remove heat radiator cover [1]



Get gasket of heat radiator cover wet, then assemble cover into testor [2].

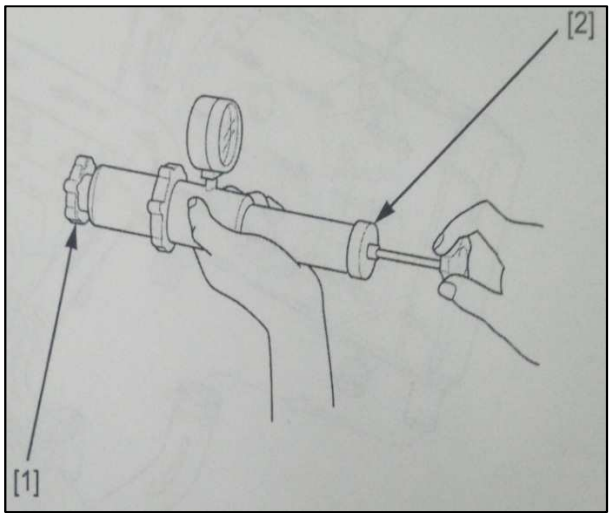
Lay pressure on heat radiator cover by testor.。

In case the heat radiator cover fails to keep pressure, or too high or low the pressure relief, please replace it.

The heat radiator cover must bear the given pressure at least 6 seconds.

Pressure for heat radiator cover:

120-150 KPa



Connect the testor to heat radiator.

Lay pressure on heat radiator, engine and soft hose by testor to check their air sealing performance.

Caution

Overpressure may damage the cooling system, whose pressure shall not be more than

150Kpa.

In case the system fails to bearing given pressure by at least 6 seconds, please repair it or replace parts.

Coolant replacement

Coolant replacement/Air exhaust

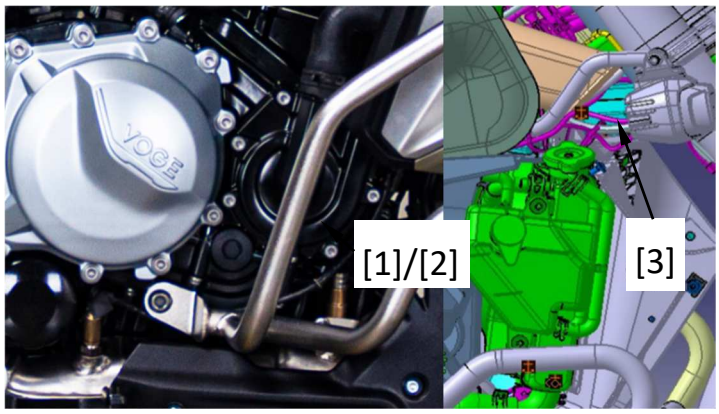
Caution: When filling up the system or sub tank, or check the coolant level, please lay the motorcycle on horizontal ground and open the main stand.

Remove the decorative component for right windshield of fuel tank.

Remove heat radiator cover [3], drain off the coolant.

When replaced the flat washer for a new one, please assemble water drainage bolt in place.

Remove water drainage bolt [1] for water pump and flat washer [2]。



Fasten the water drainage bolt to correct Torque

Torque:

Water drainage bolt for water pump:

6N．m

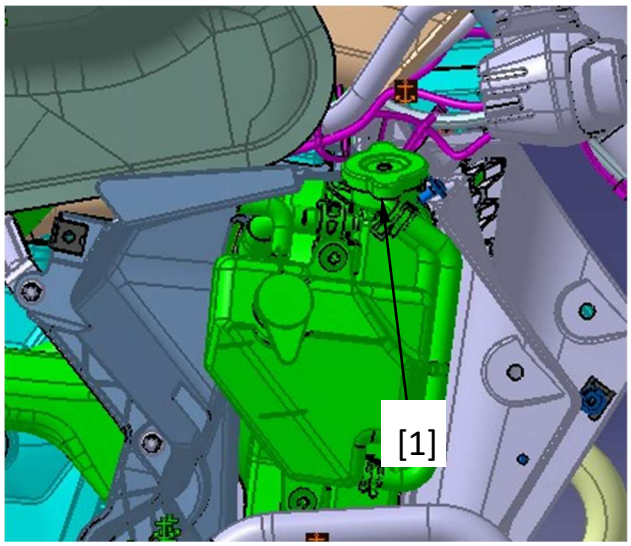
Cut off soft hose [1] for siphon from heat radiator.

Pull off siphon hose from its clamp.。

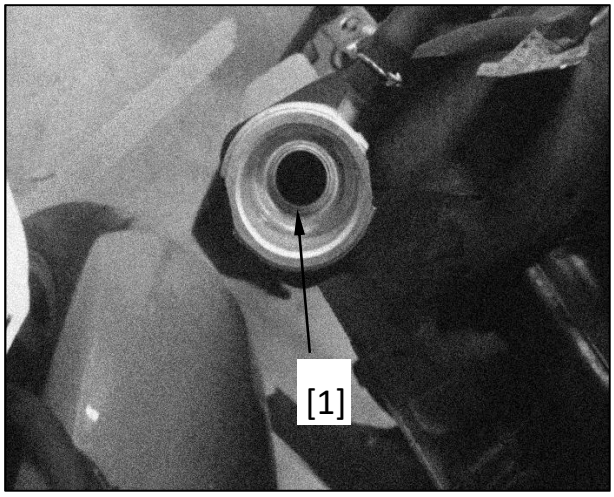
Putsoft hose on lower place out of engine rim, then drain off coolant from storage tank.

Drain off coolant, the wash the internal of storage tank by water.

Assemble soft hose into its clamp and heat radiator.



Fill up with suggested coolant through filling-up port to neck [1] of cooling system.



The coolant we suggest:

GLYSANTIN G48-24

Standard thickness for coolant:

Mixture with distilled water by ratio of 1:1

Exhaust air in system according to operation below:

1. Shift the engine to neutral gear.
   Start engine and idly run it for 2-3 minutes.
2. Start and stop throttle by 3-4 times, exhaust all air in system.
3. Stop the engine, fill up with coolant if it is necessary.
4. Assemble heat radiator cover.

Fill up storage tank with coolant we ssugest.

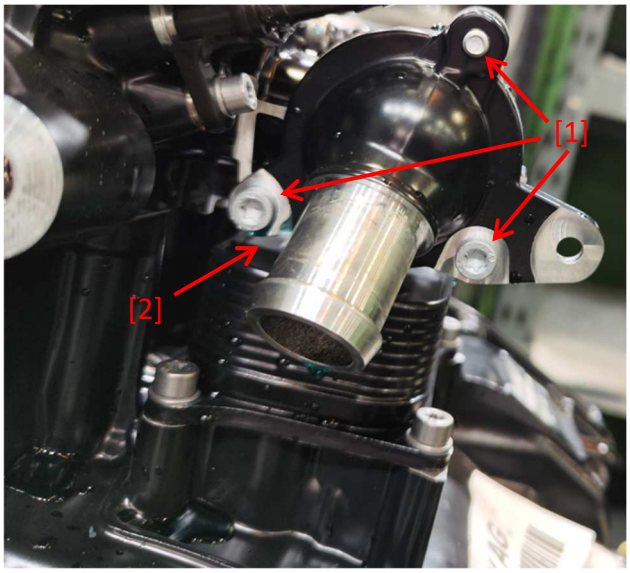
Assemble decorative component for right windshield of fuel tank.

Thermostat

Disassembly/Re-assembly

Drain off coolant.

Remove bolt [1] and thermostat cover [2].



Remove thermal valve from thermostat base.

The re-assembly is precisely opposite to disassembly.

Torque:

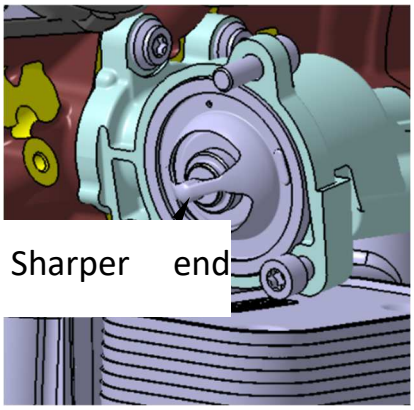
Bolt on thermostat cover:

10N·m

Caution:

- When re-assembling thermostat, the sharper end face outwards.

When replacement finished, fill up with coolant.

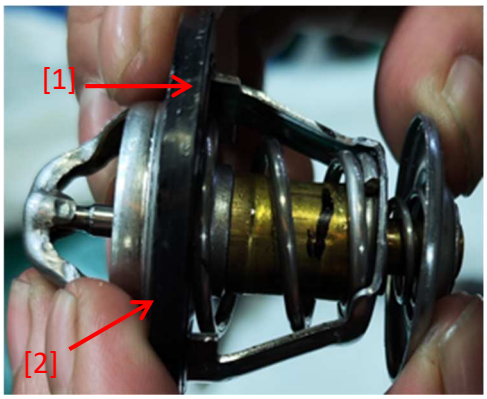


Inspection/Test

Check if there is damage of surface of thermostat [1].

In case the thermal valve is opening under room temperature, please replace.

Check and confirm if there is damage on sealing ring[2], in case it is, please replace.



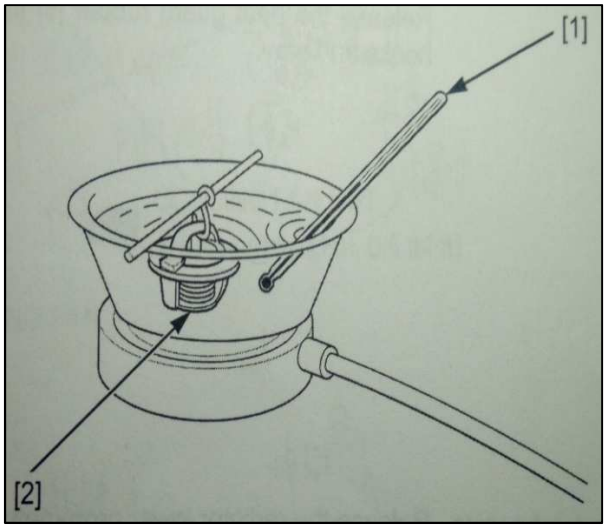
Caution:

Wear heat proof gloves and suitably protect eyes, keep combustible material far apart electrical parts.

Don't let thermostat and thermometer [1] touch bottom, otherwise the result would be wrong.

Heat water to working temperature by electric furnace and keep for 5 minutes.

Suspend thermostat [2] in hot water to check its performance.



Initial temperature of thermostat:

83-87℃（179-186℉）

Complete height for valve:

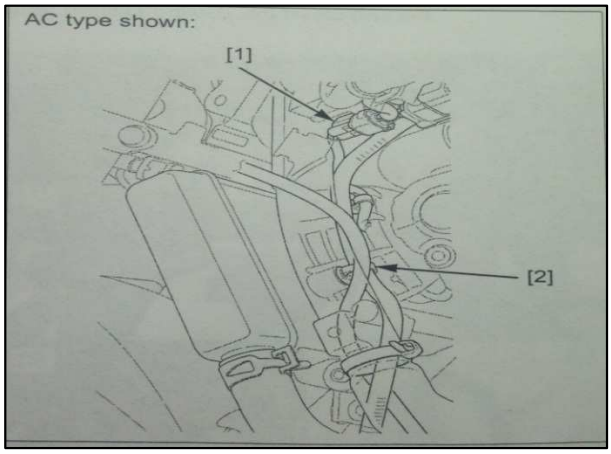
At 95℃（203℉） not lower than 7mm(0.27 in)

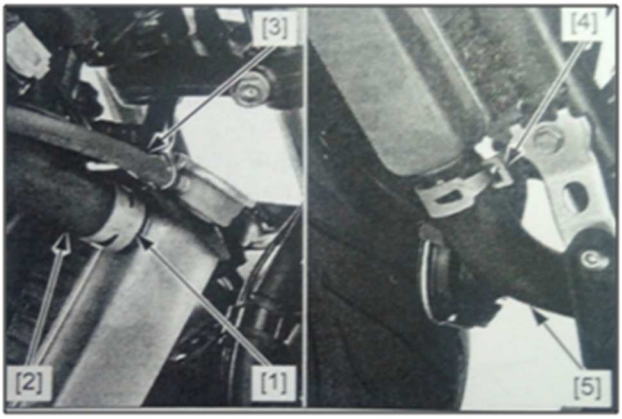
In case the thermostat fails to get opened under given temperature, please replace.

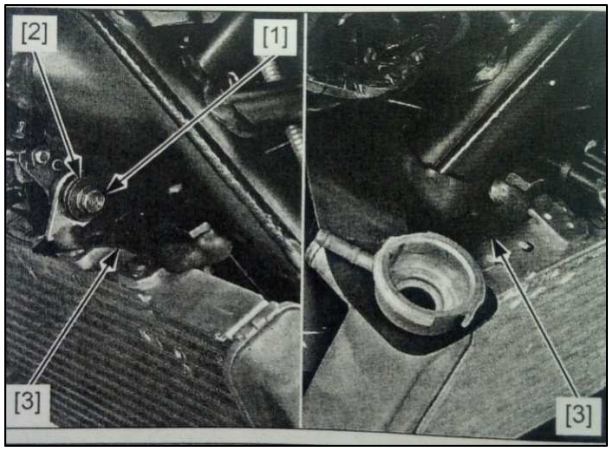
Heat radiator/Cooling fan

Disassembly/Re-assembly

The Complete Motorcycle Project Team may make it according to actual condition of KEL900.

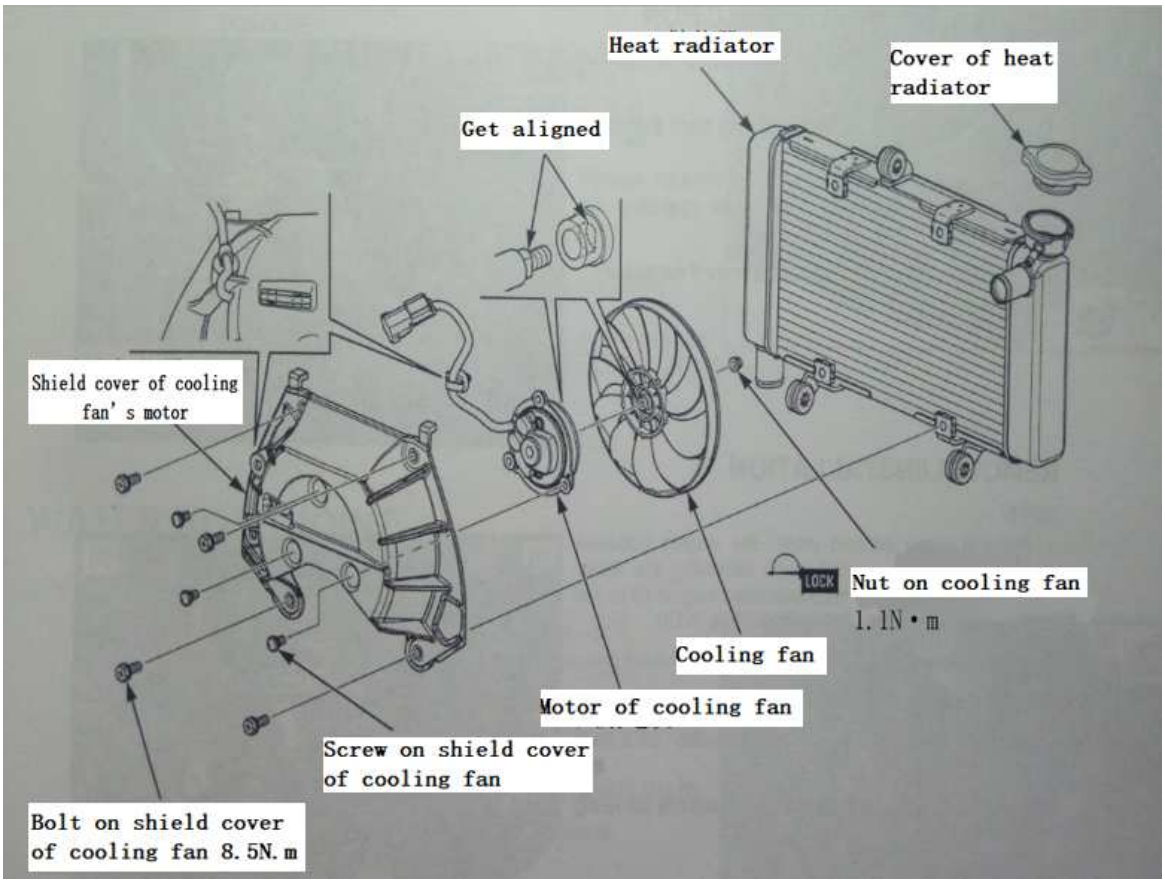






Disassembly/Re-assembly

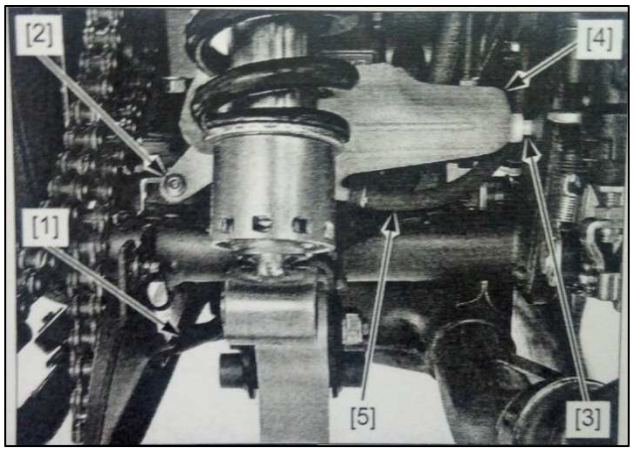
The Complete Motorcycle Project Team may make it according to actual condition of KEL900.

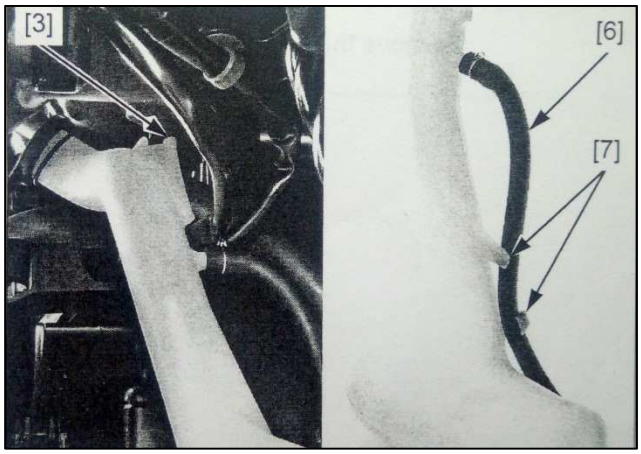


Tank of heat radiator

Disassembly/Re-assembly

The Complete Motorcycle Project Team may make it according to actual condition of KEL900.





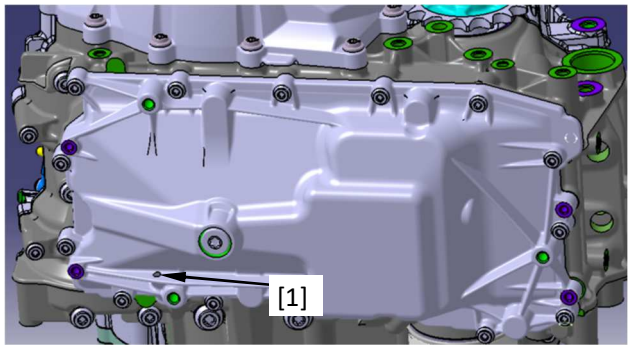
Water pump

Sealing inspection for end surface

Confirm if coolant leaks from overflow hole on water pump.

- A few coolant leaks out is normal.
- When starting engine, make sure there is not coolant leaking out.

Replace water pump for a new one if it is necessary.



Disassembly/Re-assembly

Caution:

Lay a clean oil tray under engine.

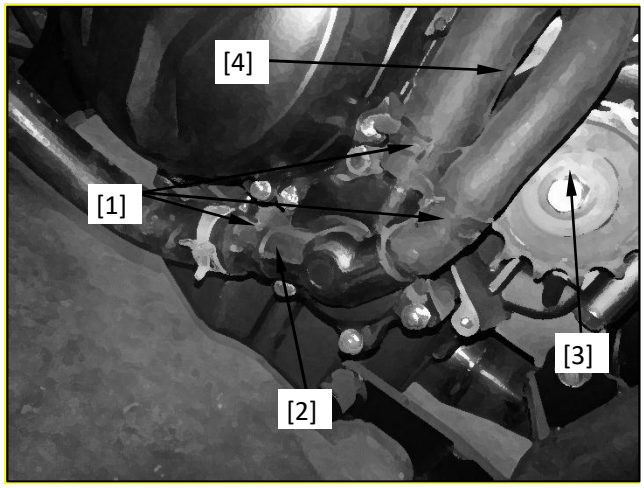
When removing water pump bodym there will be oil flow out. When re-assembled, fill up with appointed oil to given place (Refer to corresponding chapter of lubrication

system).

Drain off coolant.。

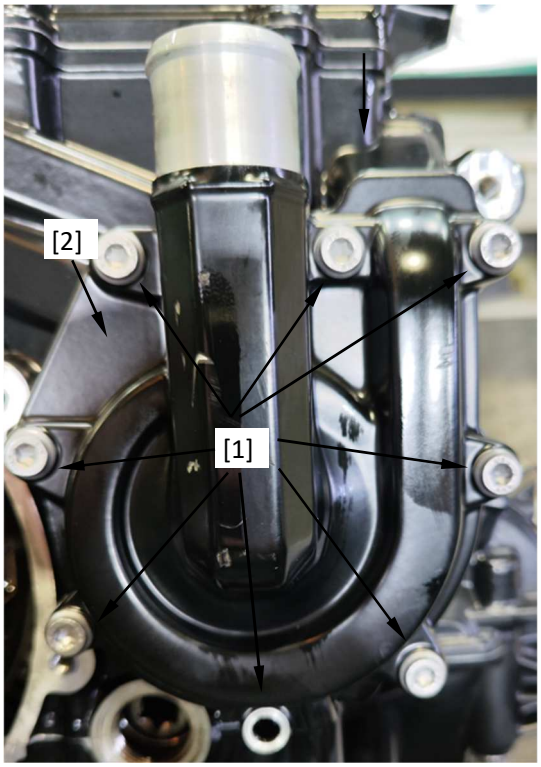
Keep motorcycle upright on horizontal ground.

The Complete Motorcycle Project Team supplement the accessories need be removing.



Remove components below:

- Bolt [1] of water pump cover
- Water pump cover [2]

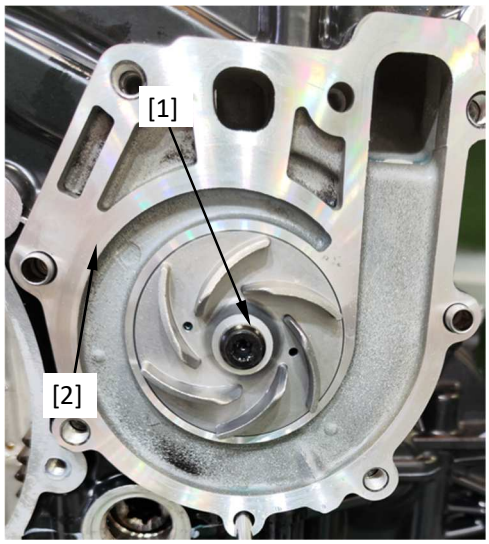


Remove gasket from water pump.

Remove central bolt [1] from impeller

of water pump.

Remove water pump [2] from crankcase.



Remove gasket [1] of water pump.

The re-assembly is precisely opposite to disassembly.

Torque:

Central bolt for imppeler of water pump:

12N • M

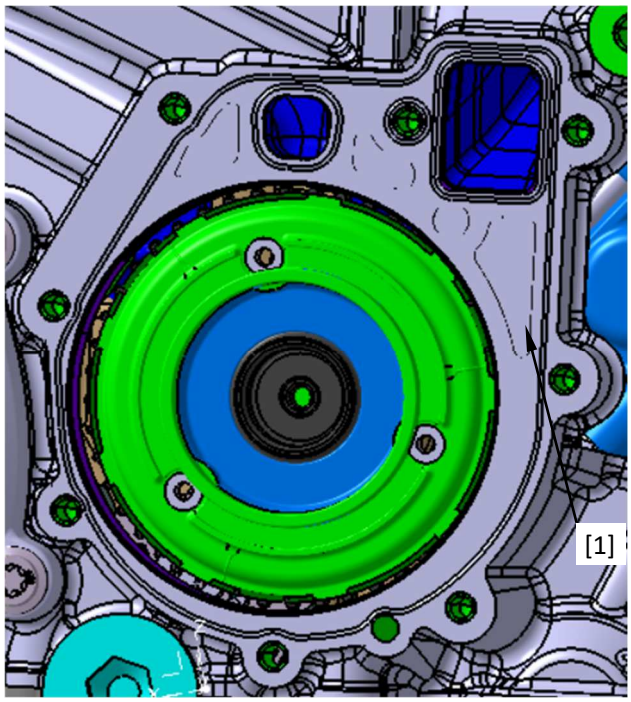
Bolt for water pump cover:

10N • M

Caution:

- Please don’ t break up the water pump body.
- Please replace water pump body/Gasket for a new one.
- Please don’ t coat water pump body/Gasket with oil, make sure not any dirt adhesion.
- When assembling water pump body, press in balancing way without forced assembly.。

- Check oil level.



Fill up system with coolant to full.

4. Lubrication system

Maintenance information

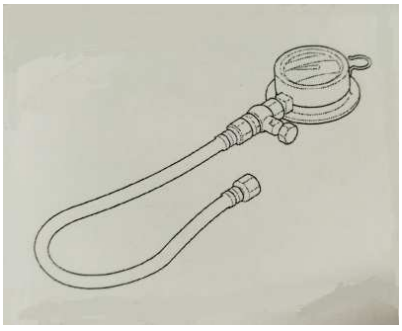
Summary

⚠, ! Warning
Repeatedly touch the engine oil in long time may get skin cancer, but this kind of situation is rarely to be seen, unless your skin touches the engine oil every day, but we still you suggest you wash up your hands by soap and clean water.

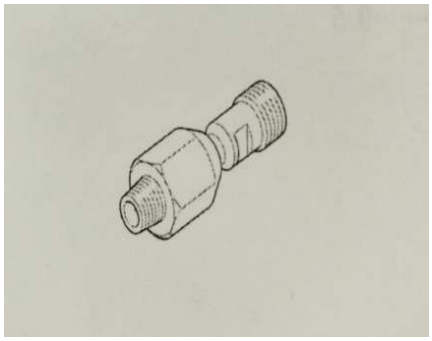
- When repairing the oil pump, we needn’t remove the engine from frame.
- The pre-condition for all maintenance steps in this Chapter is drain off the oil in engine.
- When disassembling and re-assembling the oil pump, please don’t let dust or dirt get into engine.
- Any part in oil pump passed the limit for maintenance, please replace the oil pump as a complete set.
- When the oil pump re-assembled, please check the oil leakage and correct oil pressure.
- Check the oil pressure indicator for engine and the EOP switch.
- Maintenance for injecting stream of piston.

Tools

Oil pressure gauge



Accessory for oil pressure gauge



Specification for lubrication system

unit: mm

Items		Standard	Maintenance limit
Oil capacity	After oil replaced	2.7 L	—
	When oil filter replaced	3.0 L	—
	When engine broke up	3.2 L	—
The oil we suggest		Recommended oil: 5W-40 APIquality grade: SGor higher (Don't adopt the one with round label of API service for energy saving) JASO T903 standard: MA2 Viscosity: SAE 5W-40	—
Rotor of oil pump	Clearance between tip of impeller	0.15	0.20
	Middle clearance	0.15-0.21	0.35
	Sides clearance	0.02-0.09	0.12

Troubleshooting

Too low the oil level

- Too heavy the oil consumption
- Oil leakage on external components
- Piston ring worn out or without assembling in place
- Cylinder worn out
- The seal of core shaft worn out
- Valve guiding tube worn out

Too low the oil pressure

- Too low the oil level
- Oil filtering screen was blocked up
- Oil leakage on internal components
- Incorrect use of oil

0 oil pressure

- Too low the oil level
- Safety valve for oil pressure is seized up when getting open
- Transmission chain of oil pump broke up
- Teeth of driving and driven gear of oil pump broke up
- Oil pump damaged
- Oil leakage on internal components

Too high the oil pressure

- Safety valve of oil pressure gets closed
- Oil filtering screen, oil returning hole and jet hole are blocked up
- Incorrect use of oil

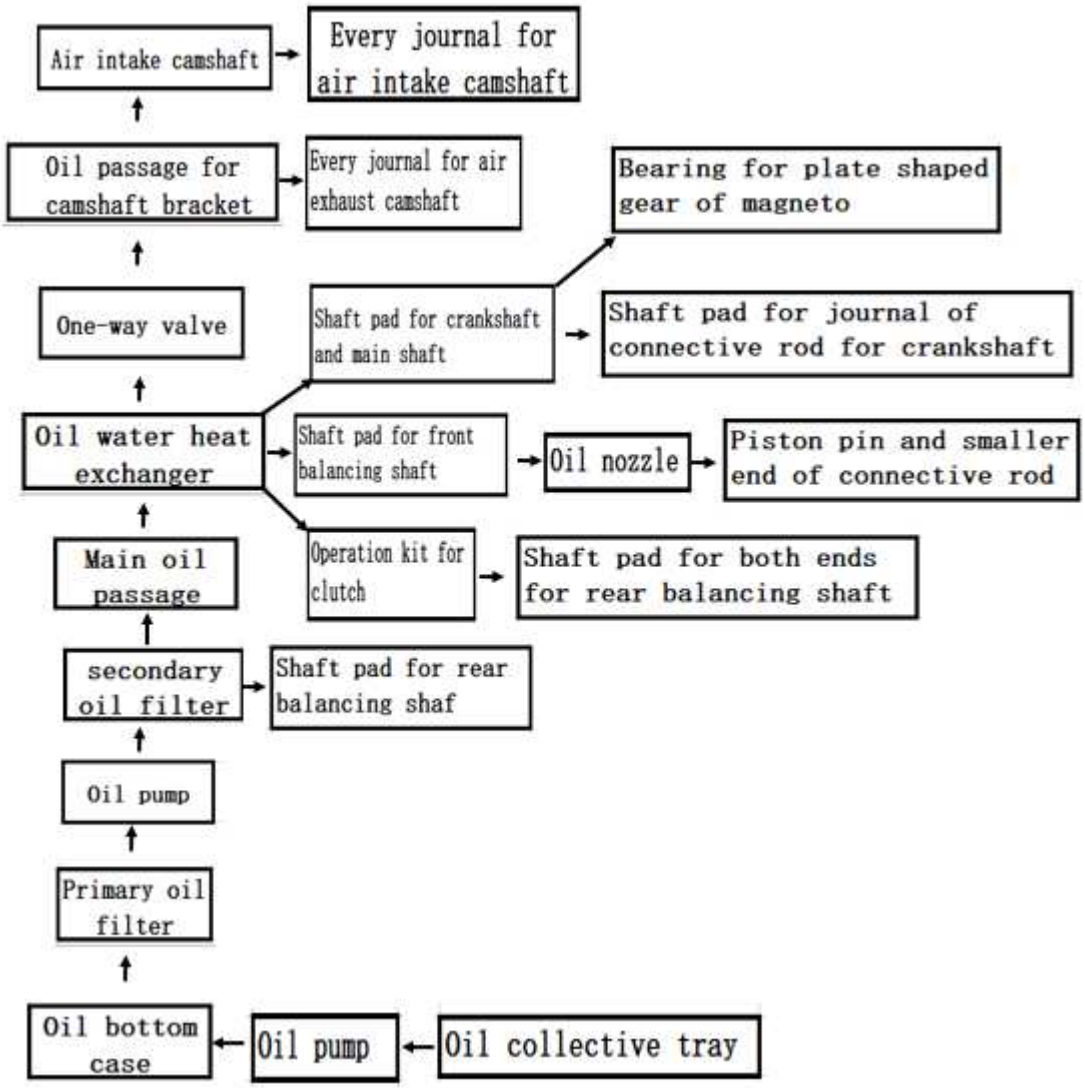
Oil gets dirty

- Didn’t replace oil and filtering screen periodically
- Piston ring gets damaged

Oil emulsified

- Cylinder head cover gets expanded and cracked
- Leakage on coolant passage
- Water gets into engine

Diagram for lubrication system

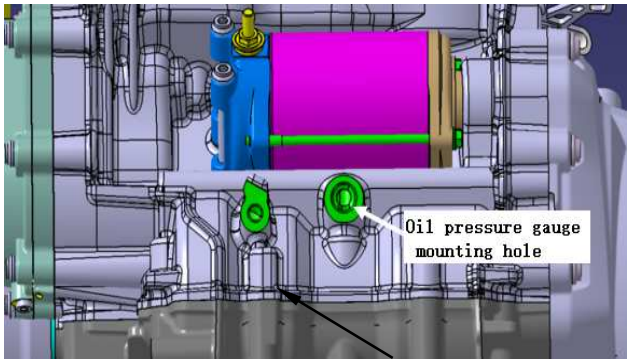


Inspection for oil pressure

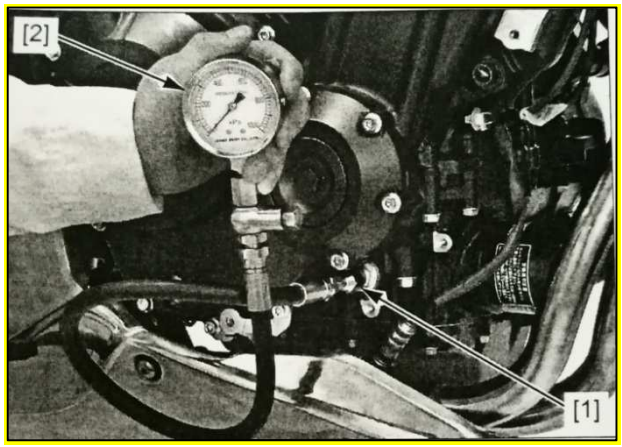
Caution:

Please remove screw plug for main oil passage

Assemble accessory [1] for oil pressure gauge into hole of screw hole.



Connect pressure gauge [2] to accessory of gauge.



Tool:

Oil pressure gauge

Accessory for oil pressure gauge.

Check oil level, fill up with oil if it is necessary.

Heat engine to working temperature （About 80℃/176℉）, then accelerate the engine to rotation speed to 1250r/min, then read the oil pressure

Standard:

At 1250rpm/80℃, result is :230kPa

Stop the engine and remove the tools.

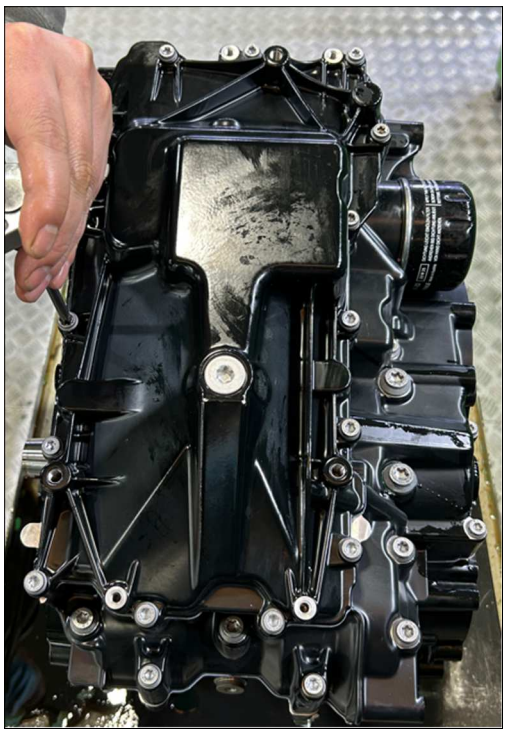
Assemble sealing screw plug for main oil passage.

Oil pump

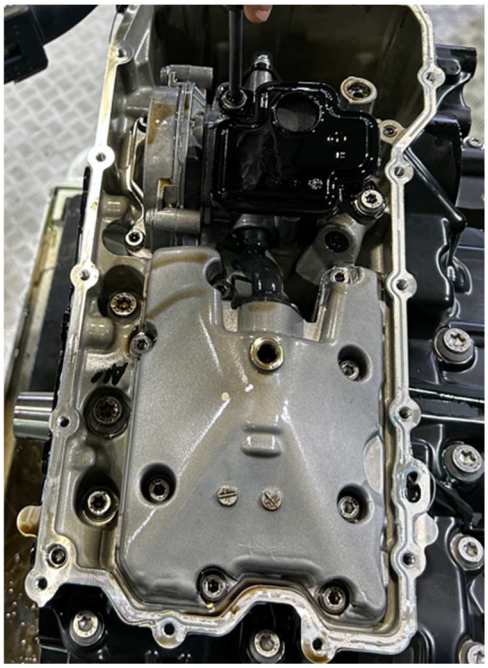
Disassembly/Re-assembly

Remove bolts on oil bottom case by diagonal sequence and remove oil

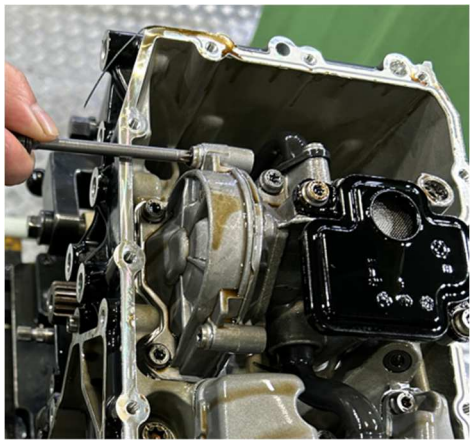
bottom case.

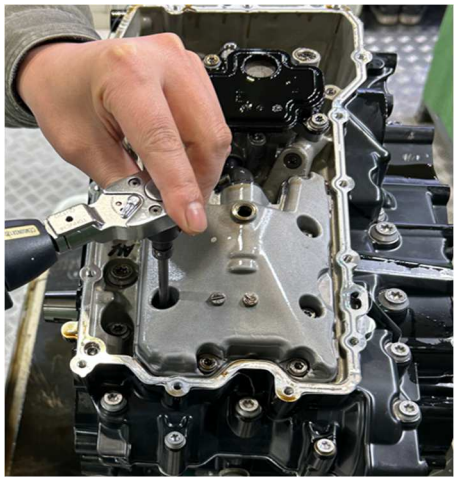


Remove bolt for primary oil filter and the filter itself.

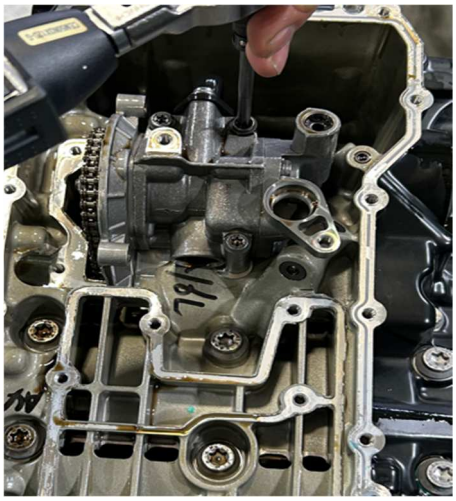


Remove sprocket wheel cover of oil pump and the wheel itself





Remove bolt for oil pump and that for oil absorption tube, then remove the oil pump kit.



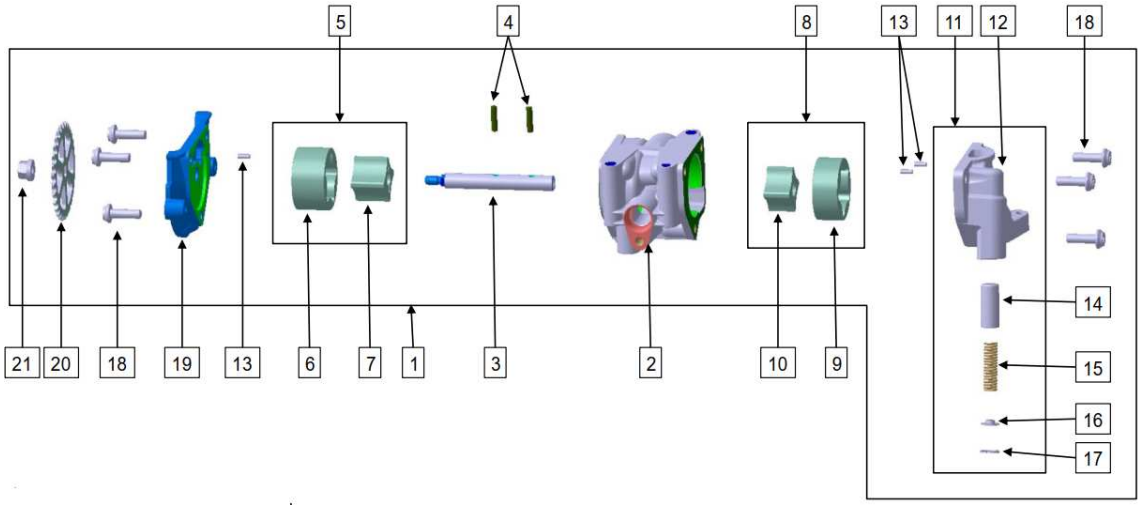
The re-assembly is precisely opposite to disassembly.

Caution:

- Coat sprocket wheel cover with sealant before re-assembly.

Disassembly/Re-assembly

The disassembly and re-assembly for oil pump is shown as below:



Inspection:

- Check driven sprocket wheel and chain for oil pump.

Check if there is damage, wear-out, distortion or burn-out on parts below.

- Oil pump shaft [3]
- Positioning pin [4]
- Oil absorption internal rotor [7]
- Oil absorption external rotor [6]
- Pressing oil internal rotor [10]
- Pressing oil external rotor [9]
- Oil absorption pump cover [19]
- Oil absorption pump cover [11]
- Oil pump case [2]

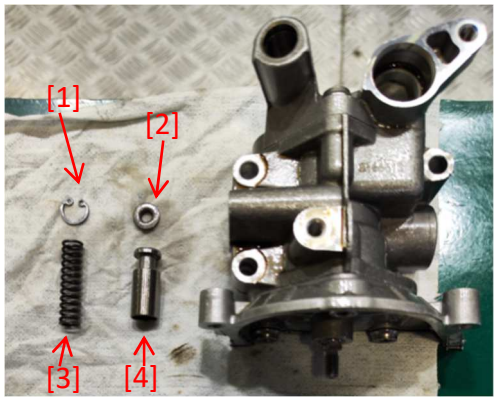
Measure oil pump clearance according to specification of lubrication system.
Any measured result passed maintenance limit, please replace the oil pump kit as a whole.

Pressure relief valve

Inspection

Caution:

- Check working situation for pressure relief valve when oil pump removed.



Remove elastic circlip [1] and break down the pressure relief valve.

Remove base ring [2], spring [3] and plug [4].

Check wear-out, scratch, or free moving for plug.

Check fatigue and damage for spring.

The re-assembly for pressure relief valve is previsely opposite do disassembly.

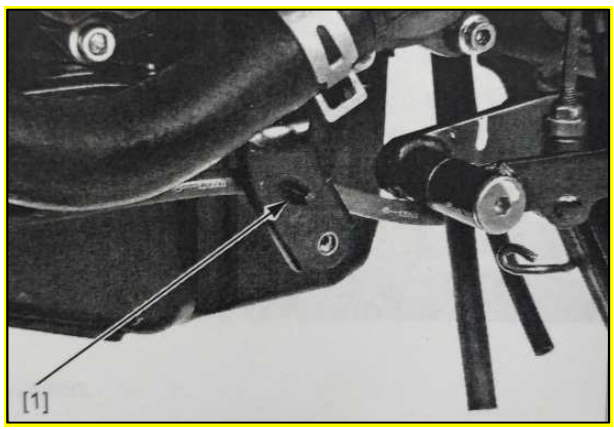
Caution:

- When re-assembly elastic circlip, whose chamfer angle face outwards.
- Make sure assemble elastic circlip into its groove.

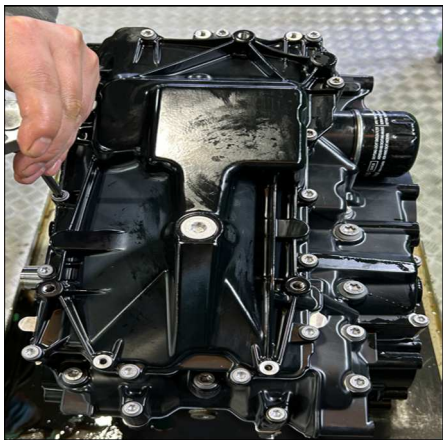
Primary oil filter

Removal

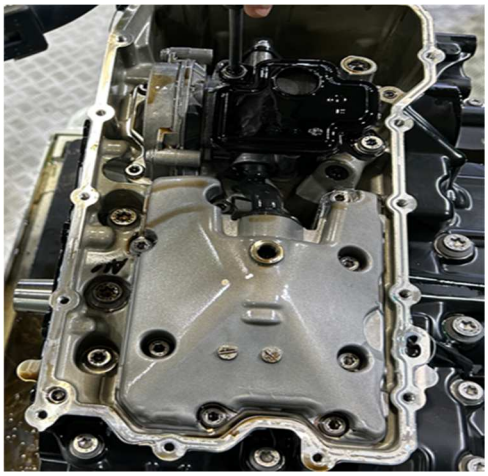
The Complete Motorcycle Project Team supplement the accessories need be removed.



Remove bolts on oil bottom case by diagonal sequence, then remove the oil bottom case



Remove primary oil filter and sealing ring.
Clean up filtering screen and check if it is damaged.



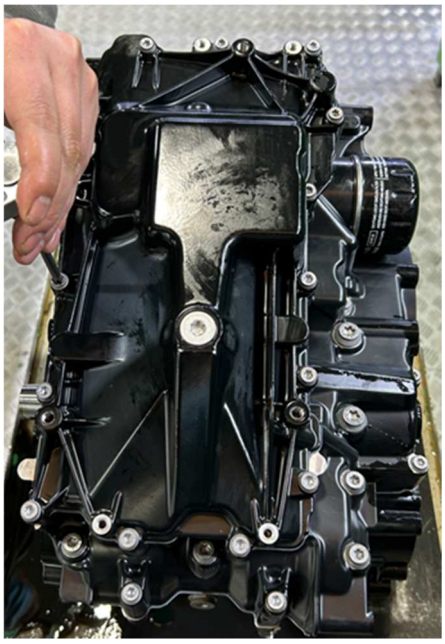
Re-assembly

Caution:: Please don't damage the installation surface for sealing.
Clean up sealant on installation surface of oil bottom case.
Replace seal ring for a new one and assemble it on primary oil filter.
Assemble filter into oil pump kit.

Coat sealing surface of oil bottom casewith sealant [1] or Dow Corning once again

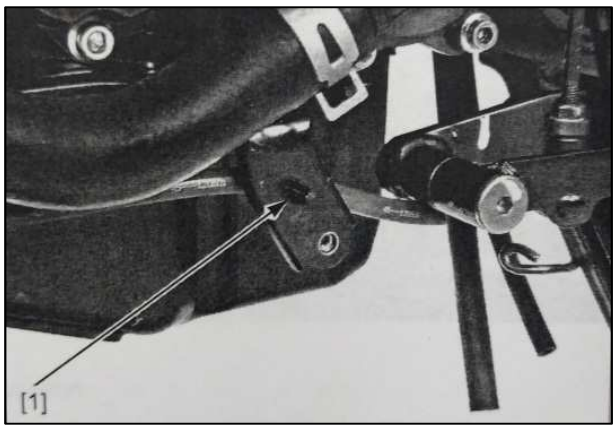
Caution: Evenly spread sealant into its groove on oil bottom case.

Assemble oil bottom case and bolt [2]onto crankcase body.
Fasten bolts by diagonal sequence.



The accessories need be assembled Onceagain shall be supplemented by project team

Fill up engine with suggested oil and check if there is any oil leaks.



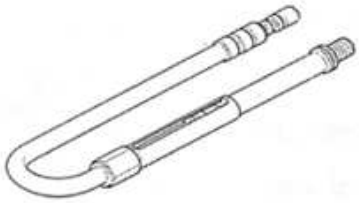
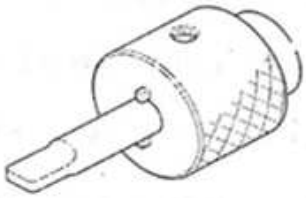
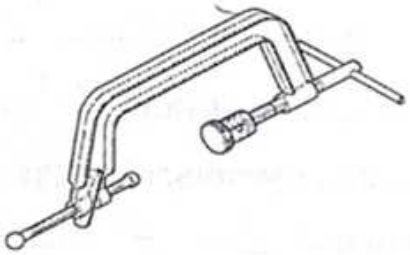
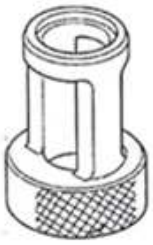
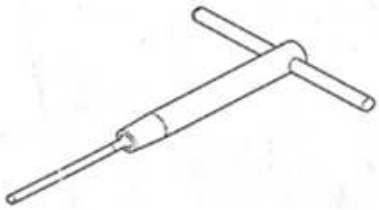
5 Cylinder head and valve

Maintenance information

Summary

- This chapter includes the inspection and maintenance for cylinder head, camshaft and swinging arm.
- When repairing the camshaft, swinging arm and adjusting stud of tensioner, we needn't remove the engine from frame; But when repairing the cylinder head and valves, we need remove the engine from frame.
- When disassembling the components, mark up the removed parts for a correct re-assembly.
- Before checking, wash up all the removed parts by cleanser, then dry them up by compressed air.
- The lubricant on camshaft is got through the oil passage in cylinder head and its cover, in this case, before re-assembling the cylinder head and its cover, wash up their oil passage first.
- Please don't damage the contact surface when disassembling the cylinder head and its cover.

Tool

Compressed index attachmer 	Tensioning device clamp B 	valve spring compressor 
Valve Spring Compression Fitting 	Valve conduit drive device5.0mm 	Valve tube adjustment actuator 
Valve guide reamer 5.0mm 	Cutter base 5.0mm 	Seat cutter 32.5mm (IN45°) 

Specification for cylinder head/Valves

Unit: mm

Items			Standard	Maintenance limit
Cylinder pressure under electrical starting			450-600kPa	—
Valve clearance		Air inlet	0.11-0.20	—
		Air exhaust	0.26-0.35	—
Swinging arm and its shaft	Internal diameter of swing arm	Inlet/Exhaust	8.013-8.028	8.033
	External diameter of swinging arm shaft	Inlet/Exhaust	7.986-7.995	7.981
	Clearance between swinging arm and its shaft	Inlet/Exhaust	0.018-0.042	0.047
Camshaft	Protrusion height of cam	Air inlet	36.226-36.288	36.206
		Air exhaust	36.050-36.112	36.030
	Clearance between journal and hole		0.020-0.056	0.07
	Runout		—	0.01
Valve, guiding tube of valve	Valve rod's diameter	Air inlet	4.966-4.980	4.956
		Air exhaust	4.956-4.970	4.946
	Internal diameter of valve's guiding tube	Inlet/Exhaust	5.000-5.012	5.04
	Clearance between valve rod and its guiding tube	Air inlet	0.02-0.046	0.07
		Air exhaust	0.03-0.056	0.08
	Guiding tube's height	Inlet/Exhaust	12.60-13.20	—
	Width for gate line of base	Air inlet	1.00-1.10	1.5
		Air exhaust	1.10-1.20	1.6

	ring			
Free length of valve spring			46.30	45.1
Flatness of cylinder head		0.05		0.10

Troubleshooting

- Malfunction at the top place of engine is usually bad for engine performance. We can find out these malfunctions by compression test, also we can find them by detective rod or stethoscope to know where the engine noise comes from, even can reach the top part of engine.
- In case the power output of engine is weak when it under low speed, please check if there is white smoke in beathing tube of crankcase. In case the soft hose is smoky, please check the jamming on piston ring.

When engine is working under low speed, too low the compressing pressure, difficult starting or poor performance

- Valve
  - Incorrect adjustment for valve clearance
  - Valve burned out or got bent
  - Wrong valve timing
  - The valve spring got cracked
- Cylinder head
  - The gasket of cylinder head with leakage or damage
  - Cylinder head gets bow, twist or crack
  - Spark plug is flexible
- Cylinder, piston or piston ring worn out

Compressing overpressure, overheat or cylinder knock

- Too much carbon buildup on piston head or in combustion chamber

Smoky

- Cylinder head
  - Valve rod or guiding tube worn out
  - Sealing piece for valve rod damaged
- Cylinder, piston, or piston ring worn out

Noisy

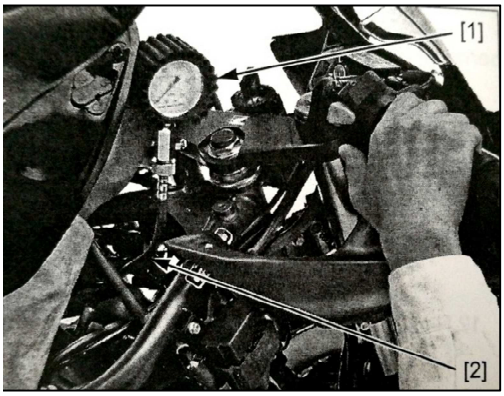
- Cylinder head
  - Incorrect adjustment for valve clearance
  - Valve gets jammed or its spring cracked
  - Camshaft worn out or damaged
  - Swinging arm and its shaft worn out
  - Swinging arm and valve rod’s end worn out
  - Chain of cam gets flexible or worn out
  - Timing chain worn out
  - Teeth of cam’s sprocket wheel worn out
- Cylinder, piston and piton ring worn out

Poor idling

- Too low the compressing pressure in cylinder

Cylinder compression test

Idly heat engine to normal working temperature.
Stop engine and remove spark plug.
Assemble threaded part of cylinder pressure gauge [1] into spark plug hole.T
Tool:
[2]Compressure gauge’ s accessories



Turn the ignition switch to “On”,
Shift to neutral gear.
Keep full throttle, start engine until pressure gauge not rise any more.
The highest data usually may keep for 4-7 seconds.
Compression pressure:
At 300rpm, 450-600kPa
Analysis for low pressure:
Leakage at cylinder head gasket.
- Improper valve clearance adjustment
- Valve leaks
- Piston ring or cylinder wear out

Analysis for high pressure:
- Carbon buildup in combustion chamber or piston top.

Cylinder head cover

Disassembly/Re-assembly

Caution:
- Repair cylinder head cover needn’ t remove engine from frame.

The accessories need be removed shall supplement by project team
1. Remove fuel tank.
2. Remove parts below:
- Remove plug [1] for secondary air suppelemt
- Remove secondary air suppelemtarytube[2]
- Remove breathing tube [3]
- Fuel evaporation control system [4] [5]

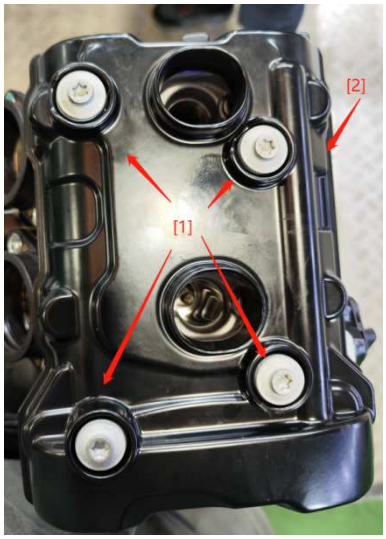
3. Remove bolt [1], locating plate for clutch cable, then remove the cable [4]
4. Loosen locking nut A [1] from adjustor of throttle cable and the adjustor itself [2], then loosen and remove throttle cable [3] from throttle drum and cable bracket.
4. Loosen adjustor B [4] for throttle cable, then loosen and remove cable [5] from throttle drum and cable bracket.
5. Fuel evaporation system: Remove installation bolt [1] of carbon canister and washer [2], then remove the carbon canister [3].。
6. Loosen overflow tube [2] from tube clamp[1].
7. Remove rubber plate [3] at place of overflow tube, then put it on the right from its lug [3].
8. Remove clutch cable from frame.
9. Removethrottle cable from frame.
10. Remove installation bolt on heat radiator.
11. Remove bolt [6] and wire joint [7] for braking
12. Remove brake tube [9] from 2 wire clips [2], then remove the clips from frame.

13. Remove bolt [4] and connective wire .
14. Fuel evaporation system： Remove controlling solenoid valve for evaporation and emission from frame. side of frame.

Caution:

To avoid runout for cylinder head cover, please fix it by adhesive tape.

Remove bolt [1] on cylinder head cover.
Remove the cylinder head cover [2] from cylinder head.



Remove gasket [1] from cylinder head, then remove seal ring [2] of ignition coil from cylinder head.
The re-assembly is presiely opposite to Disassembly.

Torque:

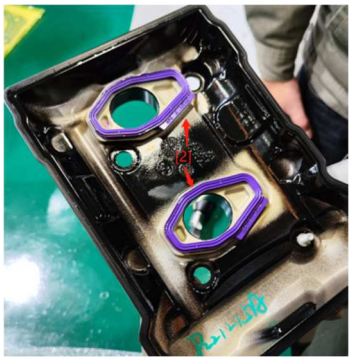
Bolt on cylinder head cover:10N·m

Caution:

- Replace gasket for cylinder head and seal ring for ignition coil for a new one.
- Before re-assemble gasket for cylinder head, please coat it with Sealant of Dow Corning.
- When re-assembling, please assemble the groove on gasket of cylinder head cover to corresponding protrusion on cylinder head.

Adjust as below:

- Free play for throttle cable
- Free play for clutch lever



Camshaft

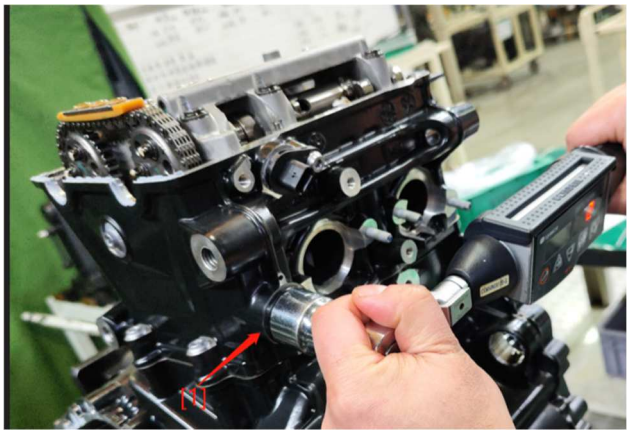
Cauton:

- When repairing camshaft, it needn't remove engine from frame.

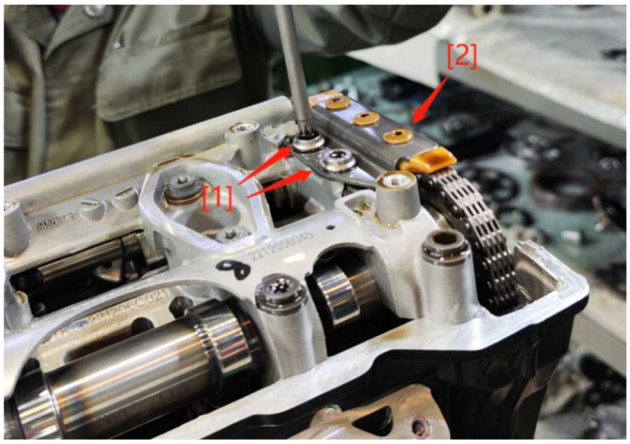
Remove cylinder head cover.

Make sure the piston of cylinder 1st is at upper stopping point of compression stroke.

Remove covering plate [1] of tensioner, then remove the hydraulic tensioner.



Removebolt[1] and upper guiding plate[2] for chain.



Caution:

Be careful, please don't let bolt on upper guiding plate for chain drop into crankcase.

Caution

Loosen bolts for camshaft bracket inwards by alternative way by several times, otherwise it is easy to damage camshaft bracket.

Be careful, please don't let boltfor camshaft bracket drop into crankcase.

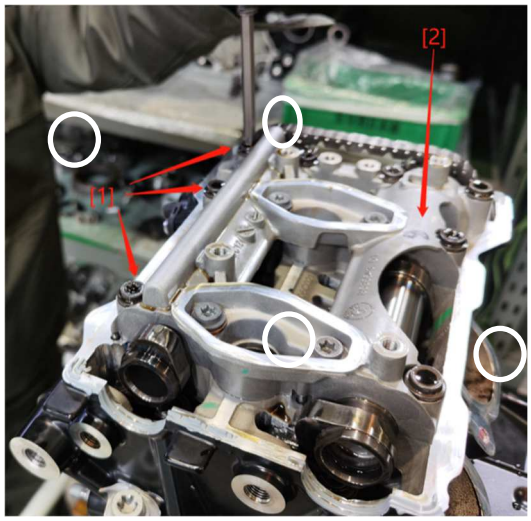
Alternatively loosen bolt [1] for camshaft bracket by 2-3 times and then remove.

Remove camshaft bracket [2] with positioning pin from cylinder body.

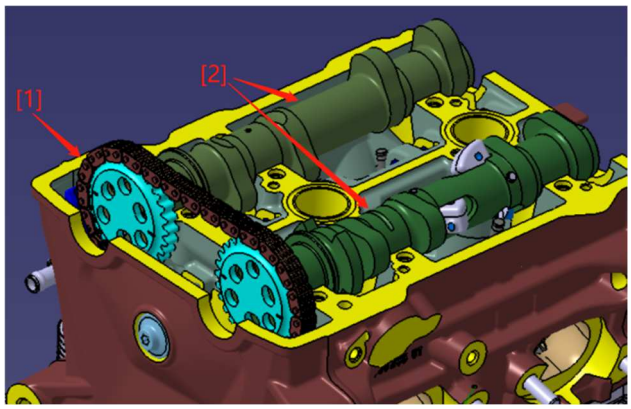
Caution:

- Forcedly remove positioning pin from camshaft bracket is not allowed.

Hold chain of cam by hook to avoid dropping into crankcase.

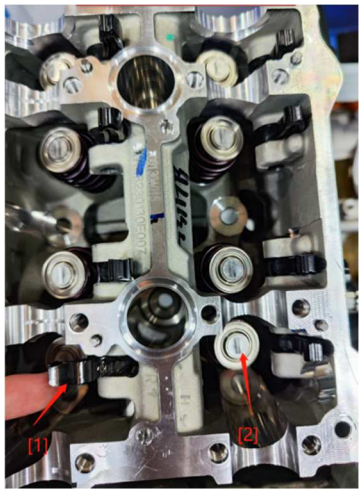


Remove chain [1] from sprocket wheel then remove camshaft.



Lift up swinging arm [1]。
Remove adjustive shim [2] for valve.
Caution:

- Please don’ t let adjusting shim drop inton crankcase.
- Mark up adjustive shim for a correct re-assembly.
- Take out shim by tweezers or magnet would be easier.



Inspection

Check and confirm if there is damage, wear-out, distortion, burn-out or oil passage blocking up on parts below.

- Sprocket wheel of cam/camshaft
- Camshaft bracket/Positioning pin

- Pressure plate for chain of cam

Measure each part according to specifications of cylinder head/valves.

Camshaft runout

Fix both ends of camshaft by V-shaped piece, then measure its runout by micrometer.

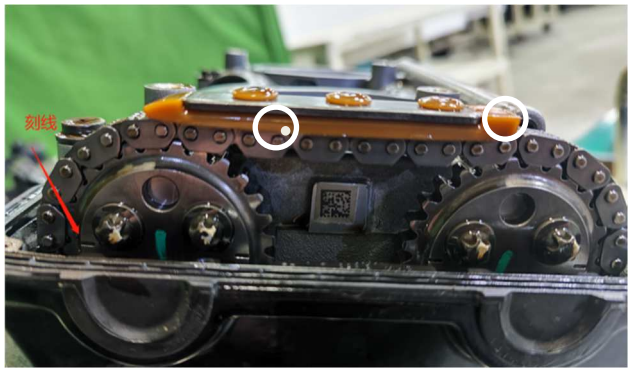
Maintenance limit: 0.01mm

Oil clearance for camshaft

Wipe up oil on camshaft, its bracket and cylinder head.

Assemble camshaft onto cylinder head.

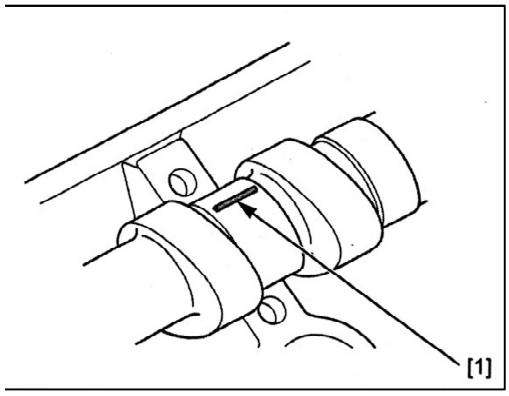
- Get marking line on end surface on driven sprocket wheel for air intake/exhaust camshaft paraller to installation surface of cylinder head cover, then put laser marking number upside down as picture shows.



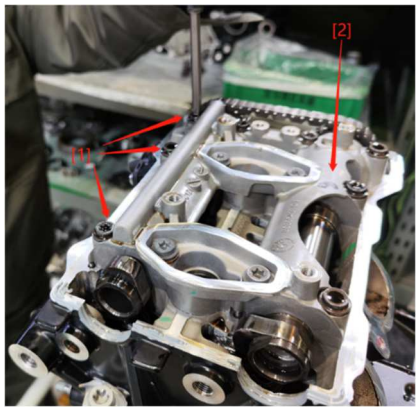
Vertically put a gap gauge [1] of plastic line on the top of journal of camshaft, please get it bypassing of oil hole.

Caution:

- During inspection, please don’ t turn the camshaft.

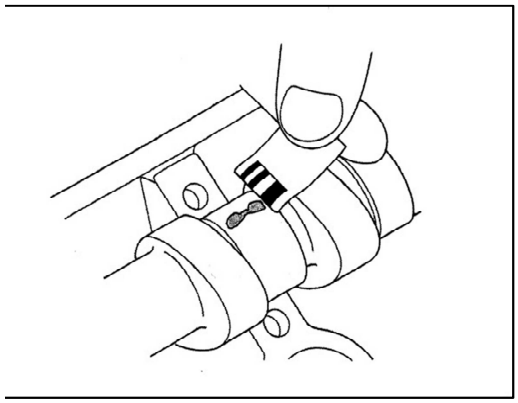


Make sure positioning pin of camshaft bracket aligned to pin’ s hole on cylinder head.
Caution: Coat journal with oil.
Assemble camshaft bracket on cylinder head.
Fasten bolts for camshaft bracket in alternative sequence outwards until it assembled in place.



Caution: Coat contact surface of bolt flange for camshaft bracket with oil.
Bolts for camshaft bracket:
- M7×38mm bolt 12 pcs
- Φ7.2×φ15×2flat washer 4 pieces [1]

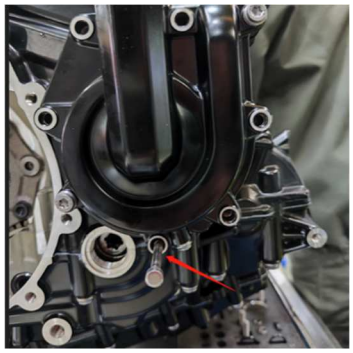
Caution *lts for camshaft bracket alternatively by several times outwards, otherwise the camshaft bracket may damage.*
Alternatively fasten bolts for camshaft bracket and cylinder as a complete kit. bracket to given torque by 2-3 times.
Torque: **15N•m**



Remove camshaft bracket, then measure each width for gap gauge of plastic line. The widest place is the oil clearance.
Maintenance limit: 0.10mm
When it passed maintenance limit, replace the camshaft for a new one and measure oil clearance once again.
In case the oil clearance passed maintenance limit, replace the camshaft

Re-assembly

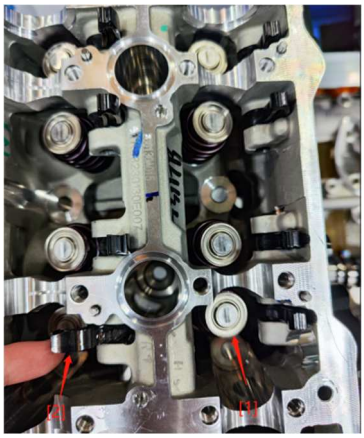
Caution: When turning the crankshaft, please don’ t press-fit chain of cam into timing sprocket wheel.
Turn the crankshaft clockwise, align positioning hole on primary driving geat to bolt hole at the lowest place of water pump cap.



Caution: Please don't let adjustive shim for valve drop into crankcase.

Assemble adjustive shim [1] for valve back to original place on base ring of valve in turn.

Lay down swinging arm shaft [2].



There is identification for camshaft of air intake/Exhaust:

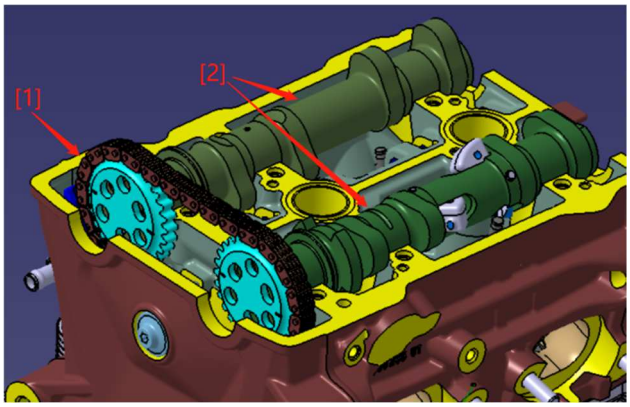
- Pressure reduction device without starting: Air intake camshaft
- Pressure reduction device [1] with starting: Air exhaust camshaft

Coat cam, journal and other stress surface with oil.

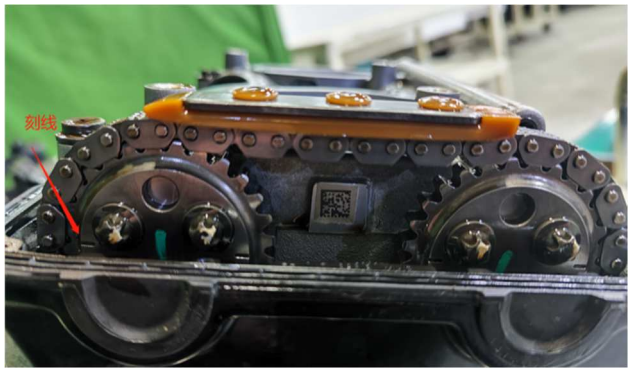
Coat all the surface of chain [1] of cam with oil.

Assemble chain and sprocket wheel of cam, them assemble camshaft on cylinder head.

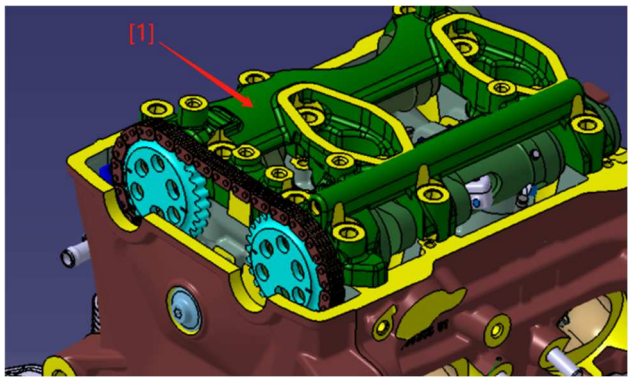
· Get marking line on end surface ofdriven sprocket wheel for camshaft of air intake/exhaust parallel to installation surface of cylinder head cover, then put laser marking part number upside down as picture shows.



Make sure positioning pin on camshaft bracket aligned to pin’ s hole on cylinder head.



Assemble camshaft bracket [1] onto cylinder head.

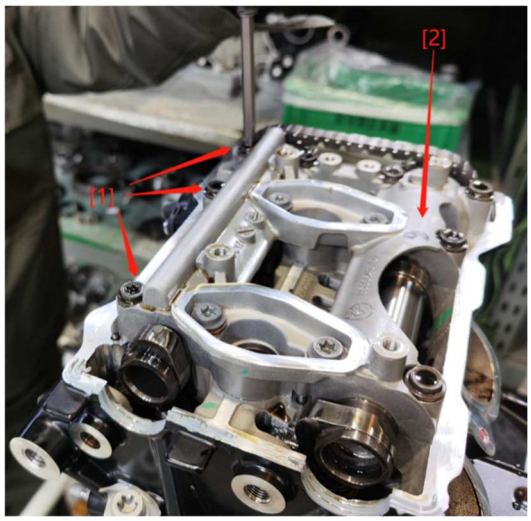


Caution: Coat contact surface of bolt flange for camshaft bracket with oil.
Bolt for camshaft bracket:
— M7×38mm bolt 12 pcs
Φ7.2×ϕ15×2 flat washer 4 pcs [1]

Caution

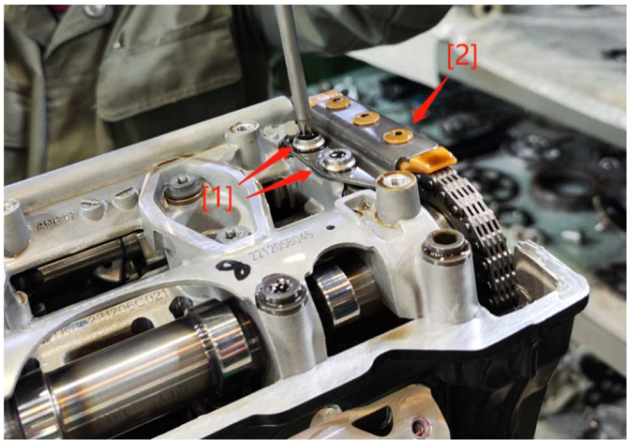
Alternatively fasten bolts for camshaft bracket by several times outwards, otherwise the camshaft bracket may damage.

Alternatively fasten bolts for camshaft bracket in place by several times outwards.
Alternatively fasten bolts for camshaft bracket to given torque by 2-3 times.

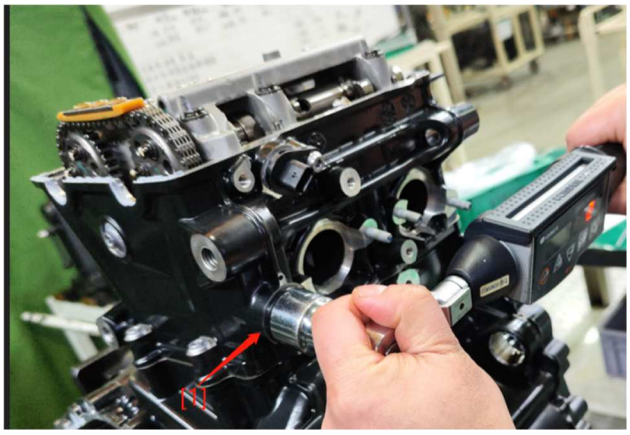


Assemble upper guiding plate [2] for chain.

Caution: Please don’ t let bolt for upper guiding plate of chain drop into crankcase.
Assemble and fasten bolt [1] for pressure plate of cam.
Torque: 10N • m



Assemble hydraulic tensioner and its covering plate.
Fastening torque 15N•m。。
Turn crankshaft clockwise several time, turn it and align positioning hole on primary driving gear to bolt hole at the lowest plate of water pump cover.
Check once again the valve timing.
Check valve clearance.
Assemble cylinder head cover.



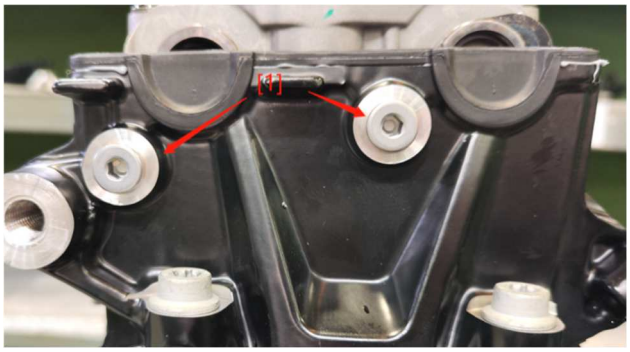
Swinging arm

Disassembly/Re-assembly

Caution:

- When repairing swinging arm shaft, it needn’ t remove engine from frame.
- The steps for repairing swinging arm shaft for both air intake and exhaust valve are the same.

Remove camshaft.
Remove sealing screw plug for swinging arm shaft and flat washer [1].

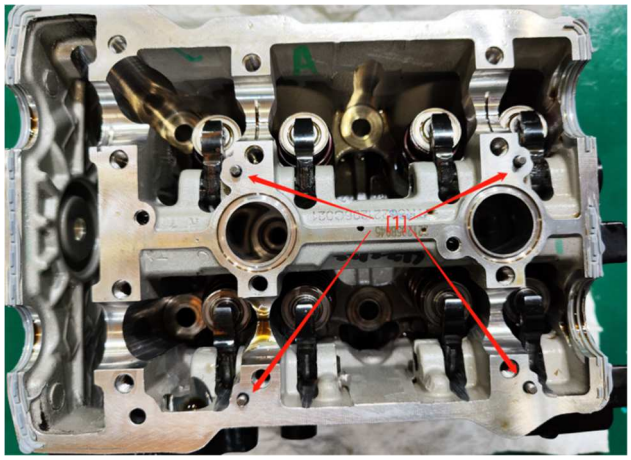


Remove limit pin [1] for swinging arm shaft
Fix swinging arm [1], then remove the shaft on outer side by tweezers first, then turn the shaft on inner side to hole, then remove by tweezers.
Remove swinging arm and mark it up.。
Coat sliding area, stress surface of swinging arm and outer surface of shaft

with oil.
Re-assemble swinging arm and its shaft.
Caution:

- The specification for swinging arm of both air intake and exhaust are the same without identification, if there is not any part on swinging arm replaced for a new one, please re-assemble swinging arm back in place according to former marking up.

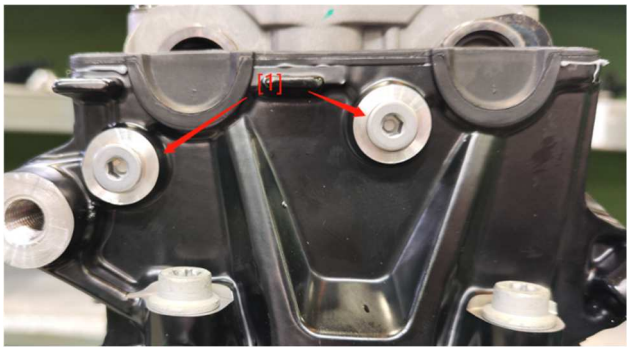
`



Assemble sealing screw plug [1] for swinging arm shaft, please replace gasket for a new one.
Fasten sealing screw plug of swinging arm shaft to given torque.

Torque: 15N•m

Re-assemble camshaft.



Inspection

Check and confirm if there is damage, wear-out, distortion, burn-out or oil passage blocking on parts below.

- Swinging arm
- Swinging arm shaft

Measure each part and their clearance according to specification of cylinder head/valves.
Any parts passed maintenance limit, please replace.

Cylinder head

Removal

Remove parts below in turn:

- Air filter
- Throttle valve body
- Engine
- Heat radiator
- Water pipe of circulation
- Cylinder head cover
- Upper guiding plate for chain
- Camshaft bracket
- Air intake/exhaust camshaft

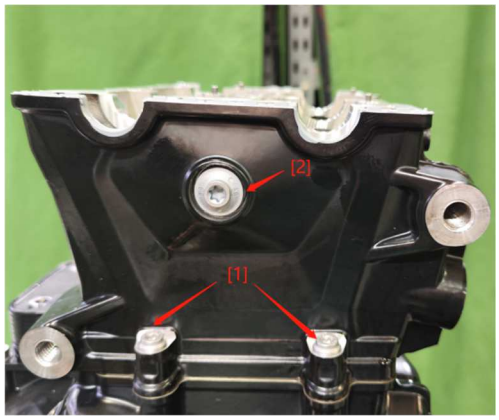
Remove bolt [1] of M6, remove noise reduction bolt kit [2]。

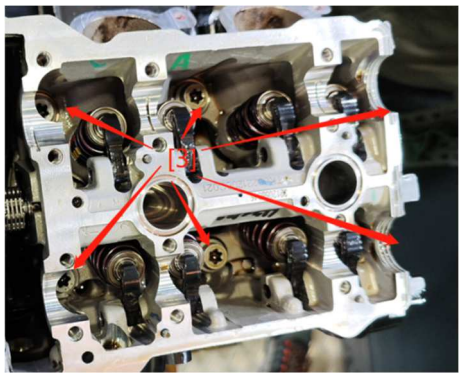
Alternatively loose cylinder head bolt [3] of M9 by 2-3 times, then remove the bolt.

Remove cylinder head.

Caution:

- Fix chain of cam by hook to avoid dropping into crankcase.
- Heavily knock cylinder head is not allowed, don't damage contact surface by lever bar for prying up.





Remove gasket [1] of cylinder head.

Break up

Remove parts below:

- Spark plug
- Water temperature sensor

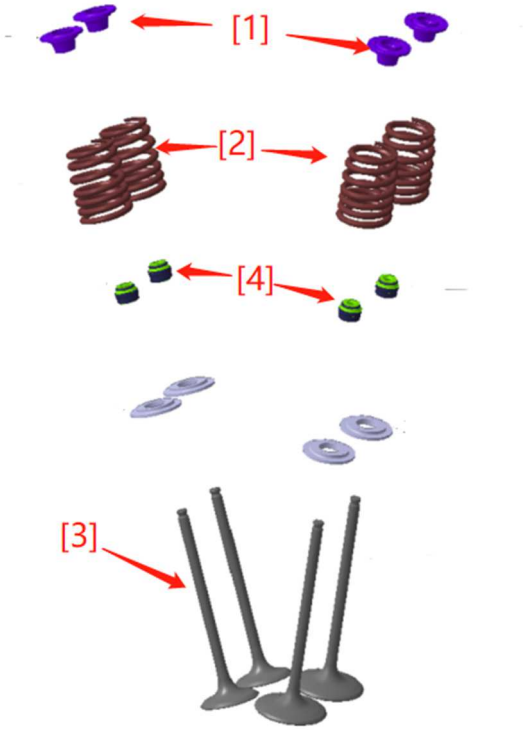
Caution: Please don't heavily compress valve spring for permanent distortion when disassembling.

Remove valve clip by the tools for it only.

Tools:

Compression tool for valve spring

Compression accessory for valve spring



Mark up each parts when disassembly for a easy re-assembly.

Remove valve compression tools and parts below:

- Upper base ring [1] for valve spring
- Valve spring [2]
- Valve[3]
- Oil shield cover[4]
- Spring base [5] for valve

Please don't damage contact surface between cylinder head and crankcase body also surface of valve base.

Please clean up carbon buildup in combustion chamber and surface of gasket for cylinder head.

Inspection

Check if there is damage, wear-out, distortion, burn-out or oil passage blocking on parts below.

- Cylinder head
- Valve spring
- Valve
- Guiding tube of valve
- Guiding plate/Tensioning plate for chain

Measure each part and clearance according to specification of cylinder head/valve Any part passed maintenance limit, please replace.

- Clean up carbon buildup inside guiding tube by reamer before measuring.
- Please refer to inspection for valve base.

Replacement for guiding tube of valve

Break down cylinder head

Put new guiding tube of valve in freezer for an hour.

Caution:

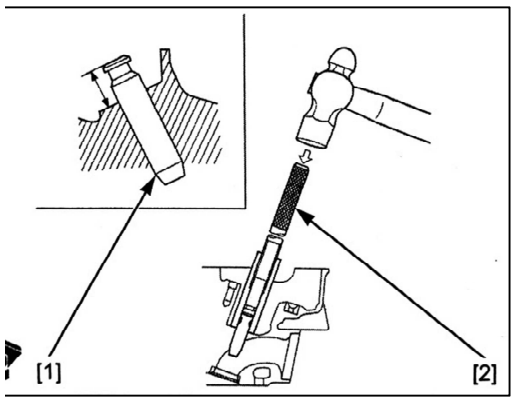
- Please wear heat insulation glove for avoid scald when operating hot cylinder head.
- Please don't heat cylinder head by fire, otherwise it may distort.

Heat cylinder head to 130-140℃ by baking oven. Ensure the suitable temperature for heating cylinder head by thermal indicating bar, which could be bought from shop for welding tools.

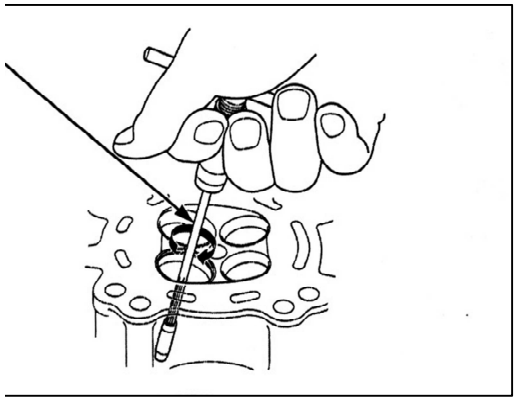
Hold cylinder head, push guiding tube andits clamp out of cylinder head from side of combustion chamber.

Tool:
Guiding tube driver, 5.0mm

Take new guiding tube [1] of valve from freezer.
When cylinder head is still hot, assemble new guiding tube from side of camshaft, untill its exposing length reached stipulation.
Tool:



[2] Driver for adjustment guiding tube of valve.
Stipulation: Intake/Exhaust : 12.60-13.20mm



Requirement for re-assembly:
Mark up depth for guiding tube by marker pen.
Adjust depth to correct by driver of guiding tube.
Get cylinder head cooled down to room temperature.
Adjust new guiding tube by reamer when re-assembled.

Caution:
When reamer is working, please don't let it raise up or get inclinging inside of guiding tube.
During this operation, please use lubricant for cutting.
Insert reamer from side of combustion chamber of cylinder and always turn the reamer clockwise.
Tool:

Guiding tube reamer, 5.0mm
Totally clean up cylinder head to erase metal chips after reamer worked, them trim the valve base.

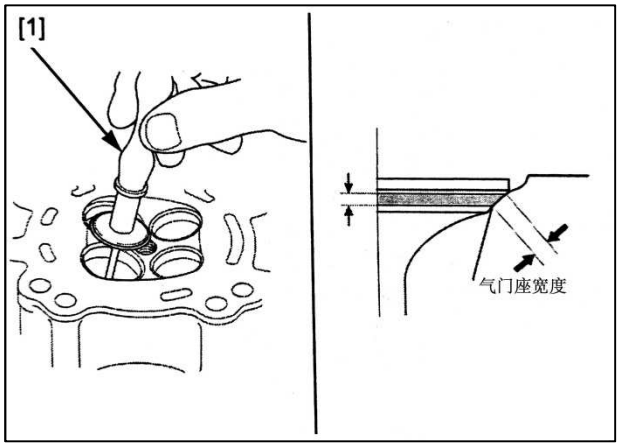
Inspection and trim for valve base

Inspection

Break down cylinder head.
Totally clean up carbon buildup for air intake/exhaust valve.
Coat each valve with a thin layer of red lead.
Slightly knock valve by hand grinding tools [1] to direction of valve base, check contact situation of valve base without turning valve.

Remove valve to check width for each surface of valve base.
The width of contact surface for valve base shall be within stipulation, while surrounding of valve base shall be smooth and flat.

Standard:Intake1.00-1.10mmExhaust 1.10-1.20mm
Maintenance limit : Intake 1.5mmExhaust1.6mm



In case the width of valve base is out of given range, please trim it.。
Grinding for valves are not aloowed. In case contact surface is burned out or worn out,or the base is not flat and smooth, please replace the valve.
Check if there is situation for base surface for valve below:

- Contact surface for valve base is not smooth or flat
  - Bent or folded valve rod, replace valve for a new one and trim its base.
- Base surface wear-out
  - Replace valve and trim its base.
- Contact area（Too high or low）
  - Replace valve base for a new one.

Trim

Tools for trimming valve base are as below.

Tools:

Cutter bar holder,4.5mm
Valve base trimming cutter,32.5mm (IN, 45°)
Valve base trimming cutter,26.2mm (EX, 50°)
Flat milling cutter,31.79mm (IN, 23°)
Flat millng cutter,25.28mm (EX, 33.7°)
Internal milling cutter,34.5mm(IN, 52°)
Internal milling cutter,26.97mm(EX, 56.85°)

Valve base width: Intake 1.00-1.10mm
Exhaust1.10-1.20mm

Caution:

- Please strictly follow requirement of User Manual of polisher manufacturer.
- Please don't grind valve base too much and produce too many chips.

1、Use cutter for air intake of 45° / exhaust of 50° , cut off rough place and irregular part.

2、Then use flat milling cutter of intake 23° /exhast33.7° , cut off ring belt area by 1/4 on upper part of working surface of valve base.

3、Then use internal milling cutter of intake 52° /exhaust 56.85° internal milling cutter, cut off ring belt area by 1/4 on bottom part of working surface of valve base.

4、Then use trimming cutter of intake 45° /exhaust 50° trimming cutter, grind valve base to suitable width.

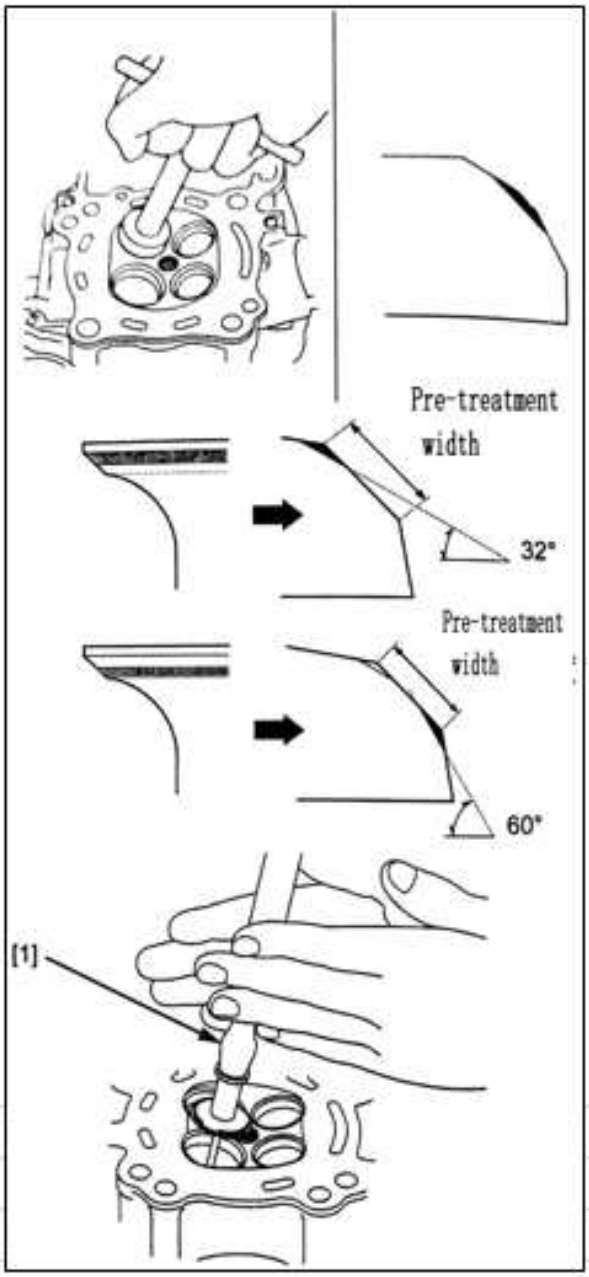
Make sure all the rough and irregular surface on valve base are grinded off.

5、When valve base was grinded, coat valve surface with abrasive, then slightly grind the valve.

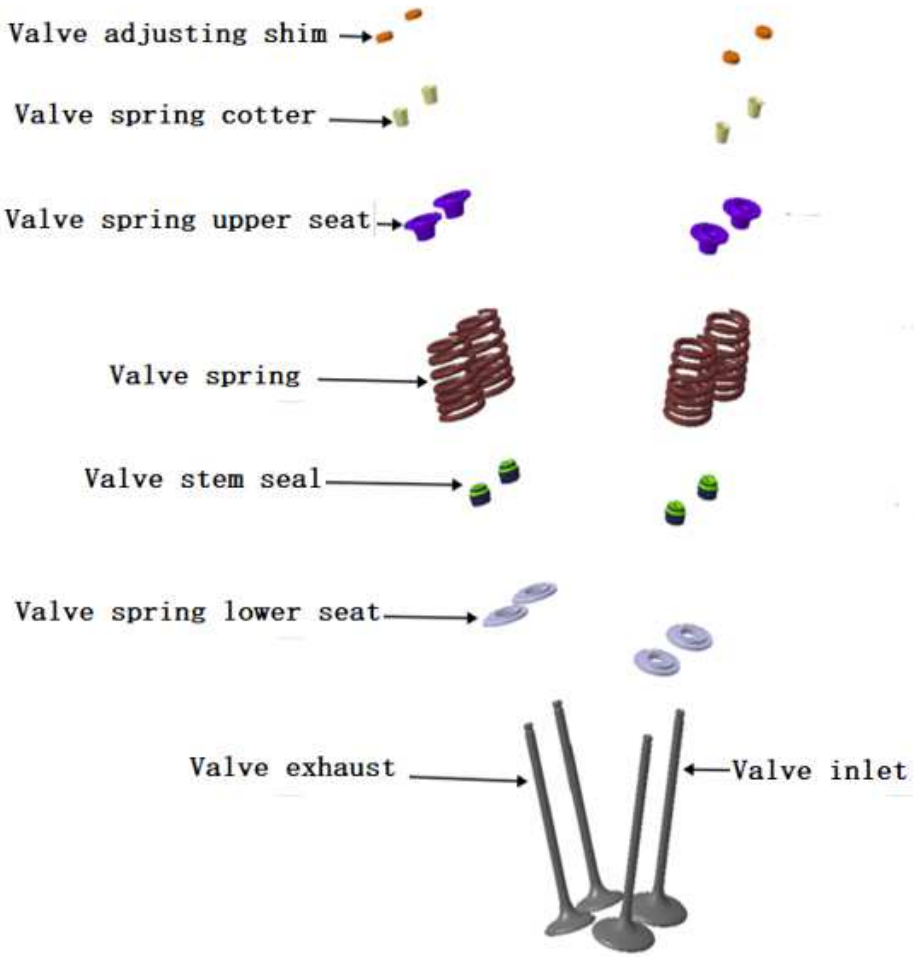
Caution:

- Powfully grind may lead to valve base distort or damage.
- Frequently change angle of grinding tools can prevent uneven grinding.
- Don't let the abrasive get to place between valve rod and guiding tube.

When grinded, please wash up the residual abrasive on cylinder head and valve, then check once again the contact surface of valve base.



Re-assembly



Wash cylinder head kit by cleanser, then blow all the oil passages by compressed air.

Lubricate new oil shield cover [1] by oil.。

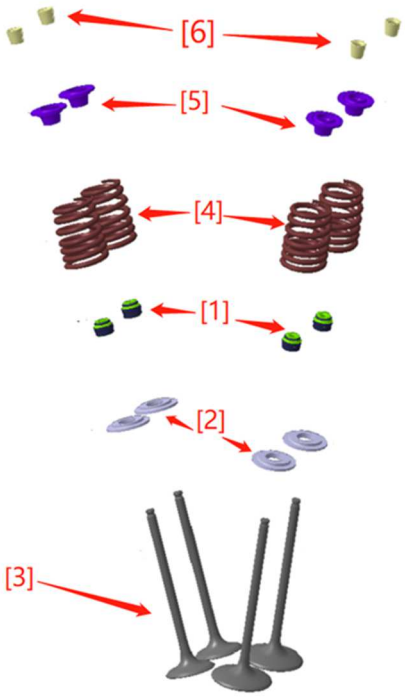
Re-assemble lower valve spring base [2] and oil shield cover.

Lubricate sliding area of valve rod and rod end by oil.

Insert valve [3] into guiding tube, meanwhile slowly turning valve to avoid damage on oil shield cover.

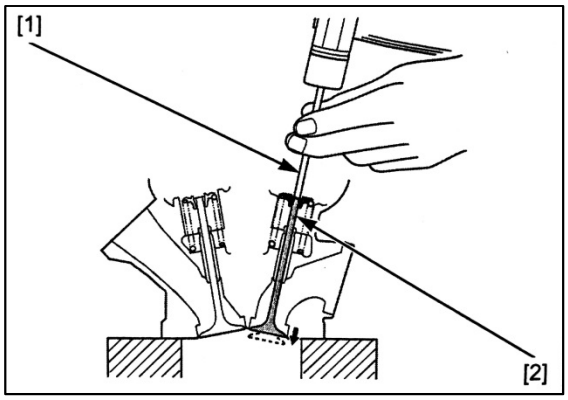
Re-assemble valve spring [4], get the side with bigger inner diameter face to combustion chamber.

Re-assemble base ring [5] of upper valve spring [5].



Re-assemble valve clip [6] by tools for this only.
To avoid performance loss of spring, please don’t heavily compress.
Tools:
Compression tool for valve spring
Accessory for compression tool of valve spring

Hold cylinder head on working bench to avoid damage on valves.
Put suitable tool [1] into guiding tube[2].
Slightly knock to stably re-assemble lock clip.
Re-assemble parts below:
- Water temperature sensor
- Spark plug



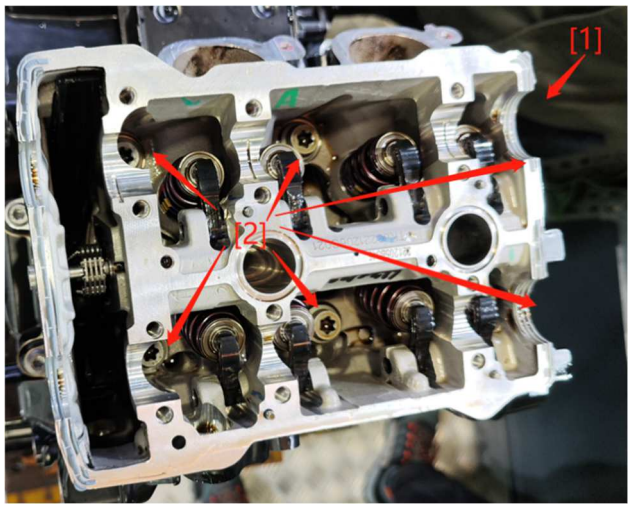
Re-assembly

Erase dirt on contact surface of cylinder.
Caution: Please prevent dust or dirt dropping into cylinder.

Re-assemble new gasket [1] into cylinder head.

Get timing chain through cylinder head, assemble cylinder head onto crankcase.
Totally clean up threaded part of connective bolt (M9) and base surface, then wipe it up.
Coat oil for engine on threade part of seal bolt (M9) for cylinder head and base surface.
Alternatively assemble seal bolt (M9) [2] for cylinder head by 2-3 times, then fasten to given torque.
Torque:5N·m+10N·m+90° +90°
Re-assemble and fasten cylinder head bolt
- Camshaft for air intake/exhaust

（M6）[3]. Torque:**10N·m**
Re-assemble parts below:



- Camshaft bracket
- Upper guiding plate for chain
- Cylinder head cover

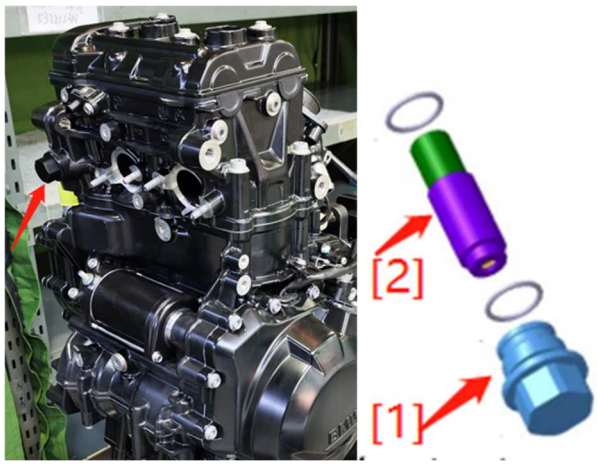
Tensioner and its covering plate

Disassembly/Re-assembly

Caution:

- The maintenance for tensioner and its covering plate needn’ t remove engine from frame.

Remove covering plate [1] of tensioner and the hydraulic tensioner [2].



Caution:

- When hydraulic tensioner was removed, please don’ t turn or move crankshaft and camshaft.

The re-assembly is previsely opposite to disassembly.

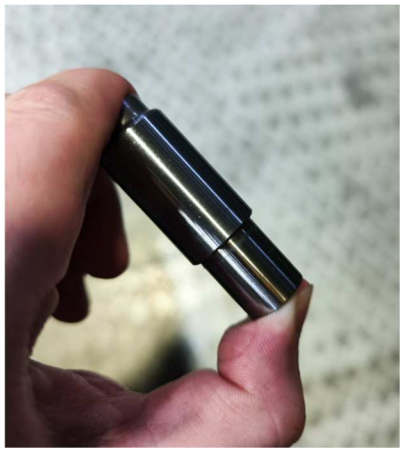
Caution:

- Replace seal ring for a new one. Coat seal ring with lubricant of MP3 before re-assembling.

Inspection

Check operation performance for tensioner [1].

- Press by hand, obviously feel its bounce back without jamming.

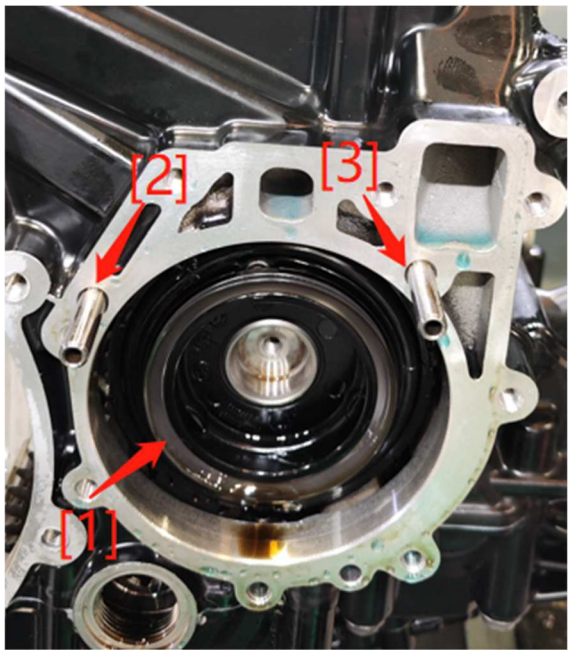


Timing chain/Sprocket

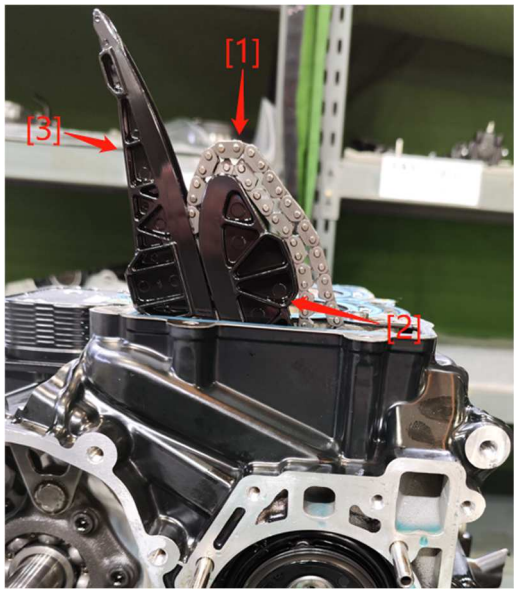
Removal

Remove the parts below:
- Cylinder head
- Water pump kit

Remove timing double gear [1] from crankcase body.
Remove limit pin [2] for guiding plate and limit pin [3] for tensioning plateby magnet and tweezers.



Remove timing chain [1], guiding plate [2]and tensioning plate [3] for chain.



Inspection

Check and confirm if there is scratch, damage, wear-out or distortion on parts below, in case it is, please replace.
- Timing chain
- Tensioning plate for chain
- Guiding plate for chain
- Timing double gear

Re-assembly

Re-assemble timing double gear [1], coat all the surface of timing chain [1] with oil, the match up and assemble with double gear, the align the 2 timing points on double gear to that on driving and timing gear, then assemble into crankcase.

Put tensioning plate and guiding plate into crankcase from upper side of chain chamber,then align the hole to correcponding hole on crankcase body.
Coat the limit pin for both tensioning plate and guiding plate with oil, then insert into corresponding hole.
Caution: Make sure the limit pin was also inserted into limit hole for tensioning and guiding plate.
Assemble the parts below:

- Water pump kit
- Cylinder head

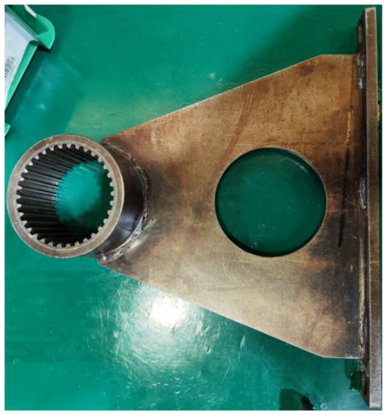
6 Clutch and gearshift

Maintenance

Summary

- The maintenance for clutch and gearshift device in this chapter needn’ t remove the engine from frame.
- The oil level and viscosity has influence on separation of clutch. When the clutch failed to separate or the motorcycle is still in low speed when clutch separated, please check the oil level before clutch maintenance.

- Tool(s)



Specification for clutch and gearshift device

Unit: mm

Items	Standard	Maintenance limit
Free play of clutch lever	10-20	—

Troubleshooting

Difficult to hold clutch lever tightly

- The clutch cable damaged, twisted or too dirty
- Wrong wiring for clutch cable

- The thrust mechanism of clutch got damaged
- Malfunction in bearing of clutch’s pushing rod
- Incorrect installation for operational rod of clutch

Clutch skidding in acceleration

- Jamming on clutch’s pushing rod
- Driving friction plate worn out
- Poor performance for clutch spring
- Not any free travel on clutch lever
- Molybdenum disulfide or graphite additive gets into oil

When clutch separated or failed to separate, the motorcycle is still under low speed

- Too wide the free travel of clutch lever
- The friction plate of clutch gets warped
- Too high the oil level, wrong viscosity or incorrect additive
- The locking nut on clutch center case gets loosened
- Thrust mechanism of clutch gets damaged
- Incorrect installation for clutch’s operational rod
- The inserting groove on clutch outer case and clutch gear worn out
- Wrong operation for clutch

Difficult gearshift

- Incorrect adjustment for clutch cable
- Wrong operation on clutch
- Wrong viscosity of oil
- The gearshift fork gets damaged or bent
- The shaft of gearshift fork gets bent
- The claw of gearshift fork gets bent
- The bolt on five-star shaped plate gets loosened
- The five-star shaped turning plate gets damaged
- The guiding groove on gearshift drum gets damaged
- Five-star shaped turning plate gets worn out or damaged

Gear jump in transmission system

- Check plate gets worn out
- Poor performance even damage on returning spring of check plate
- The bolt on five-star shaped turning plate gets loosened
- Five-star shaped turning plate gets damaged
- Shaft of gearshift fork gets bent
- Gearshift fork gets bent or damaged
- The meshing surface or teeth groove gets damaged

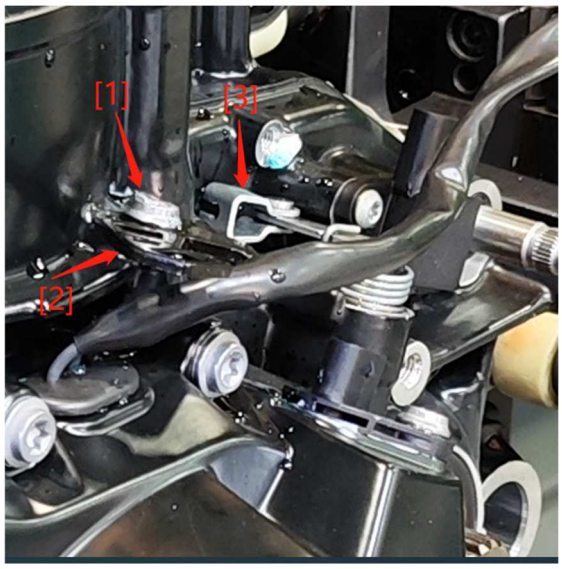
Gearshift plate fails to return

- The poor elasticity of returning spring of gearshift spindle or gets cracked
- Gearshift spindle gets bent or damaged

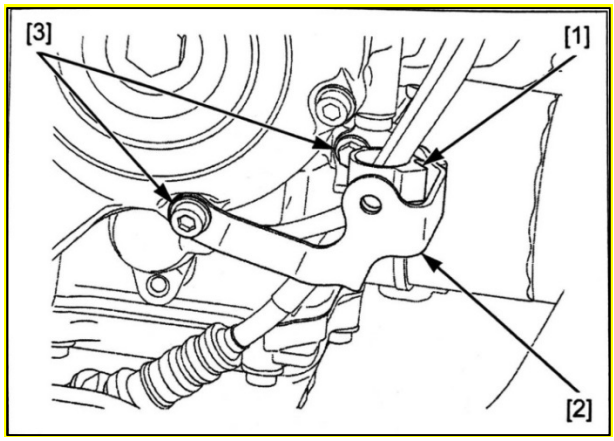
Right crankcase cover

Disassembly/Re-assembly

The accessories need be removed shall supplement by project team.
Drain off oil in engine.
Remove bolt [1] and locating plate [2] for clutch cable, then remove clutch cable from clutch operation arm.



The accessories need be removed shall supplement by project team.



Loosen bolt [1] on right crankcase cover by 2-3 times in alternative way.
Caution: The two bolts in position pointed by arrow are with washer, please mark them up.
Remove the parts below:

- Bolt
- Right crankcase cover kit [2]

Clean up residual sealant on contact surface between crankcase and its cover

without damaging the surface.
The re-assembly is precisely opposite to disassembly.

Torque:

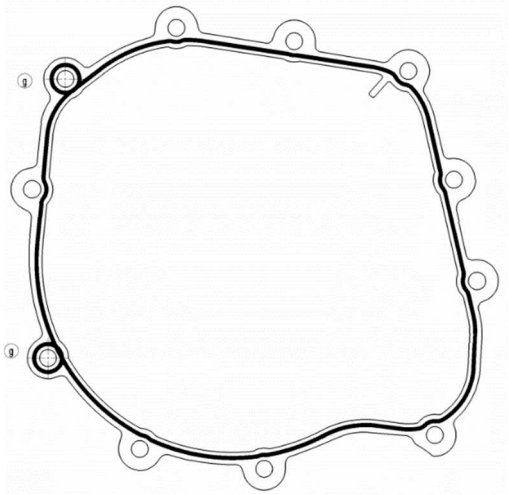
Bolt for right crankcase cover: 20N ¶m

Caution:

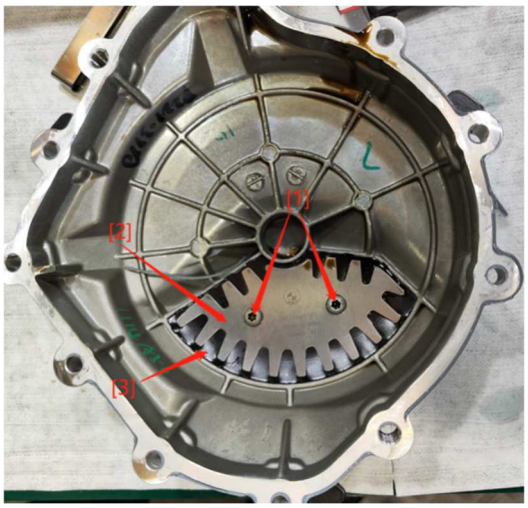
- Coat contact surface of right crankcase cover with sealant as picture shows.
- Replace the washer for re-assembly for a new one.

Adjust the free play for clutch lever.
Fill up crankcase with oil we suggest and check if there is oil leaks.

Disassembly/Re-assembly



Loosen bolt [1] for pressure bolt of damping rubber sheet for right crankcase, then remove pressure plate [2] and damping rubber sheet [3].
The re-assembly is precisely opposite to disassembly.
Caution:



- Replace the bolt for pressure plate for a new one (Coat with sealant).
- The surface of damping sheet with mark face outwards.
- The surface of pressure plate with mark face outwards.

Torque:6N·m

Inspectioon

Check if there is scratch, damage, wear-out or distortion on parts below.

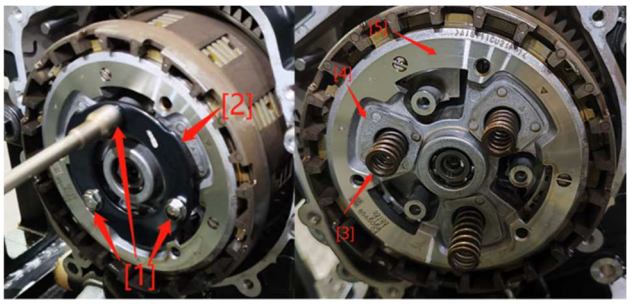
- Pressure plate for damping rubber sheet.
- Bolt for pressure plate of damping rubber sheet.

Clutch

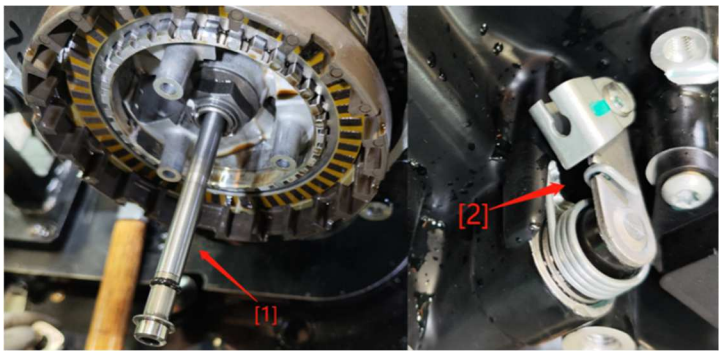
Removal

Remove right crankcase cover.

Loosen bolt [1] for lift plate in alternative way by 2-3 times, remove bolt, lift plate [2] and clutch spring [3], clutch spring base and pressure plate [5] for clutch.



Remove pushing rod [1] for clutch and operation arm [2] for clutch.

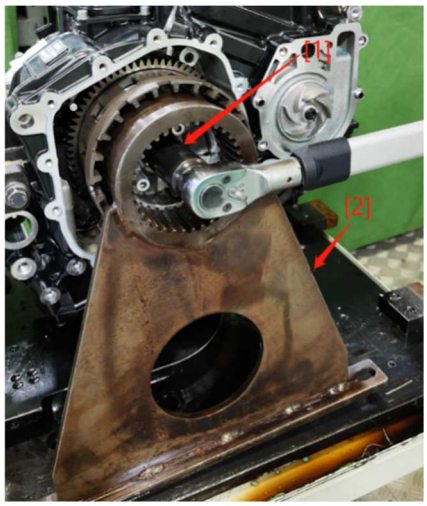


Disassemble locking side of locking nut on central case of clutch. The remove driving and driven friction plate and disc spring for clutch.

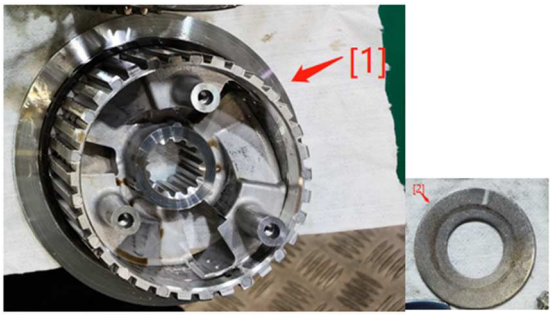
Caution: Please don't damage threaded part of main shaft.

Fix central case for clutch by tools for it only, meanwhile loosening locking nut [1].

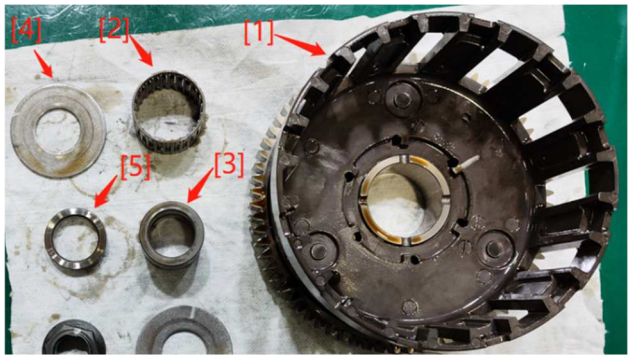
Tool:
Turning stop tool for central case [2]
Remove locking nut.



Remove central case [1] and washer [2] for clutch.



Remove outer case [1], needle bearing[2],bearing collar[3], washer [4], and collar [5] clutch.



Inspection

Check and confirm if there is scratch, damage, wear-out or distortion on parts below,in case it is, please replace.

- Pushing rod of clutch
- Operation arm for clutch

- Lift plate for clutch
- Spring
- Central case of clutch
- Washer
- Disc spring
- Driving and driven friction plate
- Outer case of clutch/Primary driven gear
- Needle bearing/Collar
- Collar for clutch
- Main shaft

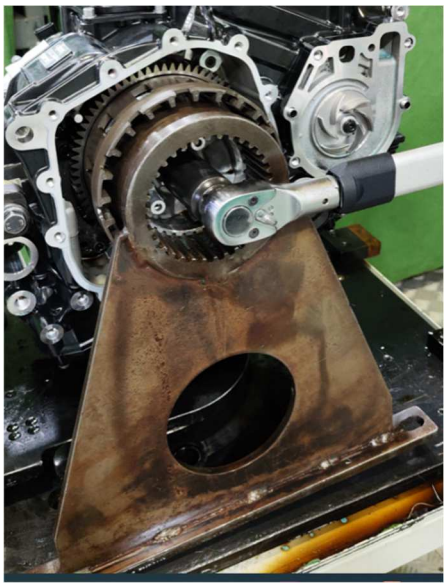
Caution:

- Replace clutch spring as a kit.
- Replace driving and driven friction plate as a kit.

Re-assembly

Re-assemble collar and washer for clutch to main shaft

Coat needle bearing and its inner and outer hole for outer case of clutch, surface of primary driving and driven gear with clean engine oil.
Re-assemble outer case of clutch together with needle bearing and its collar.



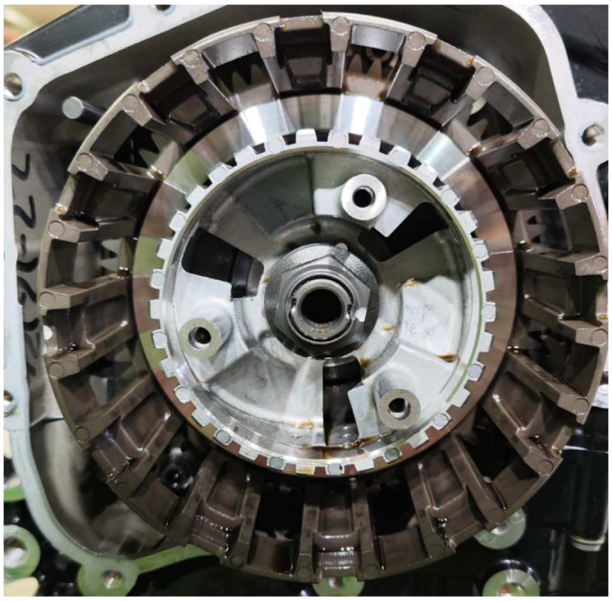
Caution:

- Make sure correct meshing-up between driving and driven primary gear.

Re-assemble washer and central case of clutch.
Re-assemble locking nut, then fasten it by turning stop for central case of clutch only.

Torque: 190N·m

Caution, when the first time fastened to 190N·m, loosen it anticlotckwise by 45°, then fasten to 190N·m once again. When fastened, get opening of clutch nut distorted by chisel and get it sunk, which closely stick to gap on main shaft, please don't damage threaded part of main shaft.

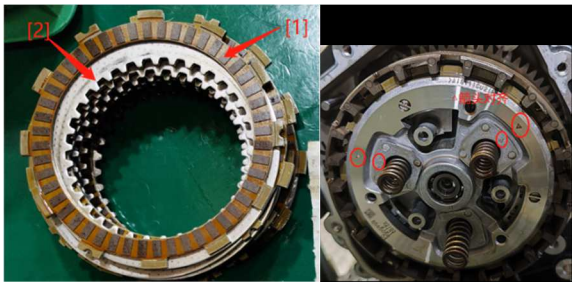


Re-assemble disc spring into central case of clutch and pay attention to its direction

Re-assemble pushing rod and operation arm for clutch.

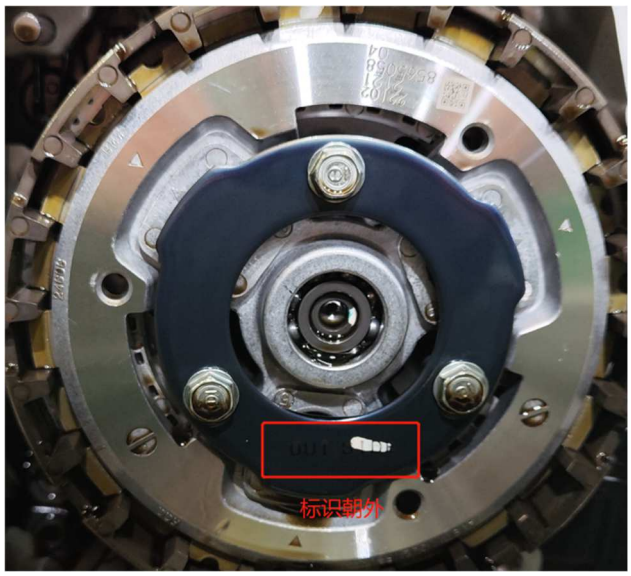
From driving friction plate [1], re-assemble driving plate and driven plate [2] in turn.

Re-assemble driving, driven plate and pressure plate onto central case of clutch, then assemble spring base onto pressure plate, then align mark "△" on pressure plate and spring base



Re-assemble spring to its base, then assemble lift plate and its bolt. Please

get the side with mark “OUTSIDE” on lift plate face outwards.
Fasten bolt of lift plate alternativelyby 2-3 times to given torque. Torque: 10N•m



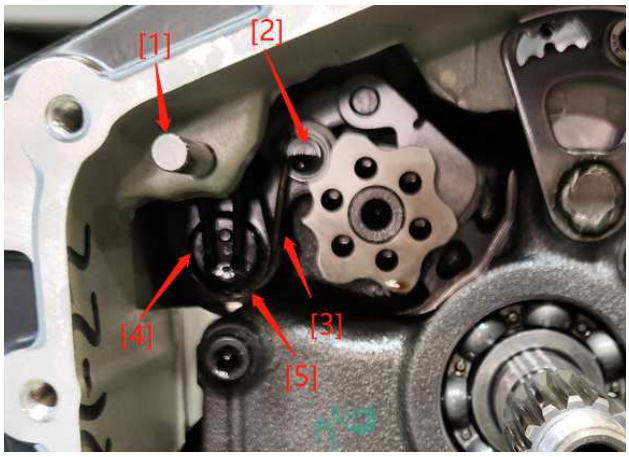
Re-assemble right crankcase cover.

Gearshift device

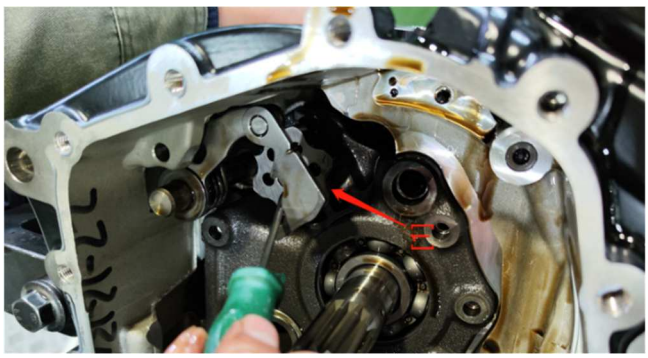
Disassembly

Remove the parts below:
- Right crankcase cover
- Clutch

Remove pin shaft [1], check plate kit [2],stoppingstwist spring[3], stopping twist spring base [4] and washer [5].
Caution: Mark up wahsers, please don’t get confused to that on gearshift arm.



When lift gearshift ratchet up, please pull out gearshift arm kit [1] from crankcase.
Caution: Please mark up re-assembling sequence for small parts on gearshift arm kit for a correct re-assembly.



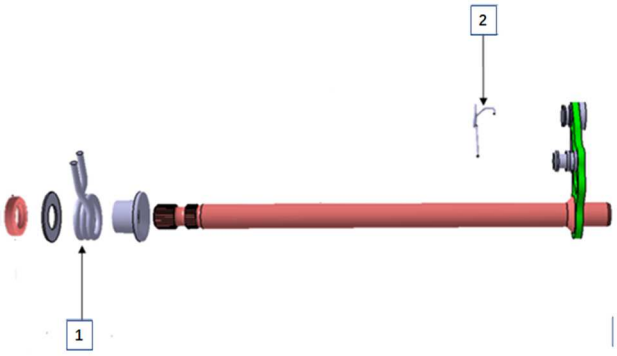
Inspection

Check if there is damage, wear-out or distortion on parts below, replace if it is necessary.

- Five-star turning plate
- Check plate kit
- Stop twisting spring
- Stoping spring base

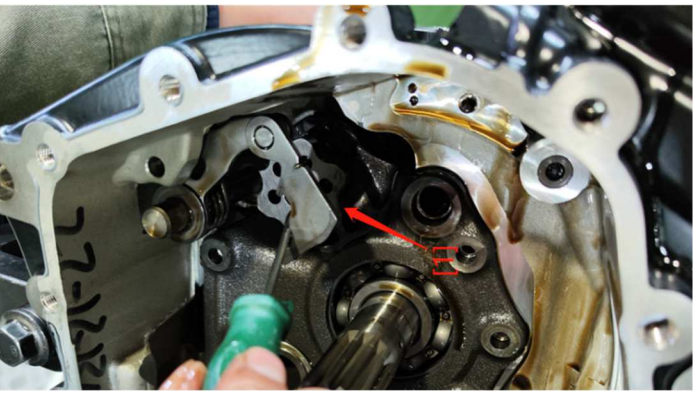
Gearshift arm

Check if there is fatigue or damage on reutnring spring [1] for gearshift and turning spring [2] for gearshift arm, replace if it is necessary.
Check if there is wear-out or Distortion on gearshift spindle.
Check if there is wear-out, damage or distortion on gearshift ratchet.
Replace gearshift arm kit as a complete set if it is necessary.

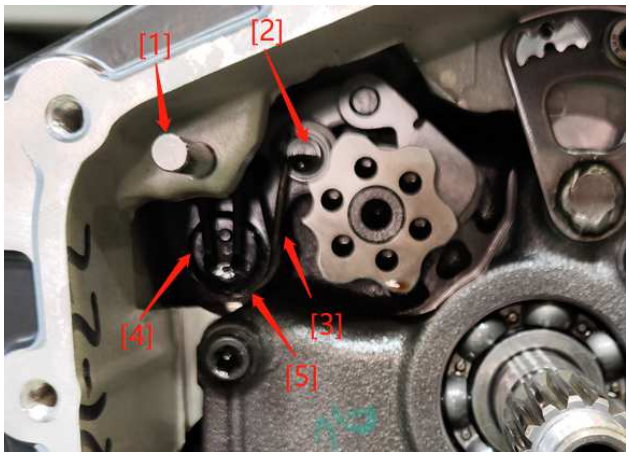


Re-assembly

Re-assemble gearshift arm kit [1] intogear box cover, the gearshift ratchet is behind five-star turning plate.



Re-assemble clutch,
Re-assemble right crankcase cover.



Re-assemble pin shaft [1], check plate kit[2], stopping twist spring [3], stopping twist spring base [4] and the washer [5].

Disassembly/Re-assembly for gearshift pedal

Supplement by project team

7 Magneto and starting clutch

Summary

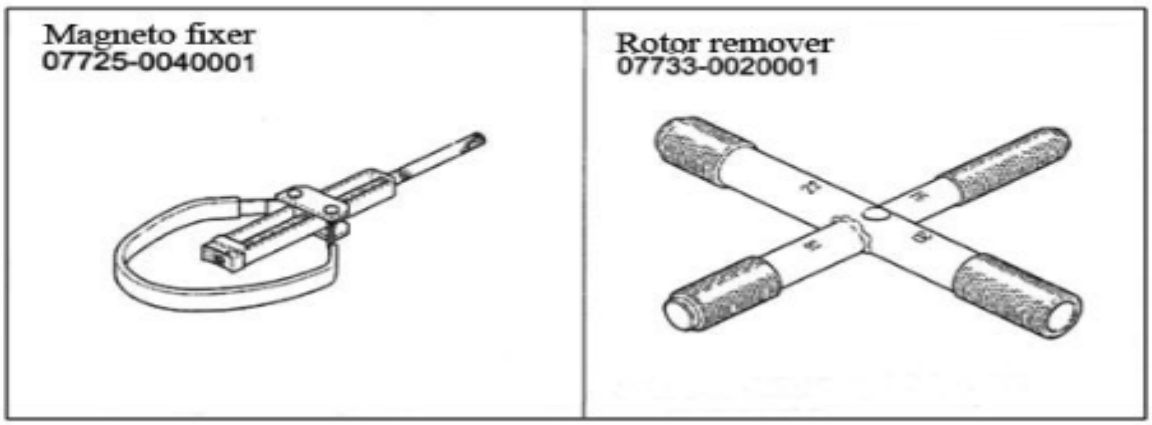
- The maintenance for stator and rotor of magneto needn't remove the engine from frame.
- Check about the charging coil of alternative power generator.
- Check about the trigger.
- Maintenance about starting motor.

Specification for magneto and starting clutch

Unit: mm

Items	Standard	Limit
External diameter for shaft jacket of starting plate shaped gear	51.705-51.718	51.685
Internal diameter for outer case of starting clutch	68.364-68.390	68.400

Tool(s)



Troubleshooting

Starting motor is run, while engine failed starting

- Malfunction in starting clutch
- Malfunction in double gear or its shaft of starting motor
- Smaller gear of starting motor in malfunction or worn out
- Malfunction in driving gear of starter

Left crankcase cover

Disassembly/Re-assembly

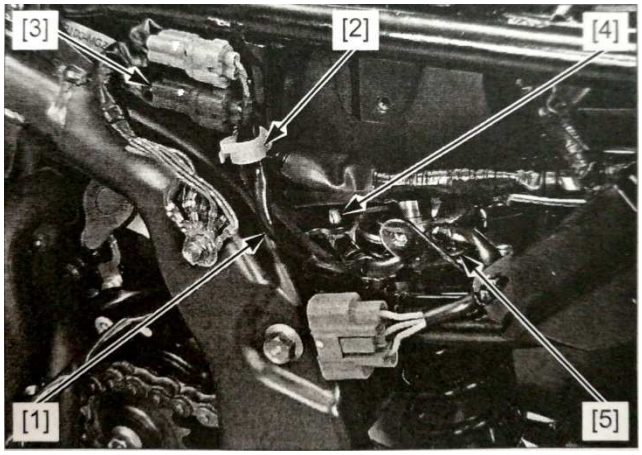
Caution:

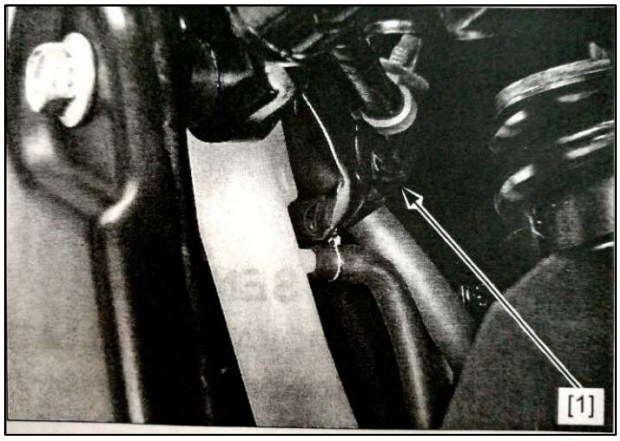
- When removing left crankcase cover, lay a clean oil tray under engine to prevent oil flowing out. When re-assembled, fill up with appointed oil to given amount.

Keep motorcycle upright on horizontal ground.

Remove parts below:

- The accessroies need be removed shall suppelement by project team.





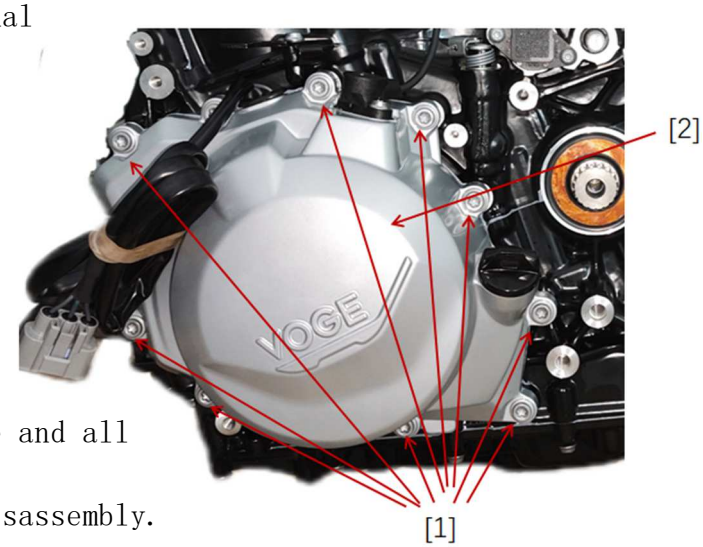
Loosen bolt [1] on left crankcase in diagonal sequence by 2-3 steps.

Remove parts below:

- Bolt
- Left crankcase cover [2]

Caution:

- The left crankcase cover (Stator) bears magnetive absorption from rotor, be carefuel when removing it.



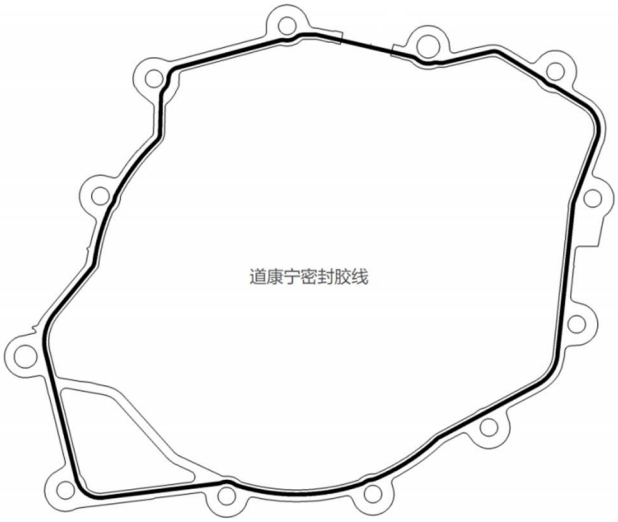
Clean up residual sealant on left crankcase and all the contact surfaces.

The re-assembly is previsely opposite to disassembly.

Before re-assembling magneto cover, coat its contact surface with sealant of Dow Corning.

Torque:
Bolt on left crankcase: 20N·m

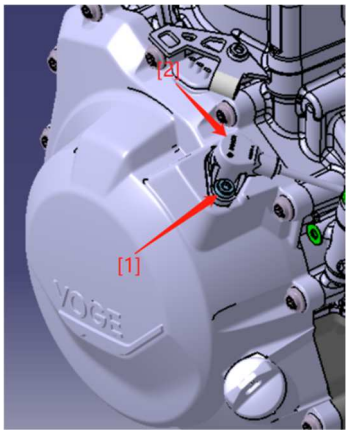
Caution:
Check oil level.
Make sure there is not any oil leaks.



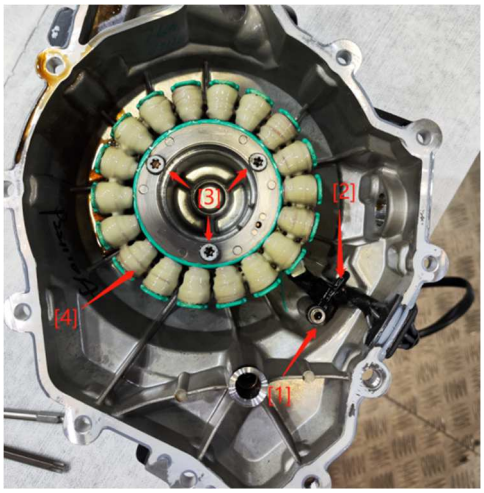
Stator of magneto and crankshaft position sensor

Disassembly/Re-assembly

Loosen bolt [1] for crankshaft position sensor, then remove the sensor[2].
Remove left crankcase cover.



Loosenn bolt [1] for wire clip, then remove the clip [2].
Loosen bolt [3] for magneto stator, then remove the stator [4].
Caution: When removing stator of magneto, please don’ t leave scratch on sealing rubber jacket for wires.

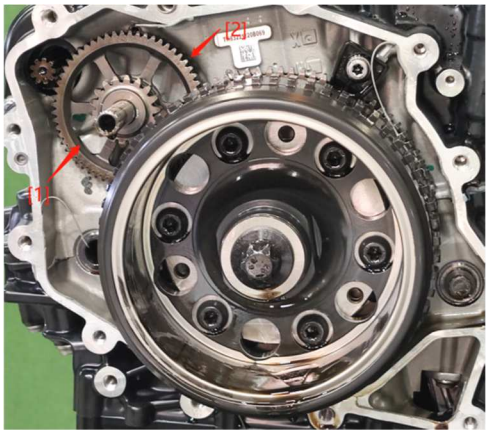


The re-assembly is previsely opposite to disassembly.
Coat new bolt for stator with Loctite in advance.
Torque: 10N·m
Replace bolt of wire clip for a new one with Loctite coating on it. Torque:**6N·m**
Bolt for crankshaft position sensor. Torque:**10N·m**

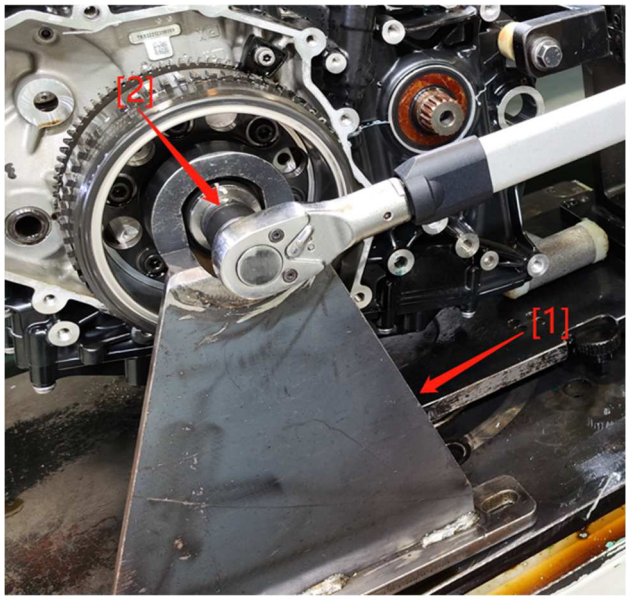
Stator of magneto

Removal

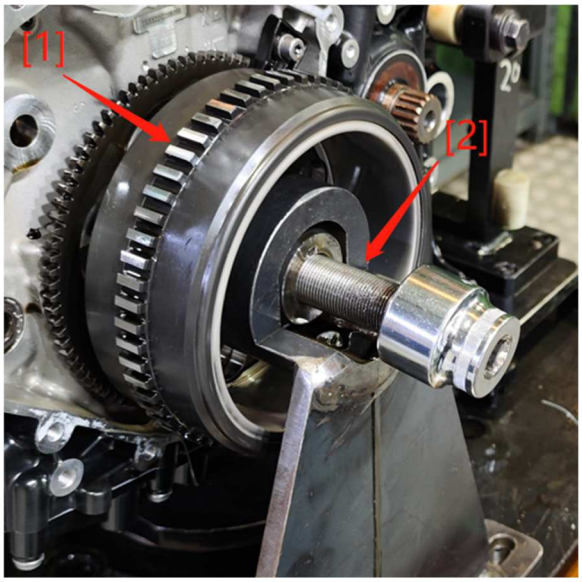
Remove left crankcase cover.
Remove the shaft [1] of double gear and the gear [2].



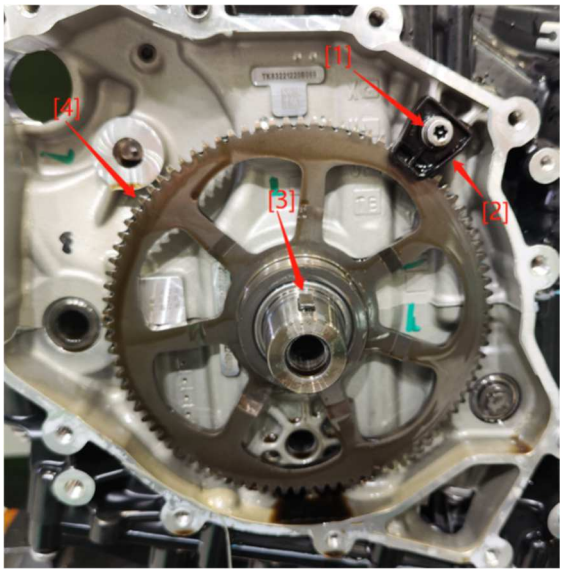
Fix rotor of magneto by its turning stop tool[1], then loosen bolt [2] for magneto.
Remove bolt for rotor and the washer.



Remove rotor [1] by external hex. boltof M22×15[2].



Loosen bolt [1] for limit piece of plate shaped gear. Then remove the limit piece [2].
Remove semi-round key [3] by knocking of rubber hammer.
Please don’ t damage semi-round key and crankshaft.
Remove plate shaped gear kit [4].



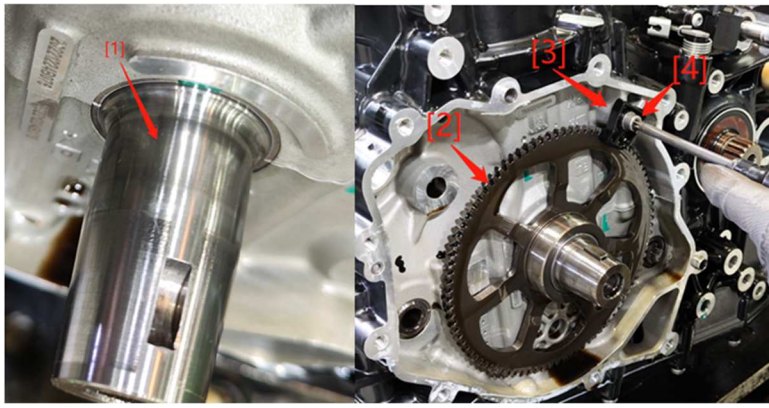
Inspection

Check if there is scratch, damage, wear-out or distortion on parts below, Please replaceif it is necessary.

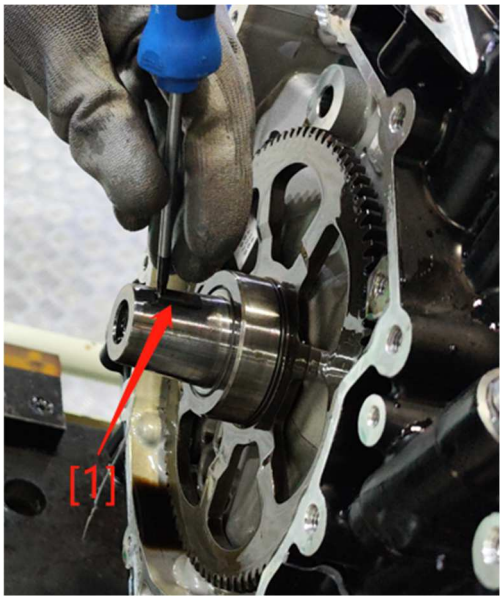
- Double gear shaft
- Double gear
- Semi-round key
- Plate shaped gear and needle bearings.

Re-assembly

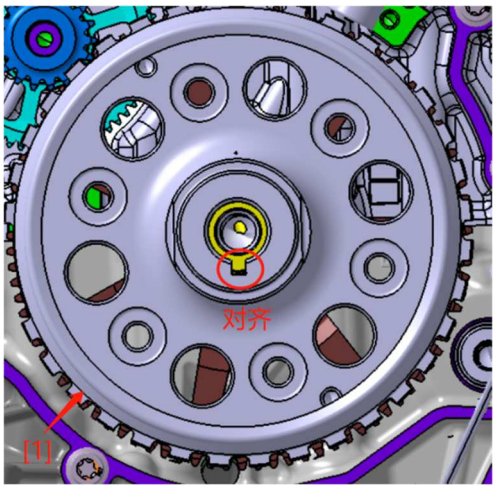
Coat contact area [1] of needle Bearingwith engine oil. Re-assemble plate shaped gear [2].
Assemble limit piece [3] for plate gearmthen fasten the bolt [4] for limit piece.
Caution: The newly replaced bolt needs coat with Loctite. Torque:10N·m
Coat contact surface of plate gear and rotor with engine oil.



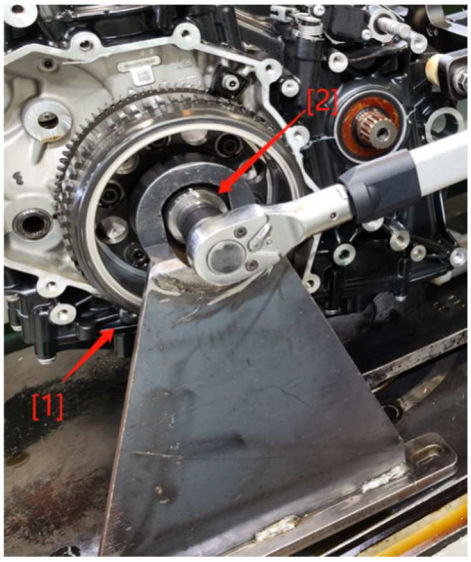
Re-assemble semi-round key [1].
Please don’ t leave damage on semi-round key and crankshaft.



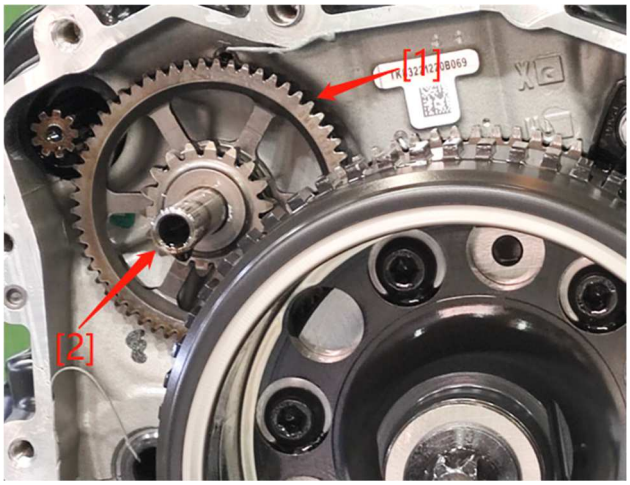
Totally clean up oil on taper surface of crankshaft and inner hole of rotor.
Re-assemble rotor [1] for magneto.
Caution: Please align semi-round key on crankshaft to its groove on rotor.



Re-assemble washer and bolt [2] for rotor.
Fix rotor [1] by stop turning tool, then fasten bolt to given torque.
Torque: 150N·m



Coat outer surface of double gear shaft with engine oil.
Re-assemble double gear [1] and its shaft [2].
Re-assemble left crankcase cover.



Starting clutch

Inspection for operation of starting clutch

Remove left crankcase cover without removing rotor.
Check operative performance for starting clutch by turningplate shaped gear [1].
Check smooth turning of plate shaped gear of anticlockwise.

Removal

Remove rotor for magneto.
Loosen bolt [1] for starting clutch, then remove starting clutch kit.
Caution: Protect inner cover of rotor, the rotor is strongly magnetive, please avoidcollitionof bolt or gun tip on inner cover.

Remove starting clutch [2] from its outer case [1].

Inspection

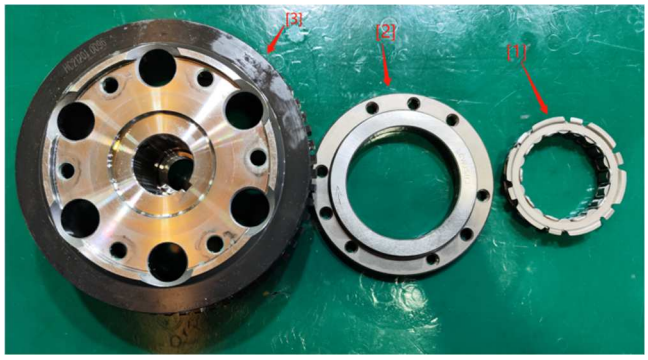
Check if there is scratch, damage, wear-out or distortion on parts below, please replace if it is necessary.

- Outer case of clutch
- Starting clutch

Make sure every part meets demand of Speficition for magneto and starting clutch. Any parts passed maintenance limit, please replace.

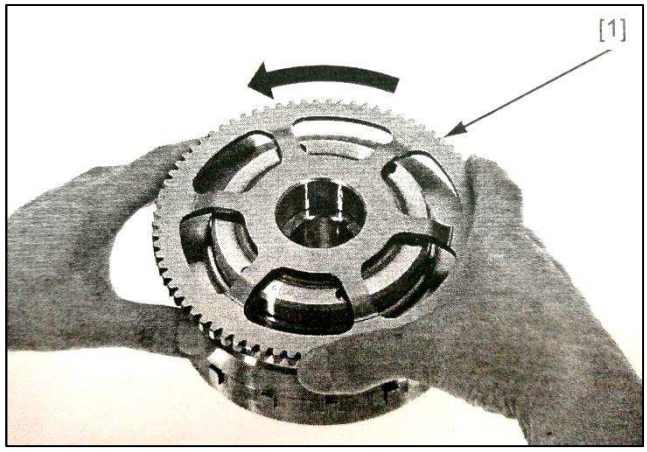
Re-assembly

Coat contact surface of starting clutch with clean engine oil.
Re-assemble starting clutch [1] onto its outer case [2].
Re-assemble starting clutch kit to rotor [3].



Coat newly replaced bolt with Loctite, then fasten the bolt to given torque.
Torque:35N·m

Re-assemble rotor of magneto.
Check operative performance of
Starting clutch by turning plate shaped gear [1].
Check smooth turning of plate shaped gear ofanticlockwise, also check if it is without clockwise turning.



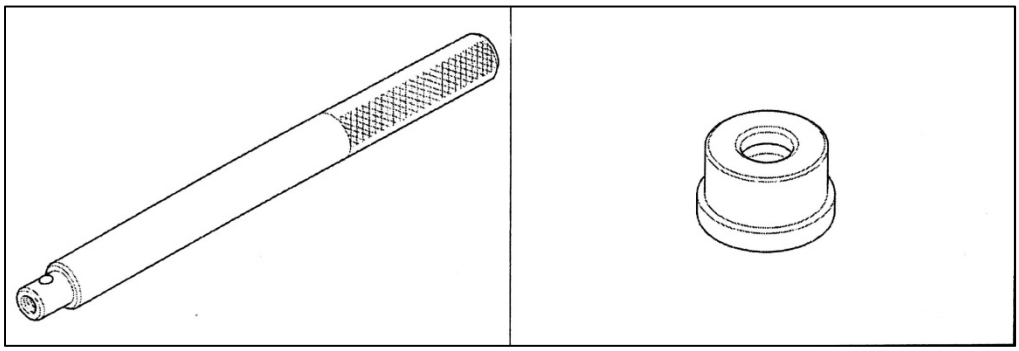
8 .Case body and transmission system

Maintenance information

Summary

- Break up the crankcase for the maintenance below:
  1. Crankshaft
  2. Balancing shaft
  3. Piston and connective rod
- Remove the parts below before breaking up crankcase:：
  1. Engine
  2. Gearshift system and gear box cover
  3. Left crankcase cover
  4. Magneto kit and starting motor kit
  5. Right crankcase cover and clutch kit
  6. Cylinder head kit
  7. Tensioner
  8. Tensioning and guiding plate
  9. Oil bottom case
  10. Primary oil filter
  11. Oil pump
  12. Oil collective tray
  13. Secondary oil filter
  14. Water pump kit
  15. Water tube
  16. Gear indicator switch set
  17. View hole cap
- Please don’t damage the combination surface of crankcase when repairing.
- Wash and clean the oil passage before re-assembling the crankcase.
- Before combining the case, coat the combination surface with sealant for end surface evenly, the surplus sealant must be clean up.
- Mark up the pad on bigger end of connecting rod and that on main shaft with suitable color, select the shaft pad according to the requirement in its <Selection Table>, check the oil gap when shaft pads re-assembled, wrong oil gap may heavily damage the engine.

Tool:



Specification for crankcase body and transmission system

Unit: mm

Items			Standard	Maintenance limit
Transmissin device	Inner hole diameter for gear	Main shaft gear6th and 5th	30.000-30.013	30.03
		Counter shsaftgear 1th, 2th, 3th and 4th	34.000-34.016	34.03
	Width for needle bearing	Main shaft gear 6th and 5th	12.45-12.80	12.4
		Counter shsaft gear 1th, th2, 3th and 4th	12.45-12.80	12.4
	Shaft diameter for main shaft	Match up with needle bearing of main shaft gear 6th and 5th	25.982-25.993	25.97
		Match up with needle baring for Counter shsaft gearth1, 2th, 3th and 4th	29.980-27.993	29.96
Turning	Shaft diameter for turning fork		11.967-11.994	11.96

fork and its shaft	shaft			
	Inner diameter for turning fork		12.016-12.043	12.06
	Tip thickness for turning fork		4.85-4.95	4.8
	Diameter for turning fork opening	Left and right turning fork	46.55-46.85	46.9
		Middle turning fork	34.05-34.35	34.4
Opening on gear	Width for opening	Main shaft gear3th-4th	5.05-5.13	5.2
		Counter shaft gear5th and 6th	5.05-5.13	5.2
	Diameter	Main shaft gear 3th-4th	33.85-33.95	33.7
	Diameter	Counter shaft gear5th and 6th	45.85-45.95	45.7

Troubleshooting

Difficult gearshift

- Wrong operation on clutch
- Wrong viscosity of oil
- Gearshift fork got distorted
- Gearshift's shaft got distorted
- Ratchet of gearshift's fork got distorted
- Guiding groove on gearshift drum got damaged
- Gearshift arm got distorted

Gear jump in transmission system

- Gear got worn out
- Guiding groove of gearshift drum got worn out
- Gearshift fork's shaft got distorted
- Gearshift drum got damaged
- Twist spring of locating plate got damaged
- Gearshift fork got worn out or distorted
- Gearshift arm got damaged

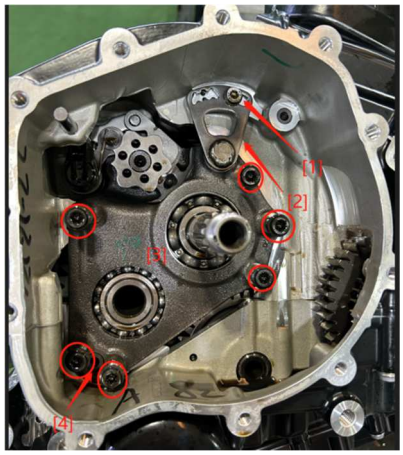
Noisy engine

- Transmission gear got worn out or damaged
- Transmission bearing got worn out or damaged

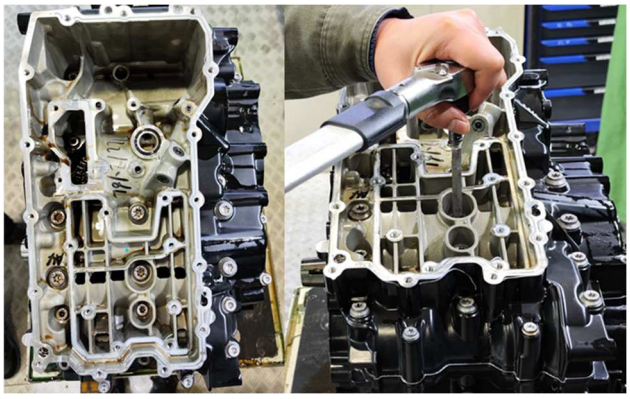
Crankcase body

Disassembly

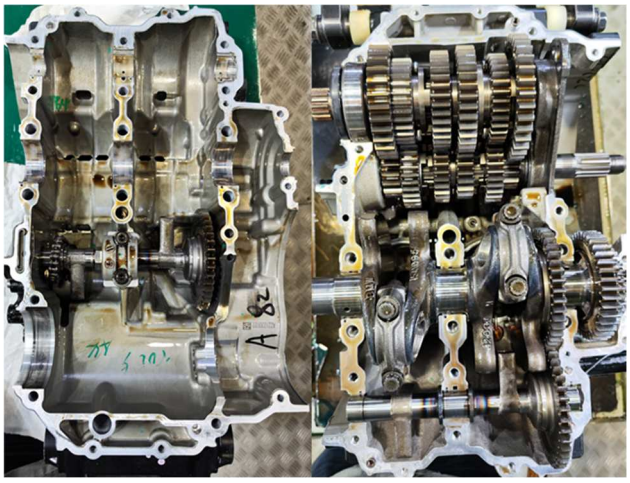
Loosen bolt [1] for locating plate of centre-off, then remove the locating plate [2].
Loosen bolt [3] of gear box cover, remove positioning pin [4] of gear box cover.



Put engine upside down.
Loosen bolt [1] of M10, [2] of M8 and {3} of M6 on crankcase body by 2or 3 times, then remove all washers for re-assembly.

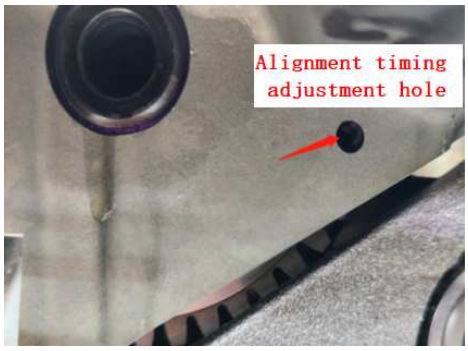


Knock lower case body by rubber hammer, then remove the lower case body from upper crankcase.
Caution: Please don't pry up contact surface of crankcase by screwdriver.
Clean up sealant of Dow Corning on contact surface.

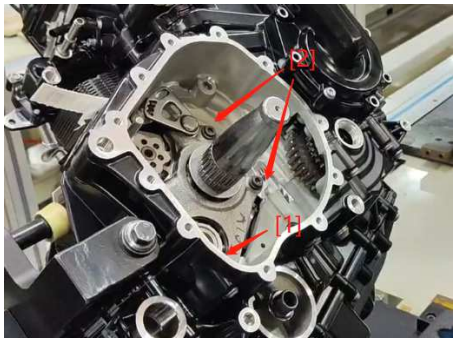


Re-assembly

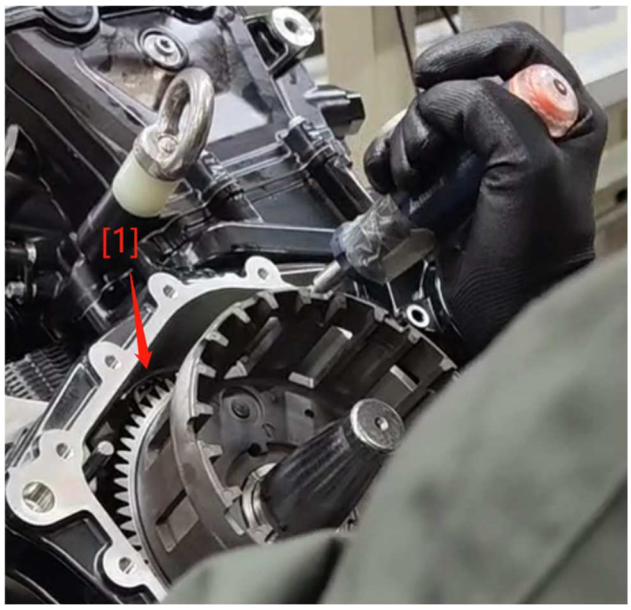
Re-assemble lower crankcase body
Make sure timing indicating hole on driven gear of balancing shaft align to that on lower crankcase body.



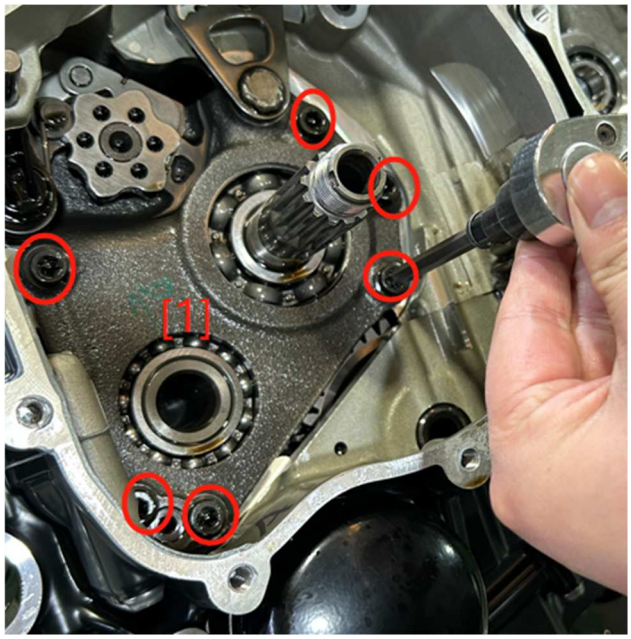
Re-assemble positioning pin [1] for gear box cover.
Pre-fasten bolt [2] for gear box cover into outer case of clutch.



Get locating plate [1] of centre-off into corresponding hole on case body.
Re-assemble washer, shim, collar, needle bearing and outer case of clutch in turn.
Insert tip of torque screwdriver into bolt groove, then turn it clockwise until reached given torque of 0.7N•m. Heard the sound of torque screwdriver by 4 times. Check the position for small hole and hole on case body. Turn the torque screwdriver anticlockwise until the hole of case body align to the second hole of "M" shape on locating plate. Re-assemble bolt [2] on locating plate for centre-off.
Torque: 10N•m



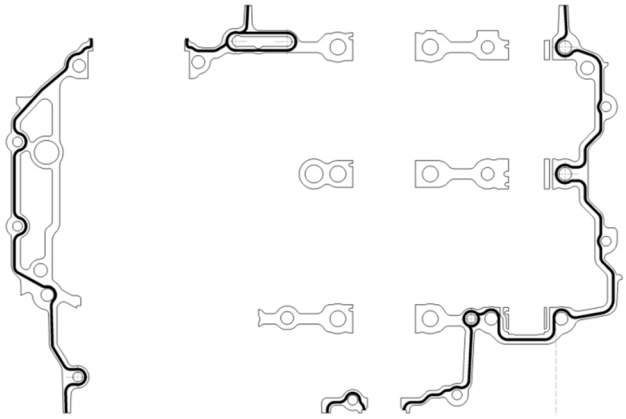
Remove washer, shim, collar, needle bearing and outer case of clutch in turn.
Alternatively fasten bolt [1] for gear box cover by 2-3 times to given torque. Torque: 18N•m



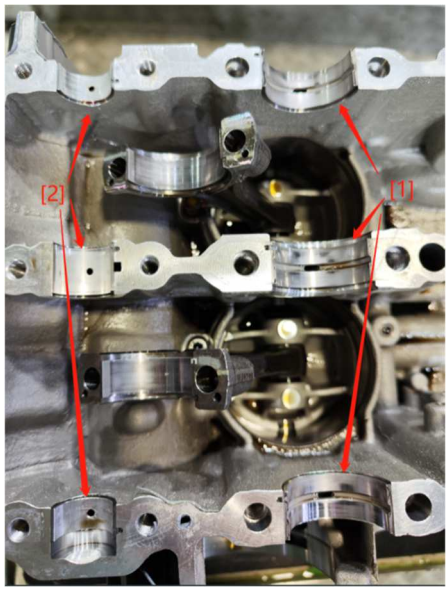
Wash contact surface between upper and lower crankcase, please don't damage the contact surface.
Check if the oil passage of case body was blocked up, please wash the oil passage if it is necessary.
As picture on the right, coat end surface sealant on contact surface of lower case body.

Caution:

- Too much end surface sealant coated is not allowed.
- Please don't coat oil passage and view-hole cap with end surface sealant.



Coat shaft pad [1] of journal of crankshaft and journal [2] of balancing shaft with oil.



Assemble lower crankcase body [1] onto the upper one.

Replace all the re-assembling washer of case combination bolt for a new one.

Re-assemble case combination bolt of M10 [2] for a new one.

Caution:

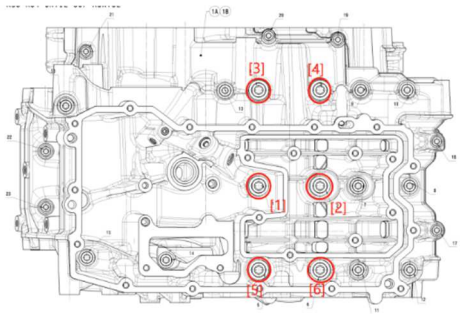
Please don't use case combination bolt of M10 which has already been used.

Confirm the firm assembly for upper and lower case body.

Fasten bolt M10 to given torque according to sequence as picture shows by 2-3 times.

Turn the case combination bolt of M10 by 80° for further strengthening.

Torque: 10N.m+80°

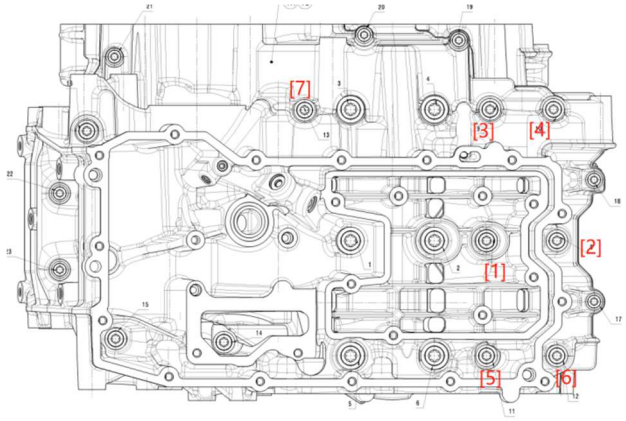


Assemble new case combination bolt [1] of M8.

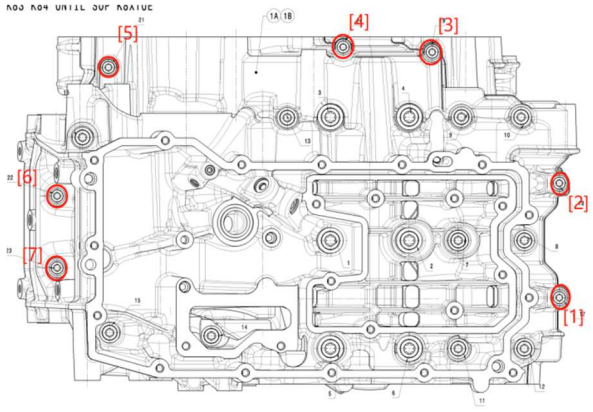
Caution:

Please don't use the case combination bolt of

M8 which has already been used.
Fasten bolt of M8 to given torque by sequence as picture shows by 2-3 times.
Turn bolt of M8 by 80° for further strengthening.
Torque: 5N.m+80°



Assemble combination bolt [1] of M6.
Fasten bolt M6 to given torque by sequence as picture shows by 2-3 times.
Torque: **10N.m**

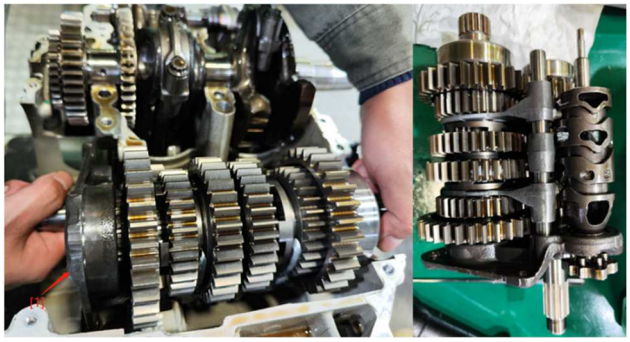


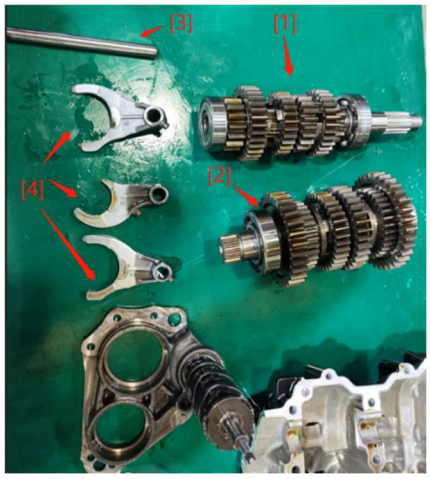
The re-assembly is precisely opposite to disassembly.

Transmission

Disassembly

Disassemble upper and lower crankcase body. Remove gear box cover [1] together with main and countershaft, gearshift drum, turning fork and its shaft from crankcase body.





Remove main shaft [1], counter shaft [2], turning fork shaft [3] and the fork from gear box cover.

Caution: The five star turning plate and gearshift drum are press-fitted on gear box cover in interference way, whose forced disassembly are not allowed.

Caution:

The bearings on botn ends of main shaft and counter shaft are press-fitted in interference way, whose forced disassembly is not allowed.

Inspection

Check if there is scratch, damage, wear-out or distortion on parts below, replace of it is necessary.

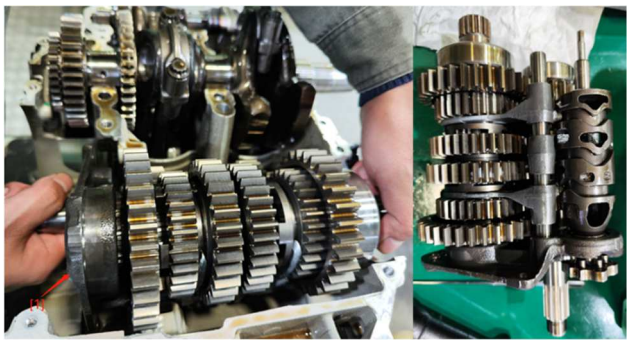
- Transmission gear
- Transmission shaft jacket
- Transmission bearing
- Gearshift drum/Gear shift drum bearing
- Gearshift turning fork
- Gearshift turning fork shaft

Measure size for each parts, calculate matching clearance according to standard, in case it is passed standard, please replace the parts.

Re-assembly

Wash all the parts by solvent then get it totally dried.
Coat the surface of gear teeth, turning surface and place of bearing with oil.
Re-assemble main shaft, counter shaft,turning fork and its shaft onto gear box cover to their original status.
Caution: The gearshift fork is with mark below:
“L”[1]：Left turning fork
“C”[2]：Middle turning fork
“R”[3]：Right turning fork 右拨叉
Coat guiding area of turning fork and its guiding pin’s position with oil.

Assemble gear box cover kit [1] into crankcase body.



Re-assemble crankcase body.

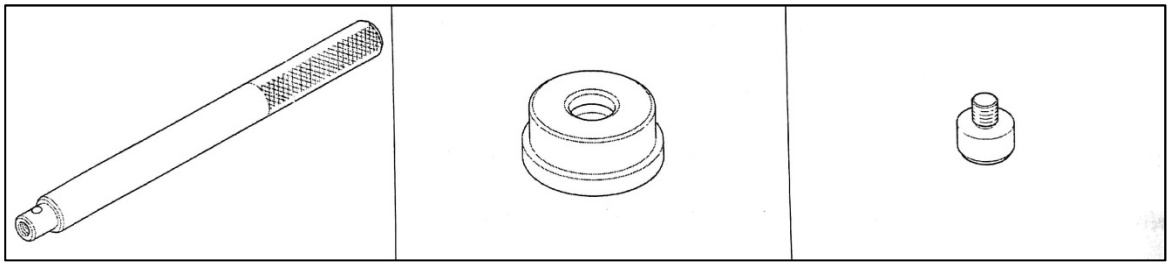
9Crankshaft, piston, cylinder and balancing shaft

Maintenance information

Summary

When maintaining the crankshaft, balancing shaft, cylinder body, piston/connecting rod and nozzle, the crankcase must break up. How to break up the crankcase refer to its corresponding chapter.
Mark up the bigger end of connecting rod, cover of the rod and crankshaft pads and well put aside to make sure the correct re-assembly.
The crankshaft's pin and pad of main shaft's journal gets matched according to their color, select the crankshaft's pad according to its color. When the new pad selected, confirm the clearance of oil film by plastic feeler gauge, the wrong clearance of oil film may heavily damage the engine.

Tool(s):



Specification for crankshaft, piston, cylinder body and balancing shaft

Unit: mm

Items		Standard	Limit
Crankshaft	Clearance in bigger end of connecting rod	0.10-0.25	0.27
	Clearance between pad on bigger end of connective rod and crankshaft	0.034-0.059	0.065
	Clearance between journal of	0.030-0.058	0.065

	crankshaft and pad			
	跳动		—	0.035
Cylinder	Cylinder bore		85.994-86.006	86.05
	Roundness loss		—	0.10
	Taper		—	0.10
	Cylindricity		—	0.10
Piston, piston pin and piston ring	Diameter for base circle of piston		85.956-85.974	85.90
	Diameter of pin’s hole		19.008-19.013	19.02
	Diameter for piston pin		18.992-19.000	18.98
	Clearance between piston and piston pin		0.008-0.021	0.04
	Closing clearance for piston ring	1st ring	0.15-0.30	0.4
		2nd ring	0.20-0.40	0.5
		Oil ring	0.20-0.70	1.0
	Piston ring and ring groove clearance	Clearance between 1st ring and groove	0.030-0.070	0.10
		Clearance between 2nd ring and groove	0.020-0.060	0.08
Cylinder matching clearance			0.020-0.050	0.10
Internal diameter of smaller end of connecting rod			19.017-19.027	19.035
Matching clearance between connecting rod and crankshaft pin			0.017-0.035	0.05

Troubleshooting

Too low the cylinder pressure, difficult starting or poor performance under low speed

- Air leakage of cylinder head’s gasket
- Wear-out, jamming or damage on piston ring
- Cylinder head/Piston worn out or damaged

Too high the pressure in cylinder, cylinder body overheat or cylinder knocking

- Too much the carbon buildup on the top of piston

Too much waste gas

- Cylinder body, piston or its ring got worn out
- Wrong assembly for piston ring
- Scratch on piston or cylinder wall

Engine noisy

- Piston pin or the hole for pin got worn out
- Smaller end of connecting rod got worn out
- Cylinder body, piston or its ring got worn out
- Crankshaft pin's pad got worn out

Engine vibration

- Too strong the runout of crankshaft

Crankshaft

Inspection for side clearance

Break up upper and lower crankcase body.

Measure side clearance of connective rod.

Maintenance limit:0.27mm。

In case the clearance passed maintenance limit, please replace connective rod.

Confirm side clearance once again, in case still passed limit, please replace the crankshaft.

Disassembly

Caution:

Please don't change the position of crankshaft pad, the pad must be at is original place, otherwise the oil film clearance will be wrong which badly damage engine.

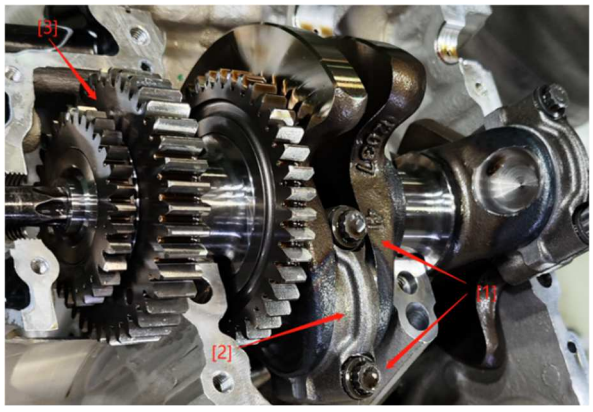
Break up upper and lower crankcase body.

Remove front balancing shaft.

Mark up shaft and connective rod coverbefore removal for correct re-assembly.

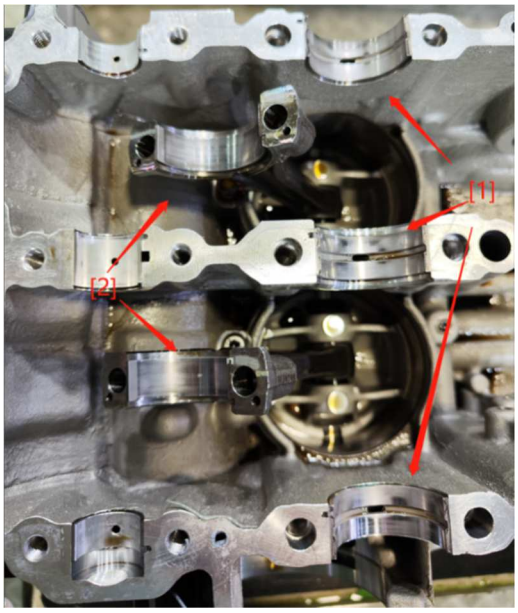
Remove bolt [1] an its cover [2] of connective bolt cover. Please don't damage crankshaft, journal of main shaft and shaft pad.

In case the connective rod cover is difficult tove removed, please slightly knock side of the cover by rubber hammer, then remove crankshaft [3].



Caution:

Before removing crankshaft, push piston to



lower stopping point to prevent damage on crankshaft.

Remove shaft pad [1] of journal of main shaft from upper and lower crankcase body.

Remove shaft pad [2] of crankshaft from bigger end of connective rod and its cover.

Caution:

Please don't change the position of crankshaft pad, the pad must be at is original place, otherwise the oil film clearance will be wrong which badly damage engine.

Inspection

Hold journal on both ends of crankshaft.

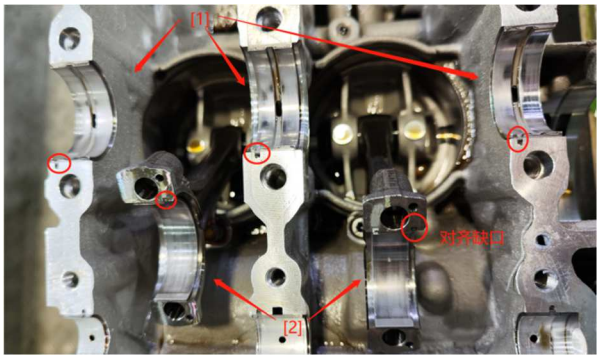
Lay a micrometer above middle journal of main shaft, please bypass the oil groove and oil hole when laying it.

Turn the crankshaft by 2 rounds（720° ），then read its runout.

Maintenance limit: 0.035mm

Check balance shaft active teeth [1], primary active teeth [2] and timing active teeth [3] for abnormal wear or damage。

Re-assembly



Assemble shaft pad [1] of mainshaft and pad [2] of connective rod at their original place.

Caution:

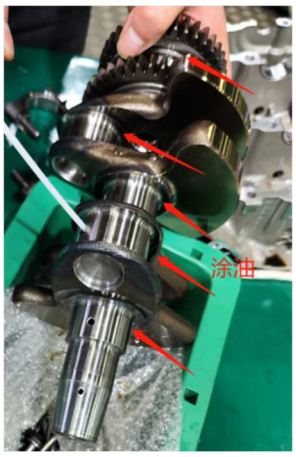
Please don't change the position of crankshaft pad, the pad must be at is original place, otherwise the oil film clearance will be wrong which badly damage engine.

Coat shaft pad of journal of main shaft and inner surface of bigger end of shaft pad for connective rod in upper crankcase with oil.

Align the end of piston skirt to edge of cylinder body.

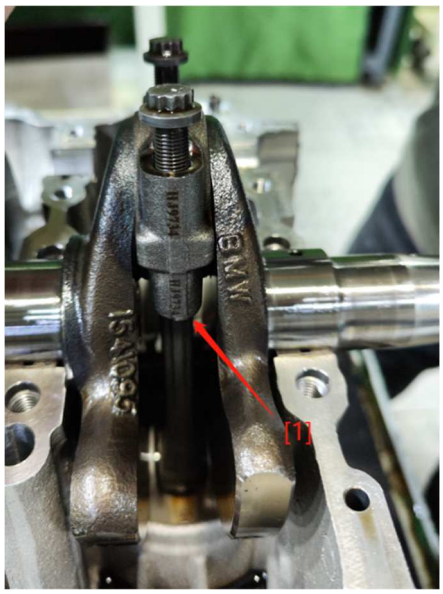
Slightly assemble crankshaft kit onto crankcase body (Please don't damage crankshaft, journal of main shaft and the shaft pad), make sure the timing indicating point at installation direction of front balancing shaft.

Coat journal of crankshaft with oil.



Put bigger end [1] of connective rod into crankshaft, avoid collision on shaft pad, then clean up contact surface between bigger end of connective rod and its cover, then blow it up by compressed air.

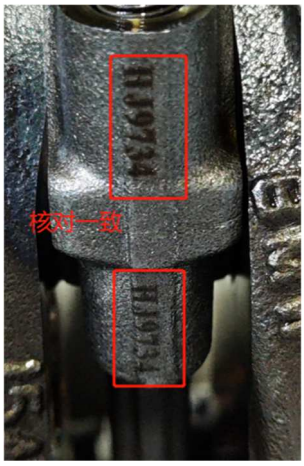
Confirm the correct matching-up between cover and bigger end of connective rod.



Coat contact place between connective rod cover and bolt flange, and threaded part of bolt for cover with oil. Pre-fasten the bolt of connective rod cover by 3-4 thread. Make sure the contact between connetive rod and its cover.

Caution:

Make sure every part is re-asssemble to its original place according to marking-up when it is removed.

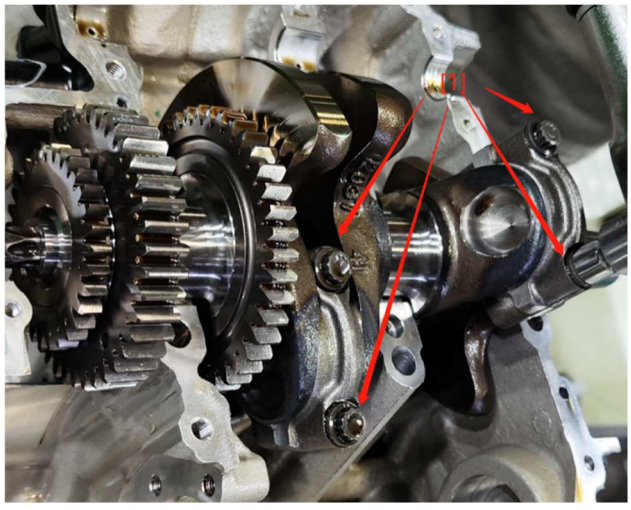


Re-assemble bolt [1] for connective rod cover, then alternatively turn to given torque by 2-3 times.

Turn the bolt of connective rod cover by 100° for further strengthening.

Torque: **20N • m**

Re-assemble lower crankcase body.



Shaft pad of journal for main shaft

Caution:

Please don't change the position of shaft pad.The shaft pad must be assembled in its initial position, otherwise the oil film clearance will be wrong, which lead to engine damage.

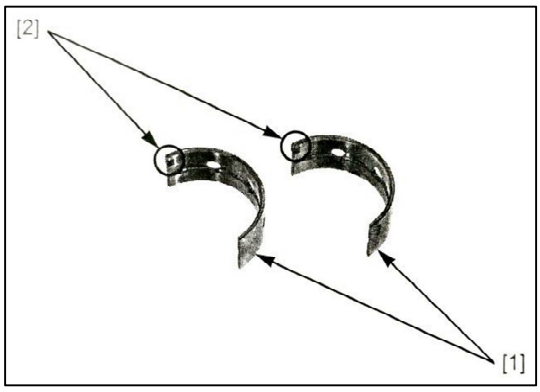
Inspection for shaft pad

Remove crankshaft.

Check if there is wear-out or spalling of shaft pad [1] for journal if main shaft.

Check if there is damage on protrusion [2] of shaft pad.

In case there is damage on shaft pad for journal of main shaft, please choose the correct one for replacement.



Inspection for oil clearance

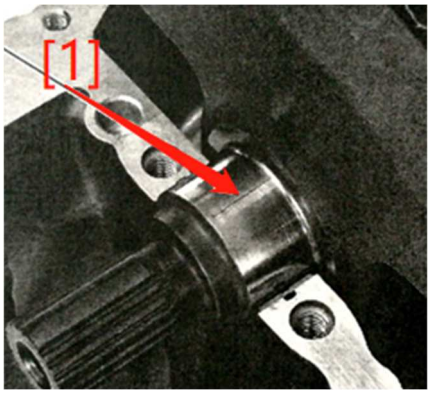
Remove crankshaft.

Wipe up all the oil on shaft oad and journal of main shaft.

Re-assemble main shaft into upper crankcase.

Put a plastic gap gauge [1] on each journal of main shaft bypassing oil hole. (During the inspection of oil clearance, please don't turn the crankshaft).

◦



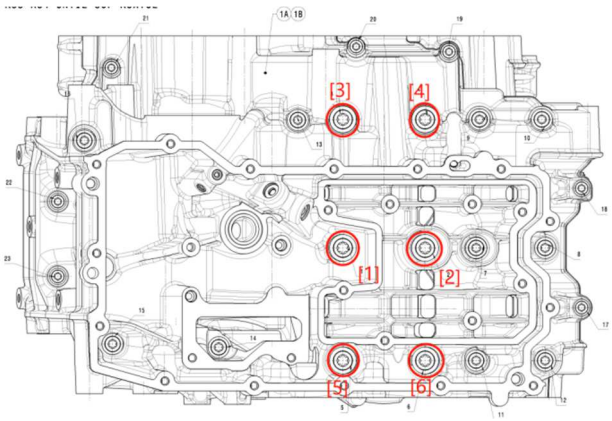
Re-assemble lower crankcase [1] onto upper crankcase.

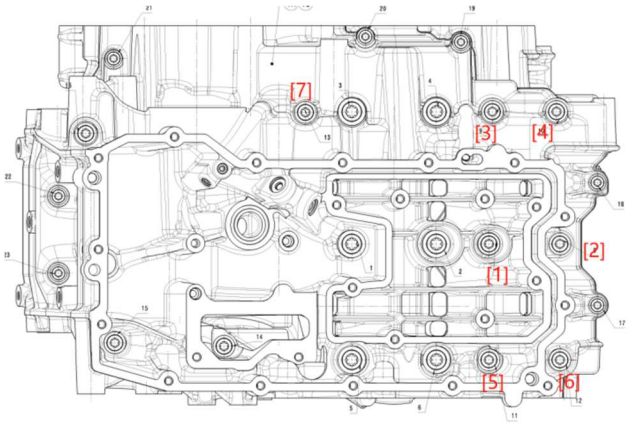
Wash case combination bolt of M10, M8, M6 by cleanser (Repeatedly use), then totally dry it up by blowing.

Re-assemble case combination bolt.

Make sure the firm assembly between upper and lower crankcase.

According to sequence of instroduction above, alternatively fasten case combination bolt to given torque and angle by 2-3 times.



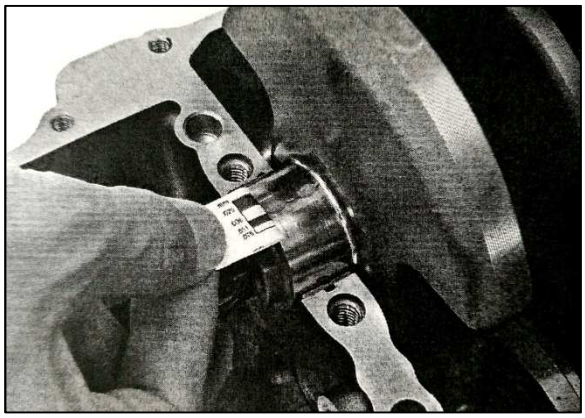


Remove case combination bolt and lower crankcase.

Measure the widest squeezed width on journal of main shaft by plastic gap gauge to confirm oil clearance.

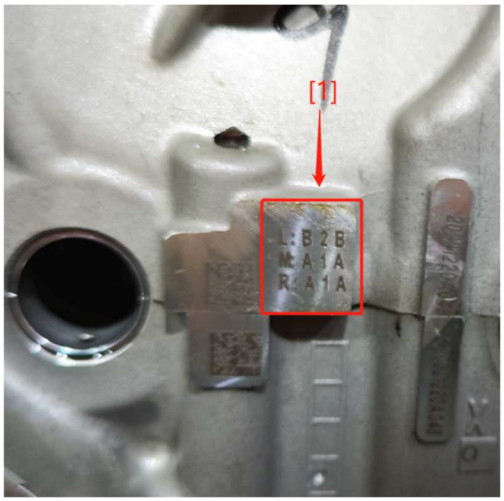
Maintenance limit: 0.065 mm

In case oil clearance passed maintenance limit, choose the correct shaft pad for replacement.

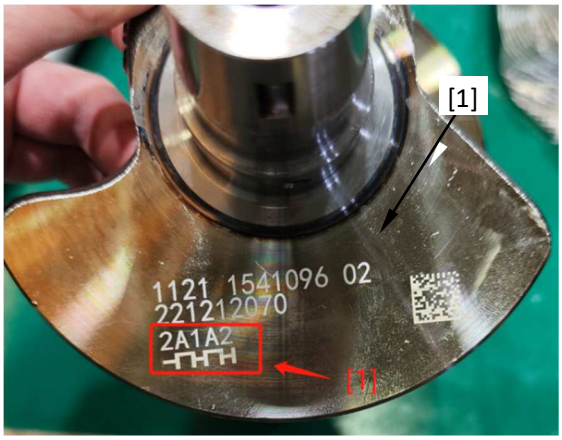


Shaft pad selection

Take the number [1] for inner diameter for installation hole of shaft pad on left side of upper crankcase into record. As picture shows (Number on left side of upper crankcase (1 or 2). Which means the number for inner diameter of installation hole for shaft pad from left to right).



In case the crankshaft needs be replaced, take corresponding number [1] on counterweight piece on crankshaft into record (The number on counterweight of crankshaft (1 or 2) means the sequence of number for outer diameter of journal for main shaft from left to right).



Select the color [1] for shaft pad by referring number for installation hole of shaft pad and journal for main shaft mutually.

Re-assemble the shaft pad with groove into upper crankcase, the shaft pad without groove assembled into lower crankcase.

Form list for matching-up of journal for main shaft:

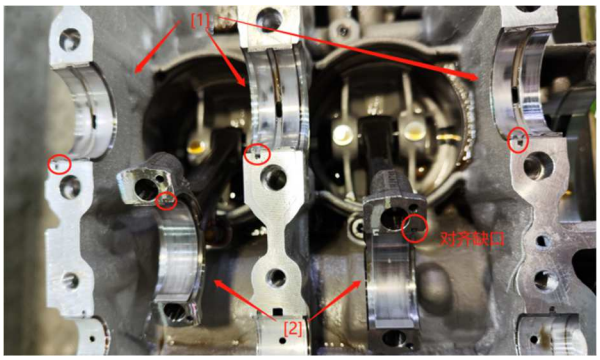
Form list for matching of crankshaft journals and shaft pad and crankshaft hole				
crankshaft hole	1	1	2	2
crankshaft journals	1	2	1	2
shaft pad (upper)	Yellow	Yellow		Green
shaft pad (lower)	Yellow	Green		Green

Caution: *When new shaft pad selected, measure clearance once again by plastic gap gauge.*

Re-assemble shaft pad

Clean up outer surface of shaft pad and installation hole for shaft pad on crankcase.

Re-assemble shaft pad [1] for journal of main shaft into its installation hole on crankcase, align each protrusion to groove. Make sure press-fitting in place. The shaft pad could not extend out of contact surface of crankcase.



Shaft pad for crankshaft

Caution:

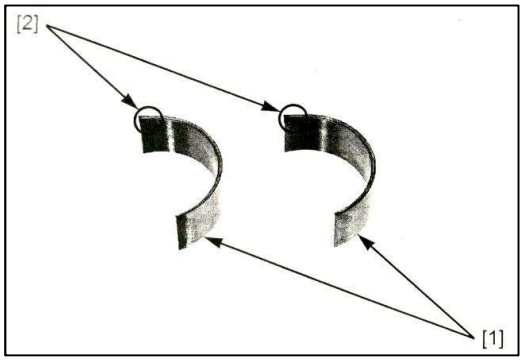
Please don't change the position of shaft pad. The shaft pad must be assembled in its initial position, otherwise the oil film clearance will be wrong, which lead to engine damage.

Remove crankshaft

Check if there is wear-out or spalling for shaft pad [1] of connective rod.

Check if there is damage on protrusion [2] of shaft pad.

In case the shaft pad for connective rod gets damaged, select shaft pad for replacement.



Check oil clearance

Remove crankshaft.

Wash contact surface between bigger end of connective rod and rod cover by cleanser, then dry it up by compressed air.

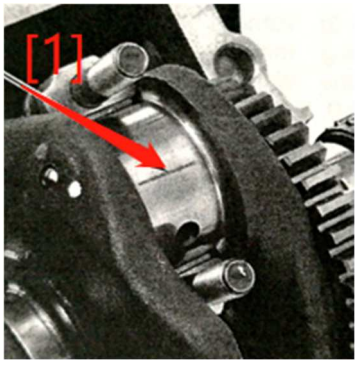
Wipe up all the oil on shaft pad and crank shaft pin.

Re-assemble crankshaft into upper crankcase.

Assemble bigger end of connective rod into crankshaft pin.

Vertically lay a plastic gap gauge [1] on each

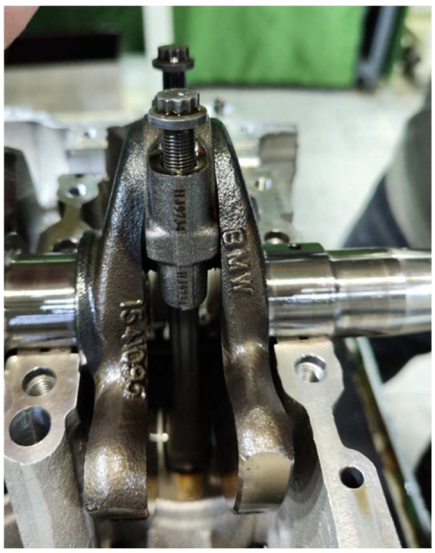
journal of main shaft bypassing oil hole (Please don't turn crankshaft during inspection for oil clearance).



Re-assemble connective rod cover when the cover and bigger end are correctly matched and confirmed. Coat the threaded part of nut for connective rod cover with oil. Pre-fasten bolt for cover by 3-4 thread, make sure the cover of rod contacted the rod.

Caution:意：

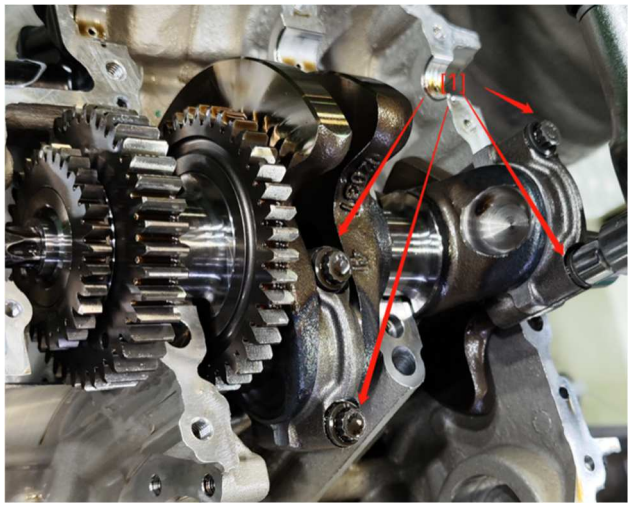
Make sure each part is re-assembled back to initial position as the same to marking-up when removing.



for further strengthening.

Torque: 20N•m

Remove connective rod cover.



Re-assemble and fasten bolt [1] for connective rod cove, then alternatively fasten to given torque by 2-3 times.

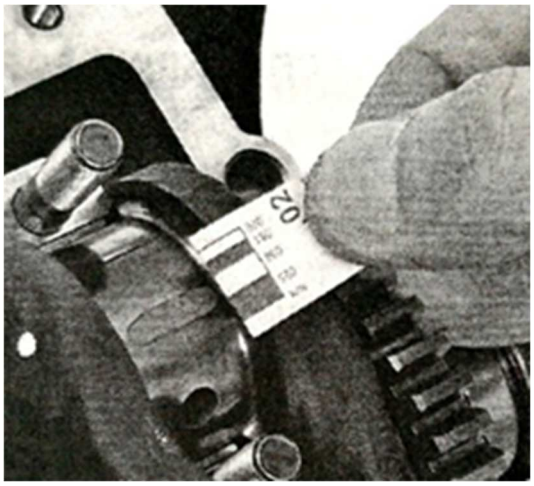
Turn the bolt for connective rod cover by 100°

Measure each squeezed widest width of plastic gap gauge on crankshaft pin to confirm

the oil clearance.

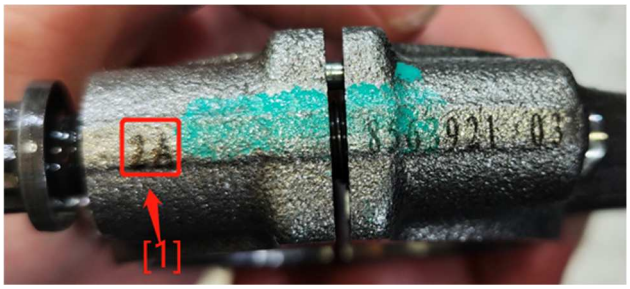
Maintenance limit: 0.065mm

In case the oil clearance passed maintenance limit, please choose the correct shaft pad for replacement.



Selection for shaft oad

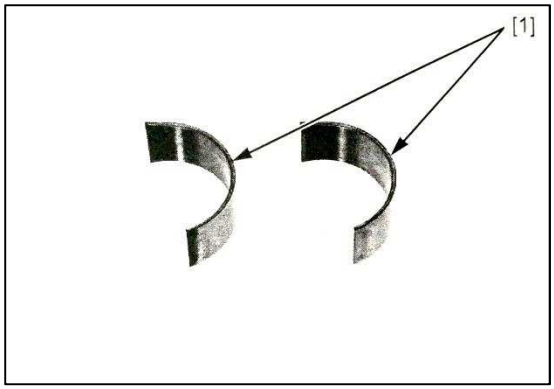
Take number [1] at inner diameter for connective rod cover into record (The number on bigger end of connective rod (A or B) means the number for inner diameter for bigger end of connective rod), or assemble the cover onto connective rod, measure inner diameter without shaft pad.



In case crankshaft needs be replaced, take corresponding number [1] on counterweight of crankshaft into record (The letter number on counterweight of crankshaft (A or B) means number sequence of outer diameter for crankshaft pin from left to right).

In case repeatedly use crankshaft, meansure its outer diameter by micrometer.

Mutually refer number for connective rod and crankshaft to select shaft pad color [1] for replacement.



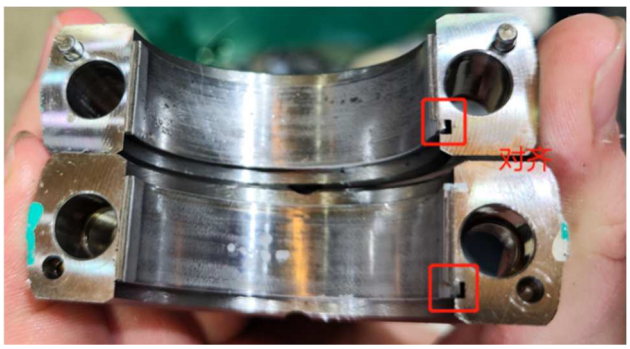
Form list for matching-up of shaft pad for connective rod:

Form list for matching of crankshaft journals and shaft pad and connective rod hole				
connective rod hole	A	A	B	B
crankshaft journals	A	B	A	B
shaft pad	Red	Brown		Blue

Caution: When new shaft pad selected, please measure clearance by plastic gap gauge once again.

Re-assemble shaft pad

Clean up outer surface of shaft pad, connective rod cover and bigger end of rod. Re-assemble shaft pad [1] for crankshaft pin into bigger end of connective rod, align each protrusion to groove. Make sure press-fitted in place, the shaft pad could not extend out of contact surface of crankcase body.



Piston/Cylinder body

Removal for piston/Connective rod kit

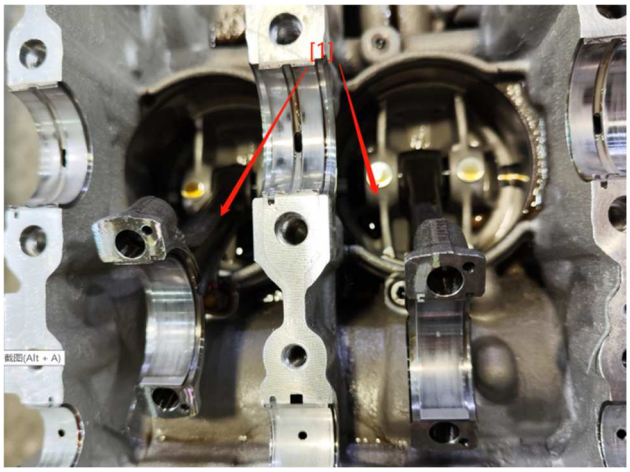
Caution:

- Before removing piston, wrap bigger end of connective rod by a clean fiberless fabric to prevent damaging cylinder hole.
- Please don't try to remove piston/connective rod kit from bottom of cylinder hole, which will be seized up at joint between cylinder sleeve and upper crankcase body.
- Please don't change the position for shaft pad, the pad must be re-assembled back to initial position, otherwise the oil film clearance will be wrong, which lead to engine damage.

Remove the parts below:

- Front balancing shaft
- Crankshaft

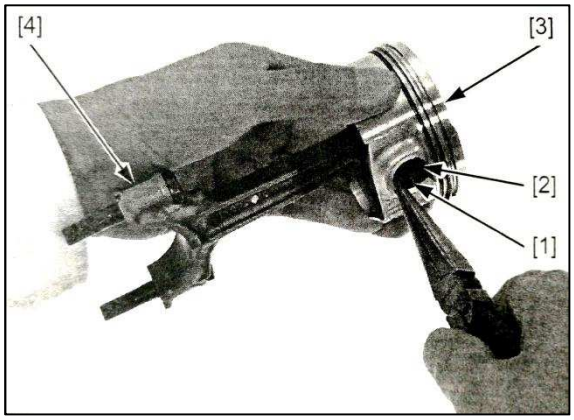
Remove piston/connective rod kit [1] from top of cylinder body.



Removal for piston

Remove circlip [1] of steel wire by tweezers.

Push out piston pin [2] from piston [3] and smaller end [4] of connective rod, then remove the piston.

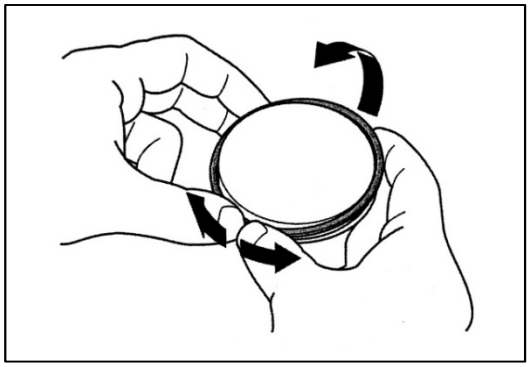


Removal for piston ring

Get opening for each piston ring apart, then remove the ring upwards along the opposite position to opening of piston ring.

Caution:

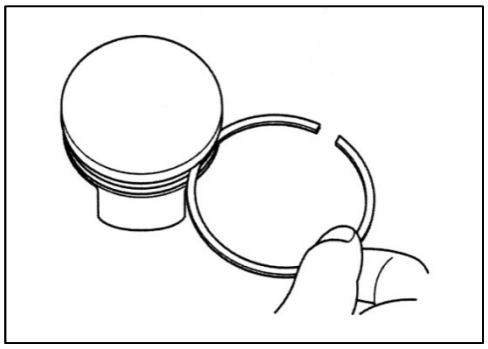
- Please don't separate the opening apart too far to prevent damaging the piston ring.
- Please avoid scratch on piston when removing its rings.



Clean up carbon buildup in groove of piston ring by piston ring which is about throwing away.。

Caution:

- Please don't use steel brush to avoid scratching groove of piston ring.



and calculate their clearance.

Any parts passed maintenance limit must be replaced.

Inspection

Check if there is scratch, damage, wear-out, distortion, burn-out or oil passage blocking-up on parts below.

- Cylinder body
- Piston
- Piston ring
- Piston pin
- Smaller end of connective rod

Measure each parts according to Technical specification for crankshaft/piston/cylinder hole/balancing shaft

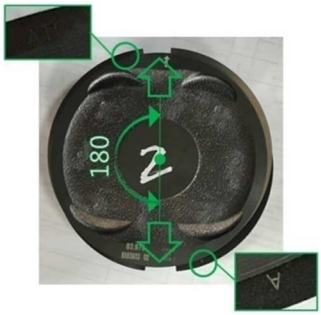
Re-assemble piston ring

Totally clean up groove of piston ring then re-assemble piston ring.

- Coat the complete surface of piston rings and their grooves with engine oil.。
- Please don't damage piston and its rings during re-assembling.
- When re-assembling, get the side of piston ring with color mark face upwards.
- When re-assembling oil ring, assemble linner ring first, then the scratching ring.

Get the crossing angle of opening between the 1st /2nd ring mutually by 180°. As picture shows.

Dislocate opening of scratching ring for crossing angle by 120°.



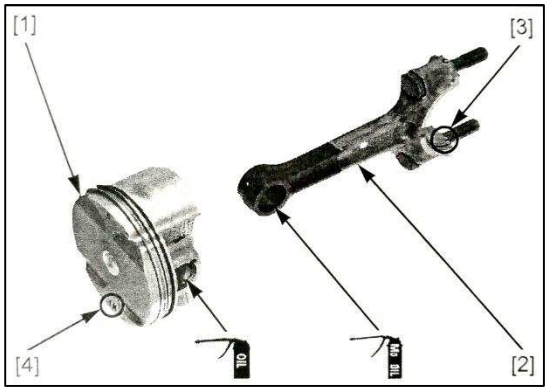
Re-assemble piston

Re-assemble shaft pad of crankshaft pin back to its initial position（Page 14-13）.

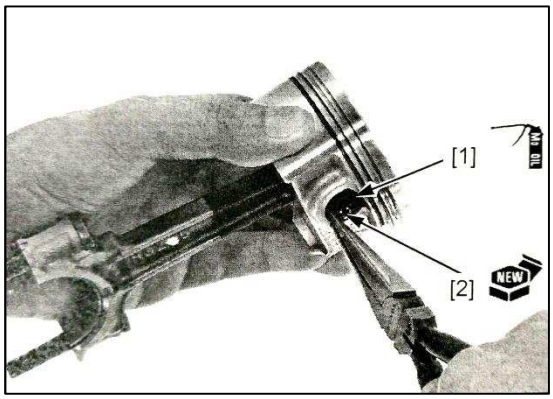
Coat internal surface of hole for piston pin with oil.

Coat internal surface of smaller end of connective rod with oil.

When matching up piston [1] and connective rod [2], get protrusion [3] for shaft pad of crankshaft pin facing to mark [4] of "IN" on piston.



- Please don’t align opening on circlip to gap on piston.



Coat external surface of piston pin with oil.
Re-assemble piston pin [1]，then fix it by new circlip [2] of steel wire.

Caution:

- Make sure circlip of steel wire assembled in place.

Coat cylinder wall and thrust surface of piston with oil.

When re-assembling piston/connective rod kit[1] into cylinder hole (When re-assembling piston/connective rod kit, the mark “Arrow” on piston face to direction of air intake).

When repeatedly using connective rod, they must be re-assembled to their original position.

Caution:

- *When re-assembling piston, please don’t damage its top surface, especially don’t damage matching place to cylinder hole.*
- *Please don’t damage cylinder sleeve and crankshaft pin by connective rod.*

Slightly knock piston into cylinder body by plastic hammer (Make sure compressing tools for piston ring is flatly put on upper surface of cylinder body).

Re-assemble parts below:

- Crankshaft
- Balancing shaft

Oil nozzle for piston

Removal/Re-assembly

Remove piston/Connective rod.

Loosen bolt for nozzle and remove the nozzle (Please don't damage hole for oil nozzle).

Totally clean up nozzle by solvent.

Check if the nozzle is blocked up, please replace for a new one if it is necessary.

Clean up oil passage for upper crankcase and nozzle.

Re-assemble nozzle into upper crankcase until it completely in place. When re-assembling, align protrusion of nozzle to groove on crankcase.

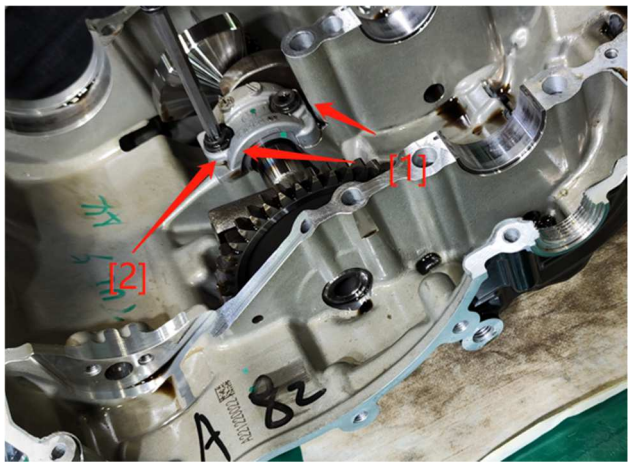
Re-assemble removed parts according to opposite sequence to removal.

Rear balancing shaft

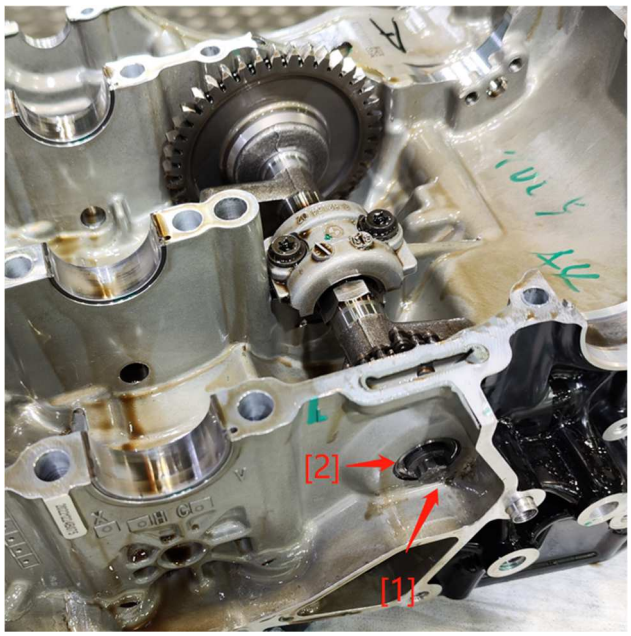
Removal

Remove lower crankcase body.

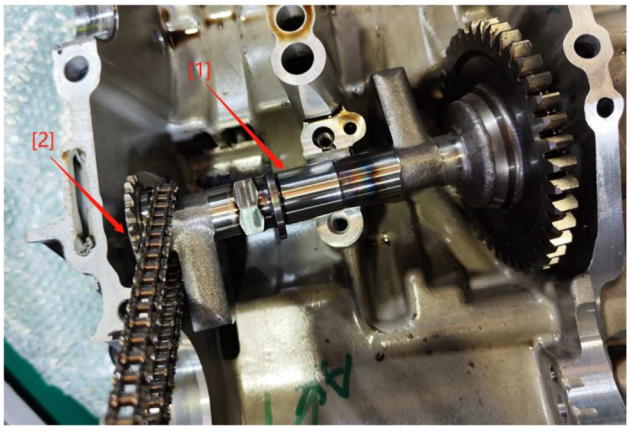
Remove bolt [1] and shaft pad cover [2].



Remove bolt [1] for shaft jacket of rear balancing shaft and the shaft jacket [2].



Remove rear balancing shaft [1] and driving chain [2] of oil pump.



Inspection

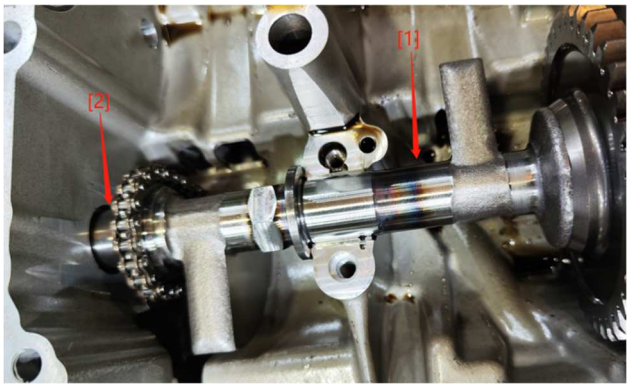
Check if there is scratch, damage, wear-out or distortion on oarts below, replace if it is necessary.

- Driven gear for balancing shaft
- Counter gear for driven gear on balancing shaft.
- Pressure spring for driven gear
- Balancing shaft
- Bearing for balancing shaft

Re-assembly.

Coat shaft pad and jacket of balancing shaft with oil.

Re-assemble balancing shaft [1] into upper crankcase, then assemble shaft jacket [2] for balancing shaft.



Fasten bolt [1] for shaft jacket of rear balancing shaft and bolt [2] for shaft pad cover.