



**GPX 450 FSE  
Engine manual  
ZS194MQ (NC450)**

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move

machine

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build

handbook



Chongqing Zongshen Engine Manufacturing Co., Ltd.

Prepare: Proofread: Review: Approve:

**Repair of cylinder head assembly**

1. Troubleshooting 2. Maintenance Instructions 3. Removal of the cylinder head cover 4. Disassembly of the cylinder head 5. Decomposition of the cylinder head 6. Inspection of valve and valve spring 7. Rocker arm inspection 8. Inspection of cylinder head	9. Assembly of cylinder head 10. Installation of cylinder head 11. Installation of cylinder head cover
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## Troubleshooting

<p><b>Low cylinder pressure:</b></p> <p>1、 valve  Incorrect valve clearance adjustment  Poor valve seal  Incorrect gas timing  Broken valve spring</p> <p>2、 cylinder head  The spark plug is not tightly connected to the cylinder head  Damaged cylinder head gasket  Cracks or blisters in the cylinder head</p> <p>3、 Cylinders, Pistons, Piston Rings  Excessive or broken piston ring clearance  Cylinder block</p>	<p><b>Exhaust with black smoke</b></p> <p>1、 valve guide wear  2、 Oil shield leaking or damaged  3、 Cylinder head gasket leakage  4、 Excessive piston ring clearance</p> <p><b>Heat engine noise is too loud or abnormal</b></p> <p>1、 Incorrect valve adjustment  2、 Stuck valve or broken valve spring  3、 Excessive wear on the upper rocker arm  4、 Incorrect gas timing  5. Camshaft wear  6. The pressure relief valve is broken</p>
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### Maintenance parameters of each component

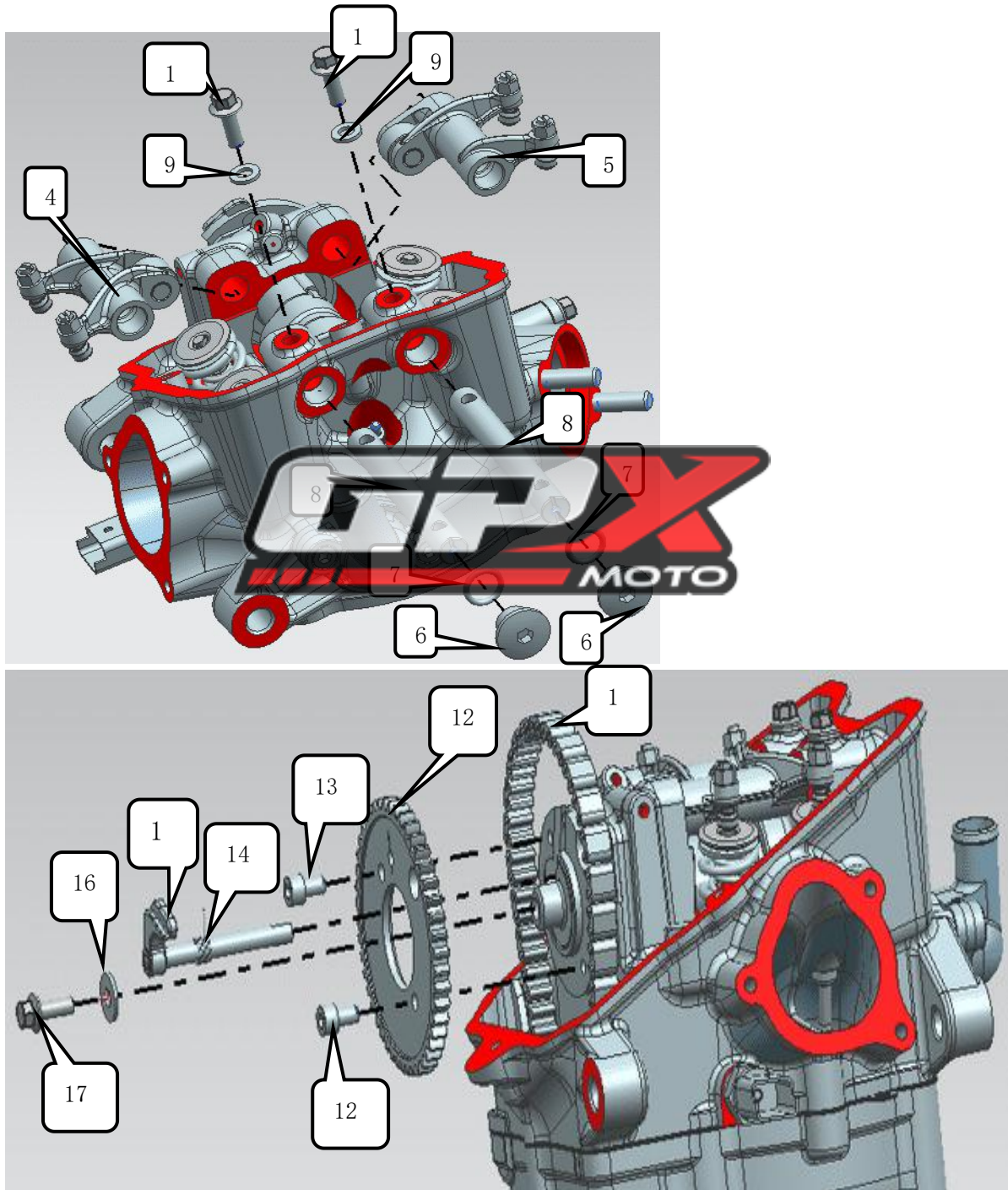
project	Standard value mm	Maintenance limit mm
Axial clearance between rocker arm and cylinder head rocker arm	0.05~0.3	0.5
Radial clearance between rocker arm and rocker arm shaft	0.016~0.045	0.08
valve spring free length	Outside: 39.6 Inside: 37.7	Outside: 39.75 Inside: 36.85
<b>valve clearance</b>	<b>0.06~0.08</b>	-----
Camshaft base circle runout	0.02	0.04

project		Standard value mm	Maintenance limit mm
valve	valve stem outer diameter	intake $\phi 4.972 \sim \phi 4.987$ exhaust $\phi 4.96 \sim \phi 4.975$	$\phi 4.96$ $\phi 4.94$
	Valve guide inner diameter	intake $\phi 5.005 \sim \phi 5.015$ exhaust $\phi 5.005 \sim \phi 5.015$	$\phi 5.035$ $\phi 5.035$
	Valve stem and guide clearance	intake 0.018~0.043	0.07
		exhaust 0.35~0.055	0.08
valve seal width		1.5	----
cylinder head	<b>Flatness</b>	0.04	0.05
	Valve seat working face width	0.8	----

## Disassembly and maintenance of cylinder head assembly

1. Cylinder head assembly drawing . For this drawing please see the bottom of this document

For a key to these diagrams please visit the bottom of this document.



### Removal of cylinder head cover

1. Remove the 2 NC450 cylinder head covers from the cylinder head cover and fix them with 2 Bolts (special-shaped M6×29.7), 2 NC450 cylinder head covers are fixed with 2 Bolts (special-shaped M6× 50.7 );

4. Remove the cylinder head cover;



### Disassembly of the cylinder head

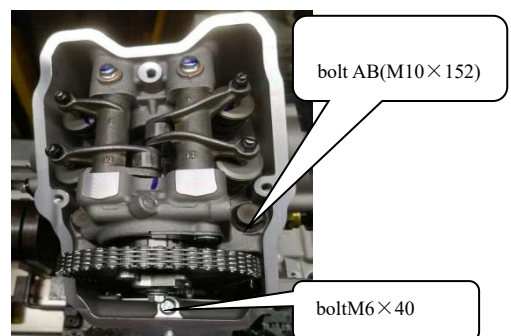
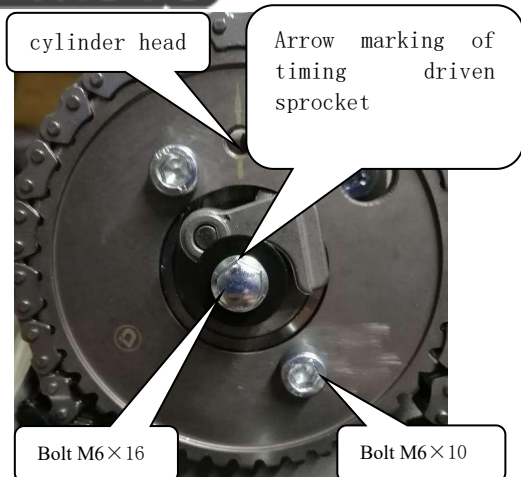
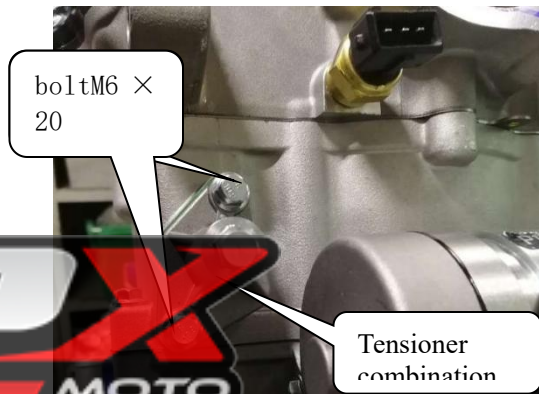
1. Remove the two M6×20 bolts that fix the tensioner, then remove the tensioner assembly and the tensioner gasket;

2. Turn the timing driven sprocket to the engine timing position:

Align the arrow mark of timing driven sprocket with the cylinder head timing mark;

3. Remove the bolt M6×16 and the flange washer, and remove the NC450 pressure reducing valve throw block combination;

4. Remove 2 bolts M6×10 and take off the timing driven chain



wheel, remove the timing chain set on the timing sprocket ;

5. Remove the M6×40 bolts connecting the cylinder head and the cylinder block;

6. Remove 4 NC450 cylinder stud bolts AB (N10×152), then remove 4 flat washers;

7. Remove the cylinder head;

### Disassembly of the cylinder head

1. Remove 1 screw M6×12, and remove the NC450 camshaft pressure plate;

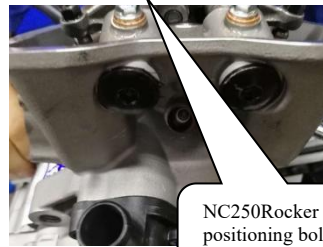
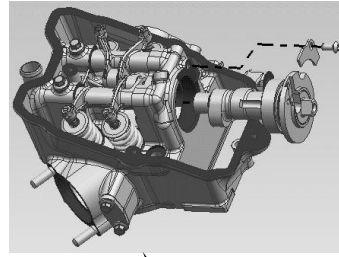
2. Remove the camshaft;

3. Remove the two NC250 rocker shafts on the cylinder head cover for positioning  
Bolt M14×1,

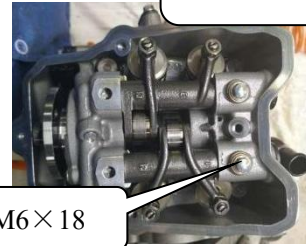
4. Remove 2 bolts M6×18 and 2 flat washers lock up;

4. Remove the intake and exhaust rocker arm shafts, and remove the intake and exhaust rocker arms;

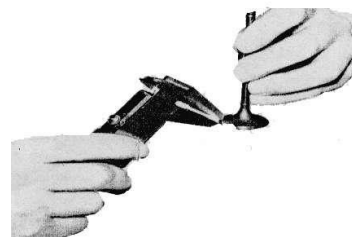
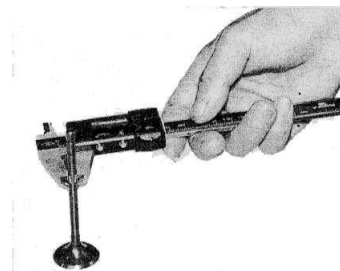
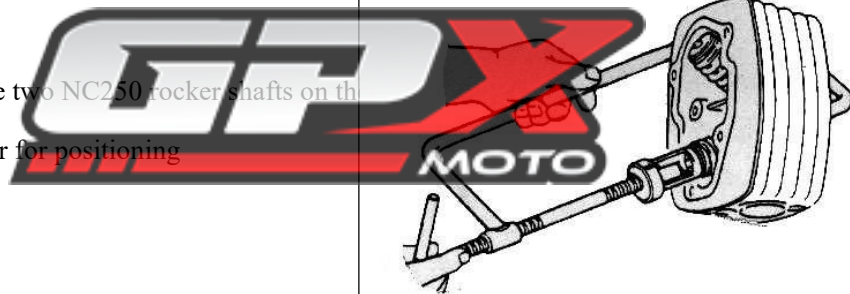
5. Press down the valve spring with the valve remover and remove the valve lock clip; then loosen the valve remover and remove the valve spring seat, valve spring and valve.



NC250Rocker shaft positioning bolt



Bolt M6×18



**Notice:**

1. In order to prevent the permanent deformation of the valve spring, the valve spring cannot be compressed excessively, and only the valve lock clip can be removed;

2. All the removed parts should be marked to ensure that the original assembly position is reached during assembly.



**Inspection of valves and valve springs**

1. Check whether the valve is bent or the valve stem has abnormal wear, and measure the outer diameter of the valve stem. Repair limit:

Air intake:  $\phi$  4.96mm

Exhaust:  $\phi$  4.94mm

2. The width maintenance limit of the contact surface: 1.5mm

**Notice:**

If the valve contact surface is rough, the abrasion is uneven or the contact with the valve seat is abnormal, and the sealing performance cannot be guaranteed, the valve should be replaced.

3. Check whether the valve spring is abnormally worn and the measurement is free length. Repair limit:

Outer spring: 39.75mm

Inner spring: 36.85mm

**Inspection of rocker arm and rocker arm shaft**

Check the rocker arm for abnormal wear, the axial clearance of the rocker arm roller

Whether the clearance and rocker rollers have excessive wear, such as wear, damage

If the phenomenon is serious or the axial clearance of the rocker roller is too large, more

Replace with a new rocker arm.

**Inspection of Camshaft Components**



1. Check whether the surface of the camshaft is worn or **damaged**  
And whether the camshaft bearing rotates flexibly, as serious wear  
Or the bearing rotates with the phenomenon of hair then the cam should be replaced with a new one.  
shaft parts;

### Inspection of the cylinder head

1. Check whether the sealing of the cylinder head is good. If the sealing of the cylinder head is poor, a new cylinder head or valve should be replaced;

2. Check whether the cylinder head is deformed, and check the flatness of the cylinder

燃烧室检漏测试：充气 0.3Mpa，泄漏量 ≤ 6000pa/10 秒。  
检测参数：充气时间 5S、平衡时间 3S、检测时间 2S、放气时间 0.5S、检压上限 320Kpa、检压下限 290Kpa、判定值 1.2Kpa。



Check cylinder head flatness



## Assembly of the cylinder head

### head

1. Install the valve spring lower seat (3) and the oil shield (4) to the valve guide;

2. After applying a small amount of lubricating oil to the intake valve rod (1) and exhaust valve rod (2), install the valve guide, install the valve outer spring (5), the valve inner spring (6), and the valve spring upper seat (7) and valve lock clip (8);

3. Use the valve remover to depress the valve spring, and then install the valve lock clip into the valve spring seat;

**Notice:**

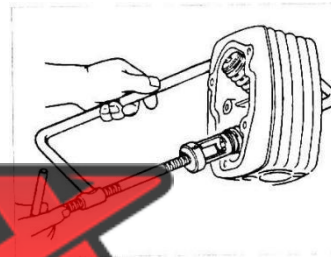
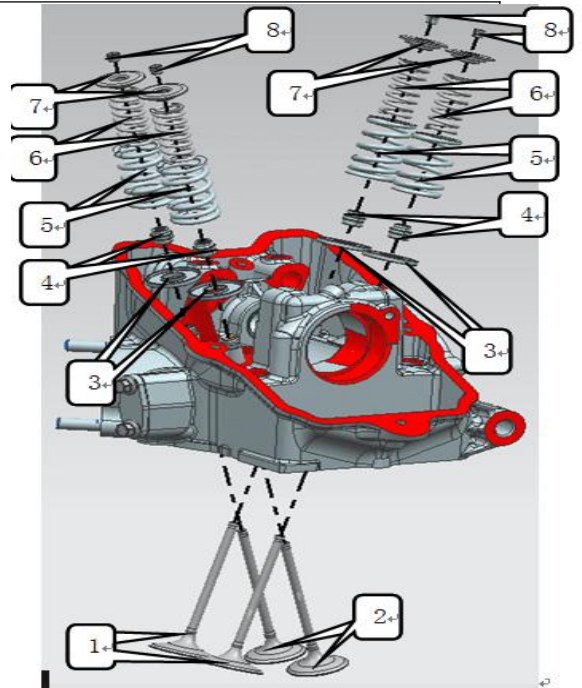
**To prevent permanent deformation of the valve spring, do not compress the spring too much to fit the valve lock clip.**

4. Check whether the valve lock clip is in place;

5. Carry out the air tightness test on the assembled cylinder head combination. If the air tightness test of the cylinder head combination is qualified, the next step can be performed (assemble according to the cylinder head composition diagram);

6. Take the assembled camshaft parts, apply grease on the surface of the small journal, assemble it at the position of the camshaft hole of the cylinder head, take the screw M6 × 12, insert it into the camshaft pressure plate hole, assemble it at the designated position of the cylinder head, and fasten;

7. Take the intake rocker arm and the valve rocker arm shaft respectively, and assemble them at the position of the cylinder head intake rocker arm shaft



This side is the cutting edge of the rocker arm shaft. When assembling the rocker arm shaft, this side should face the top of the cylinder head cover



M6×18



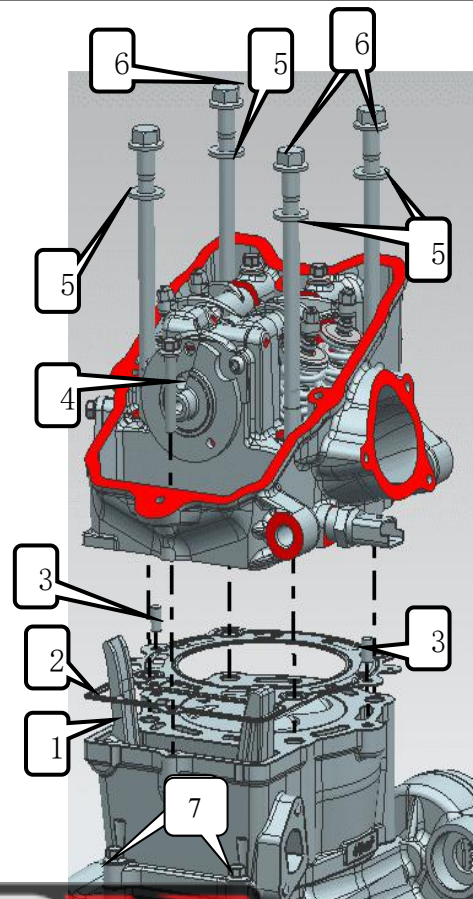
hole;

8. Take the exhaust rocker arm and valve rocker arm shaft respectively, and assemble them at the position of the cylinder head exhaust rocker arm shaft hole;

9. Use a flat-blade screwdriver to turn the rocker arm shaft of the intake and exhaust rocker arm to align the threaded hole of the rocker arm shaft with the position of the smooth hole of the dependent cylinder head.

10. Take GB16674 small plate bolts M6×18 and put flat washers on them, assemble them at the threads of the inlet and outlet rocker arm shafts, and fasten them.

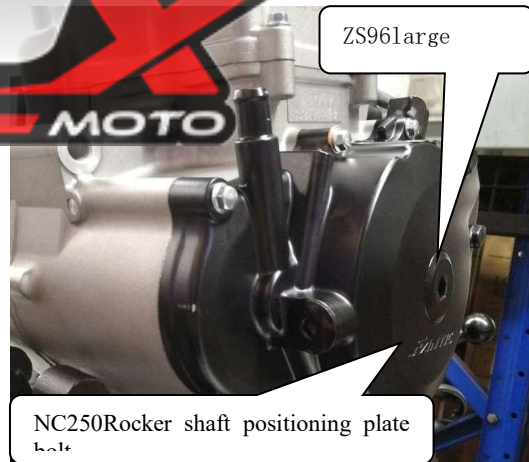
11. Take the NC250 rocker shaft positioning bolt M4×1, insert it into the O-ring, and assemble it at the designated threaded hole position of the cylinder head.



**Notice:**

**1. When installing the rocker arm shaft, the side of the rocker arm shaft with the trimmed edge should face the top of the cylinder head cover.**

**2. After the cylinder head cover is installed, turn the rocker arm. The rocker arm should rotate flexibly without sticking.**

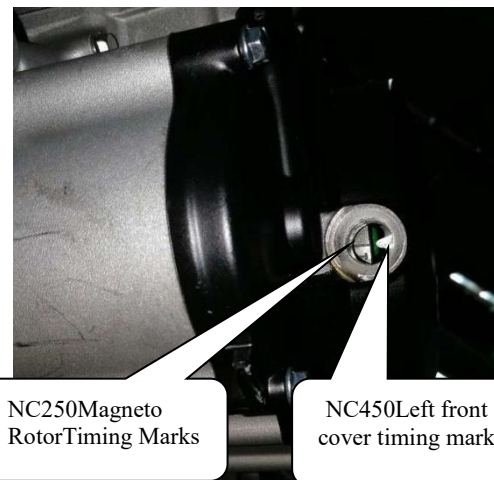


**Installation of the cylinder head**

**head**

1. Remove the old cylinder head gasket, install the new cylinder head gasket (2), and then install the positioning pin (3);

2. Install the cylinder head to the cylinder block, then put the A and B bolt nut washers (5 ) on the NC450 cylinder stud bolt AB (6 ) , and then install the NC450 cylinder stud bolt AB



(6 ) to the cylinder head , in the connecting hole of the cylinder body and fasten it;

**Notice:**

**1. The cylinder head gasket must be replaced with a new one;**

**2. Tightening torque of bolts A and B: 55~60N.m.**

3. Install the M6×25 bolts (7) to the cylinder and box

Install the bolts (4) of M6×40

into the connecting hole of the cylinder head and cylinder block and tighten.

**Tightening torque: 11~13N.m.**

4. Install the timing driven sprocket and timing chain on the camshaft, and then check whether the engine is in the timing position. If it is not in the timing position, you need to re-adjust the timing position of the engine.

**NC450 engine timing adjustment method:**

**(1) Remove the large viewing hole cover of the left front cover and the bolts of the NC250 rocker shaft positioning plate;**

**(2) Rotate the NC250 magneto lock nut with a special tool, and at the same time pass the bolt hole of the rocker shaft positioning plate on the left front cover**

**Observe whether the timing mark "one" on the magneto rotor is aligned with the timing mark on the left front cover;**

**(3) After the above timing marks are aligned, pay attention to observe whether the timing mark on the timing driven sprocket is on the same line as the cylinder head timing mark;**

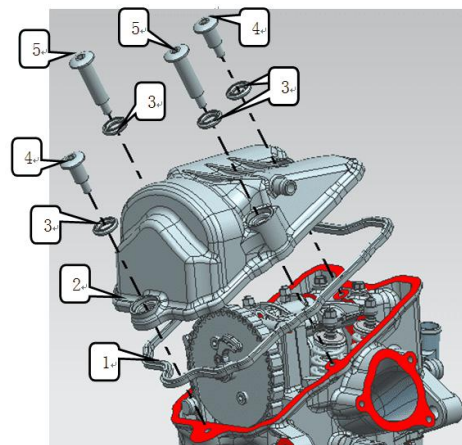
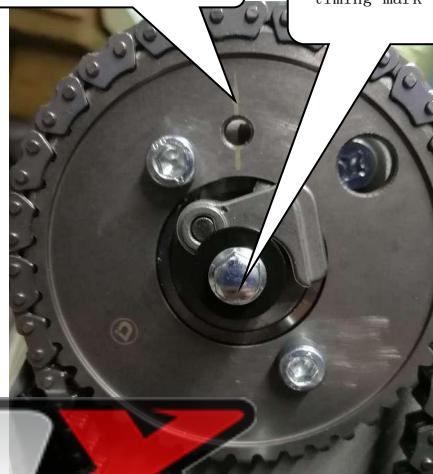
**The engine is in the correct timing position only if (2)(3) are satisfied at the same time.**

After adjusting the timing position, assemble the large sight hole cover and the bolts



Timing driven sprocket timing mark

NC450cylinder head timing mark



of the NC250 rocker shaft positioning plate to the left front cover;

6. Take 2 pieces of bolts M6 × 10, and fasten the NC450 timing driven sprocket on the camshaft; take 1 piece of the camshaft pressure reducing valve throwing block combination and the pressure reducing valve return spring, and throw the pressure reducing valve block. The combination and pressure reducing valve return spring is assembled on the camshaft through the timing driven sprocket; take the bolt M6 × 16 and put it into the flat washer, install it into the corresponding threaded hole of the camshaft, and fasten it.

**Tightening torque:** 11 to 13N·m.



7. Adjust the gap between the intake and exhaust valves, the gap value of the valve: 0.07 ±0.01mm

### **Installation of the cylinder head cover**

1. Take the NC450 cylinder head cover sealing ring (1) and the Derbi125 head cover bolt buffer washer (3), and assemble them on the designated position of the NC450 cylinder head cover (2).

2. Take 2 pieces of NC450 cylinder head cover fixing bolts (4) and 2 pieces of NC450 cylinder head cover fixing bolts (5), assemble the NC450 cylinder head cover (2) on the cylinder head, and fasten them.

**Tightening torque: 11~13N · m .**



## Cylinder block and piston repair


1. Maintenance Instructions
2. Disassembly of the cylinder
3. Cylinder inspection
4. Disassembly of the piston
5. Inspection of piston and piston ring
6. Installation of piston ring
7. Installation of piston
8. Installation of the cylinder

### Maintenance notice

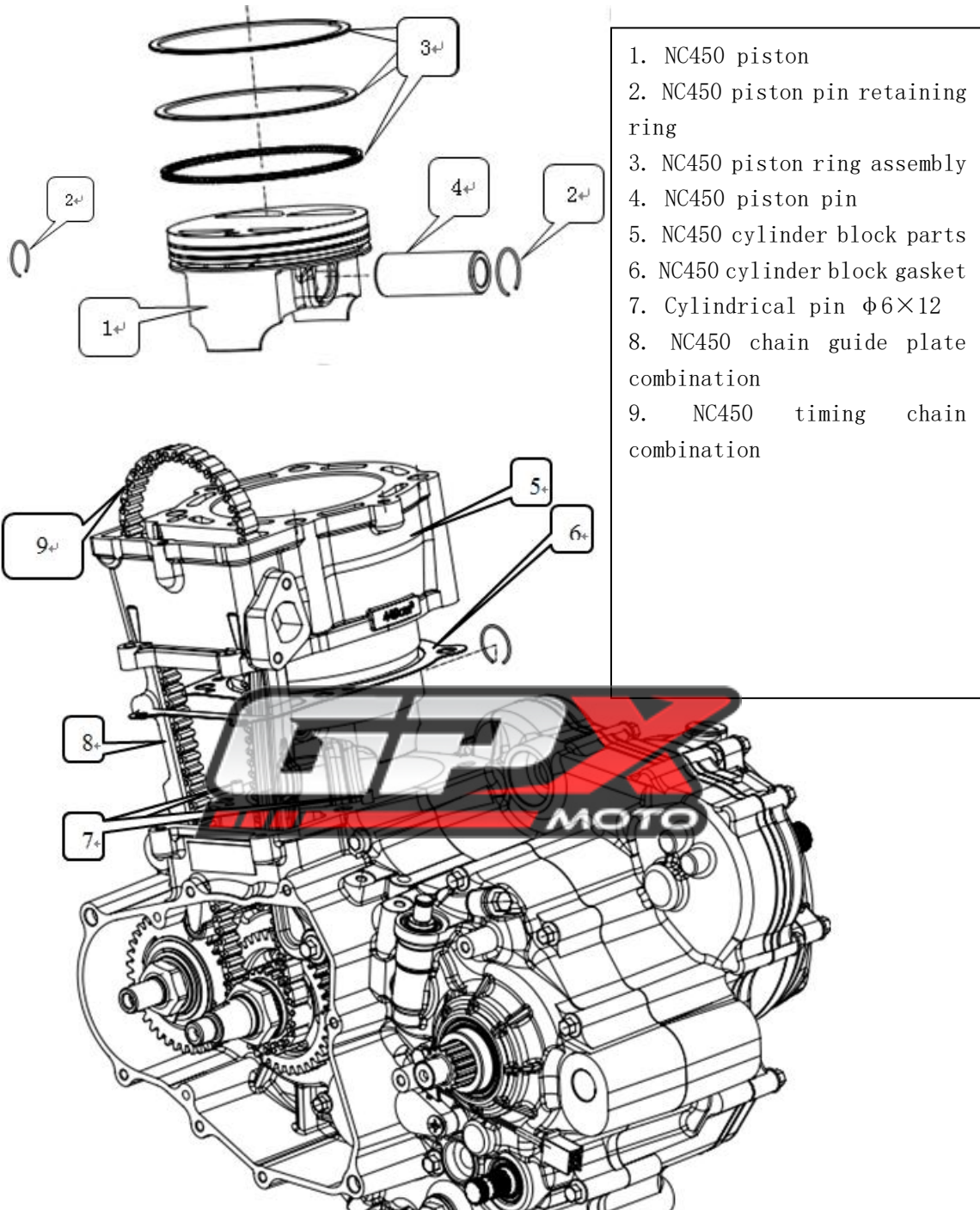
Notes :

- The cylinder head lubricating oil is supplied to the cylinder head through the small oil hole next to the AB bolt on the left body of the engine. Before installing the cylinder, make sure that the small oil hole next to the AB bolt on the left body is unobstructed. Do not install the solid positioning pin of the cylinder block into the oil passage hole.

### Maintenance parameters of each component

		Standard value mm	Maintenance limit mm	
cylinder	Cylinder bore	$\phi 94.5 \sim \phi 94.52$	$\phi 94.528$	
	Out of roundness	0.05	0.01	
	Cylinder surface flatness	0.03	0.05	
piston piston ring live plugged	Piston outside diameter	$\phi 94.45 \sim \phi 94.46$	$\phi 94.43$	
	Piston pin hole inner diameter	$\phi 20.001 \sim \phi 20.006$	$\phi 20.015$	
	Piston pin and piston pin hole clearance	0.001~0.012	0.025	
	Piston Ring Closed Gap	Top Ring/Second Ring	0.2~0.35	0.5
		oil ring	0.2~0.7	1.4
	Piston ring and piston ring groove clearance	top ring	0.03~0.07	0.08
		second ring	0.02~0.06	0.08
	Cylinder to Piston Clearance	0.035~0.065	0.07	
Piston pin outer diameter	$\phi 19.994 \sim \phi 20$	$\phi 19.99$		
connecting rod small end	the inside diameter of	$\phi 20.015 \sim \phi 20.025$	$\phi 20.04$	
	Small end of connecting rod and piston pin clearance	0.015~0.03	0.05	

Assembly drawing

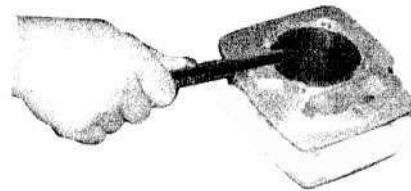


### Disassembly of the cylinder

Remove the chain guide plate, remove the two cylinder blocks and the box connecting bolts M6 × 25, and remove the cylinder block.



Use a scraper to scrape off the remaining gasket on the cylinder surface.



### Cylinder block inspection

1. Check whether the cylinder block is worn or damaged.
2. When measuring the inner diameter of the cylinder, three positions should be measured, namely the top, middle and bottom of the piston stroke, and two directions at right angles to each other should be measured during measurement.

Maintenance limit:  $\phi$  94.528mm



### Disassembly of the piston

Use needle-nose pliers to remove the piston pin retaining ring and remove the piston pin and piston.

**Notice:**

**When removing the piston pin retaining ring, do not drop the retaining ring into the crankcase**



### Inspection of pistons and piston rings

**rings**

1. Remove the piston ring;
2. Measure the gap between the piston ring and the groove of the piston ring, and the maintenance

limit value:

The first ring: 0.08mm

Second Ring: 0.08 mm

Oil ring: 0.08 mm

3. Check whether the piston is worn or cracked, and whether the groove of the piston ring is worn.

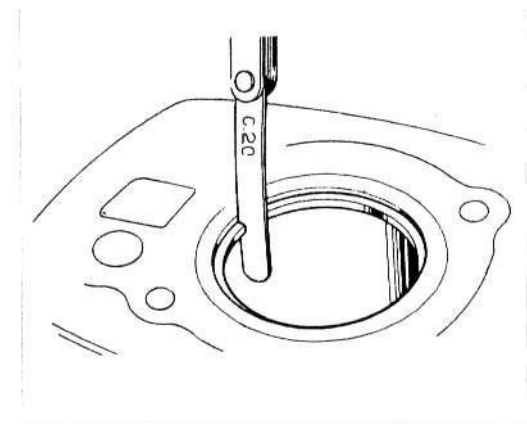
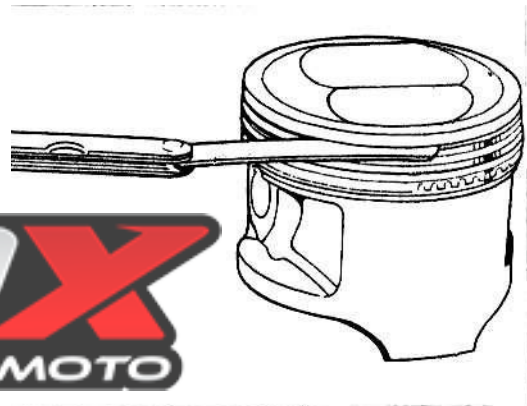
4. Insert the piston ring into the cylinder, and then measure the closed gap of the piston ring.

Repair limit:

The first ring: 0.5mm

Second ring: 0.5mm

Oil ring: 1.4 mm







5. Measure the outer diameter at a height of 7 mm from the piston skirt

Maintenance limit:  $\phi \phi 94.43$  mm

6. Calculate the gap between the cylinder and the piston.

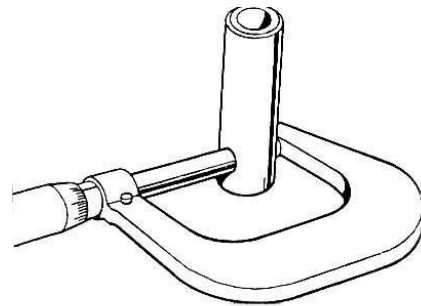
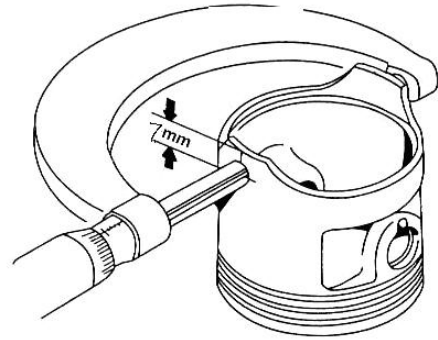
Maintenance limit: 0.1mm

7. Measure the outer diameter of the piston pin

Maintenance limit:  $\phi 19.99$  mm

8. Calculate the clearance between the piston and the piston pin

Service limit: 0.025 mm



1. Thoroughly clean the groove of the piston ring;

2. Install the piston ring;

**Notice:**

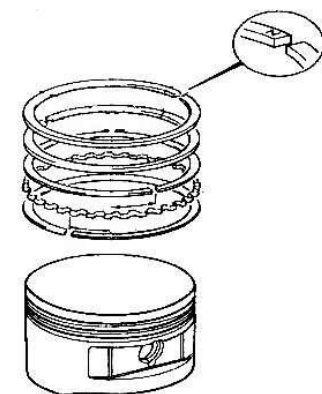
1、 **During installation, the piston and piston rings should be protected from damage;**

2、 **When installing the piston ring, do not install the first ring and the second ring wrongly .**

**The marked side of the first and second rings faces the top of the piston ;**

3、 **After installation, the piston ring should rotate flexibly .**

3. The gap between each ring in the oil ring should be matched with the gap of the spacer ring; when installing the oil ring, the spacer ring should be



installed first, and then the side guide rails should be installed.

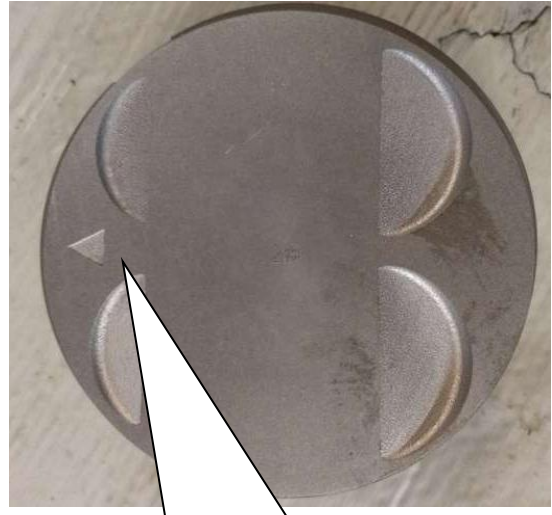


### Piston installation

Install the piston, piston pin and new piston pin retainer.

#### Notice:

1. When installing the piston, the side marked with " " should face the exhaust side of the engine ;
2. The opening of the end clearance of the piston pin retaining ring should face downward;
3. If the piston pin retaining ring is seriously deformed, it must be replaced with a new retaining ring;
4. Do not let the piston pin retaining ring fall into the crankcase .

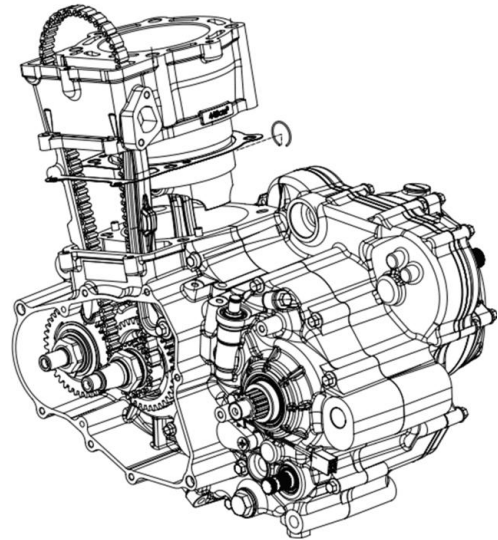


When assembling the piston, the side marked with "" should face the exhaust side of the engine



### Installation of the cylinder block

1. Install cylinder block positioning pins and new cylinder block gaskets;
2. Apply a layer of oil evenly on the surface of the cylinder block, piston and piston ring ;
3. First stagger the openings between the piston rings by 120° , and then gently assemble the cylinder block in place ;
4. Assemble the chain guide plate in place.



**NOTE:** When installing the cylinder block, avoid damaging the piston rings.

## Clutch, driving gear, overrunning clutch, oil pump, shifting mechanism

1. Maintenance Instructions 13. Inspection of super separation and starting gear
2. Removal of the water pump cover 14. Inspection of the right oil pump
3. Removal of right crankcase cover 15. Inspection of shifting mechanism
4. Dismantling of clutch 16. Inspection of double gear and starting motor
5. Disassembly of driving gear 17. Assembly of shifting mechanism
6. Dismantling of super separation and starting gear 18. Assembly of right oil pump
7. Removal of the right body oil pump
8. Removal of shift mechanism 20. Installation of driving gear
9. Removal of double gear and starter motor 21. Installation of clutch
10. Inspection of water pump impeller 22. Installation of starter motor
11. Inspection of clutch 23. Installation of right crankcase cover
12. Inspection of active teeth



**instruction:**

After removal of the right crankcase cover, removal, installation and maintenance of the clutch, oil pump and shifting mechanism can be carried out **without removing the engine**

**Maintenance parameters of each component**

project		Standard value mm	Maintenance limit mm
clutch	spring free length	25	25
	Friction active plate free thickness	2.95~3.05	2.85
	Flatness of clutch disc	0.1	0.14
	Clearance between clutch cover and friction plate	0.1~0.3	0.6
oil pump	Radial clearance between outer rotor and inner rotor	0.06~0.15	----
	End clearance between rotor combination and cover plate	0.04~0.1	----

### Water pump cover removal

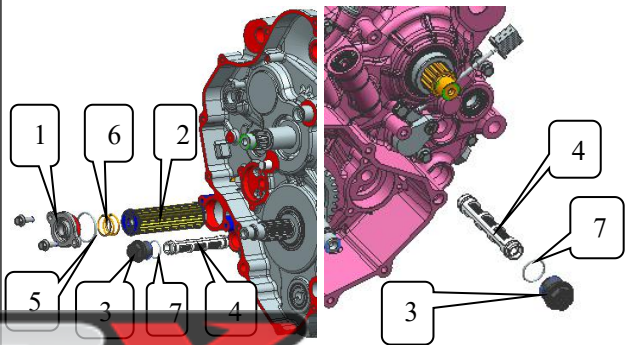
Remove the drain bolt of the water pump cover, drain the cooling water in the engine from the drain bolt, and remove the water pump cover when no water flows out from the drain bolt.



### Right crankcase cover removal

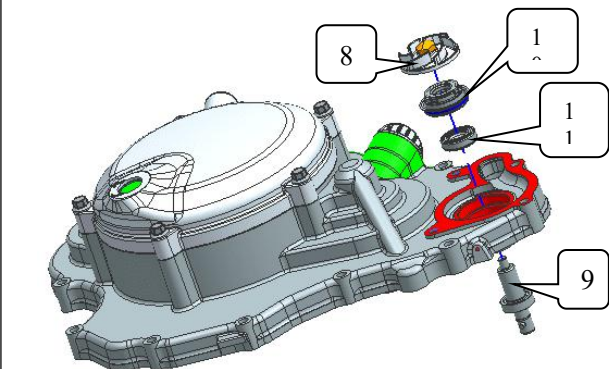
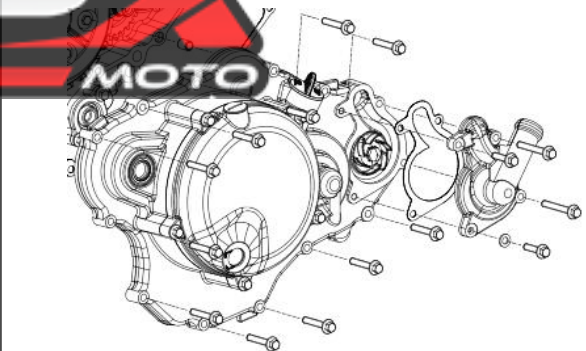
#### removal

1. Drain the engine oil first (remove the two fastening bolts M6×16 of the oil fine filter cover (1) on the right side, take off the oil fine filter cover (1), and take out the NC250 reverse fine filter spring (6), take out the fine filter part (2), remove the oil filter cover (3) of the left and right boxes, take out the oil filter combination (4) in the box, wait for the oil in the box to run out, and then disassemble the machine. When removing the oil filter cover, pay attention to whether the O-rings (5) and (7) of the oil filter cover are damaged;



2. Remove the connecting screws and take off the right crankcase cover.

**Note: When removing the right cover, remove the two positioning pins together, and keep the positioning pins in a safe place.**



**Impeller, water pump shaft, water seal assembly, oil seal disassembly**

Platen Bolt



1. Remove the water pump impeller (8) and the water pump shaft (9);

2. Remove the water seal assembly (10) and oil seal (11) in the shaft hole of the water pump.

### clutch removal

1. Remove the clutch pressure plate spring and bolts, pay attention to loosening the clutch pressure plate bolts in two or three times in a cross manner;

2. Remove the clutch pressure plate and the clutch ejector rod;

3. Remove the clutch lock nut and thrust washer;

4. Remove the clutch center sleeve, outer cover, needle bearing and gasket;

5. Take out the clutch push rod in the center hole of the main shaft.

### Dismantling of driving gear, super-detachment and starting large gear

1. Remove the drive gear lock nut and the lock nut washer;

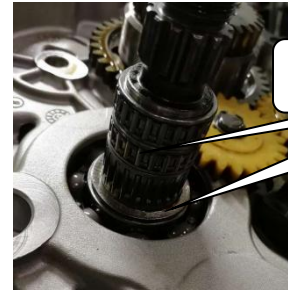
2. Remove the driving gear, super-separate and start the big gear.

#### Notice:

**When removing the starter gear assembly, remove the washer under the starter gear together, and keep the washer in a safe place.**

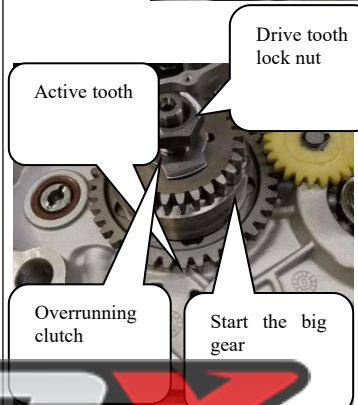
### Removal of the right body oil pump

1. Use the expansion pliers to remove the retaining ring of the oil pump bridge gear and



Needle Roller Bearings

垫片

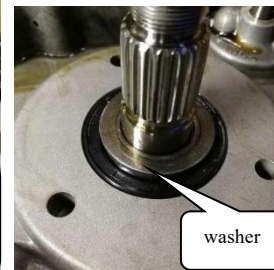


Active tooth

Drive tooth lock nut

Overrunning clutch

Start the big gear



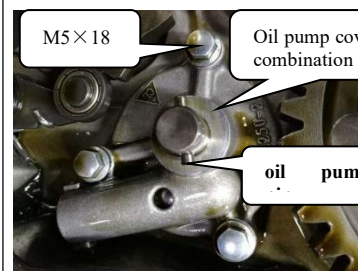
washer



retaining ring



Bridge tooth washer



M5×18

Oil pump cover plate combination

oil pump



oil pump pin

double tooth two

Double gear shaft



the oil pump gear combination;

2. Remove the oil pump bridge tooth washer, the oil pump bridge tooth, and the oil pump gear combination;

3. Remove the 3 bolts M5×18 on the cover plate of the right oil pump, and remove the combination of the oil pump cover plate and the combination of the inner and outer rotors of the oil pump.

**Notice:**

**There are one oil pump bridge tooth washer on the top and bottom of the oil pump bridge tooth. The removed retaining ring, washer and oil pump pin should be properly kept to avoid loss .**

**Disassembly of the double gear**

First remove the double gear shaft, then remove the first double gear and the second double gear.



**Removal of starter motor**

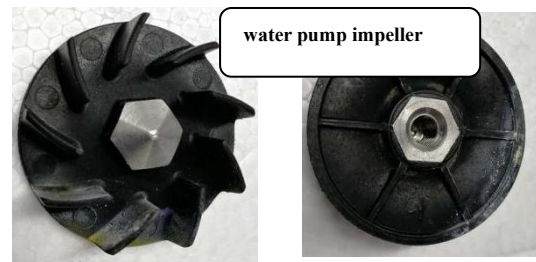
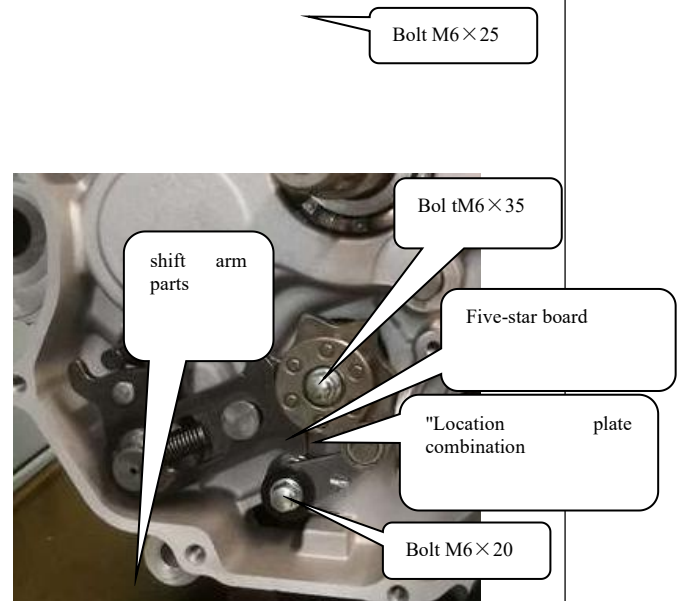
Remove the starter motor fastening screws M6×25, and take off the starter motor.

**Removal of the gearshift mechanism**

1. Remove the M6×35 fixing screws of the five-star board, and remove the five-star board

2. Remove the shift arm parts;

3. Remove the M6×20 fixing screws of the positioning plate combination, and remove the positioning plate washer and the positioning plate combination.





### Inspection of Right Crankcase

#### Cover

1. Check whether the crankshaft oil seal of the right crankcase cover is **damaged** . **If the oil seal is found to be broken, it needs to be replaced with a new oil seal ;**

**When replacing the crankshaft oil seal, pay attention to two points:**

- 1. Confirm whether the state of the oil seal is correct. The end face of the NC450 crankshaft oil seal should be marked with "NJK";**
- 2. The marked side should face outwards during assembly.**

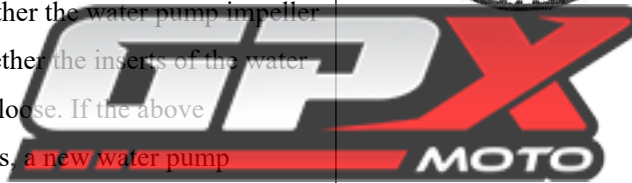
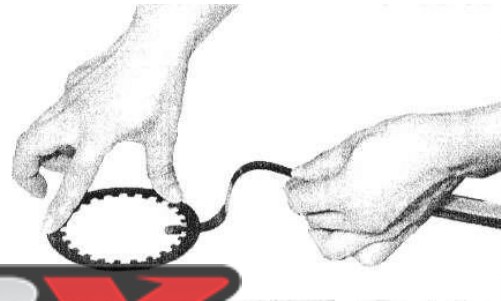
#### Inspection of water pump shaft, water pump impeller, water seal components and oil seal

1. Check whether the water pump impeller has cracks and whether the inserts of the water pump impeller are loose. **If the above phenomenon occurs, a new water pump impeller should be replaced;**

2. Check whether the water seal components and oil seals are broken, and check whether the wear of the water pump shaft is abnormal and whether there is bending. If so, you need to replace the new water seal components, oil seals and new water pump shafts ;

**When replacing the water seal assembly, oil seal, and water pump shaft, pay attention to: 1. Apply an appropriate amount of oil to the shaft hole of the NC450 water pump.**

**Use special tooling to press-fit the NC450 water pump shaft oil seal to the position, the oil seal end face mark faces outward;**



2. Use special tooling to press-fit the NC450 water pump shaft water seal in place, 0.5mm lower than the end face, and the end face mark of the water seal faces **outward when assembling the water seal** ;

3. Apply an appropriate amount of lubricating oil to the main lip of the water seal;

4. Press the new water pump shaft into place with special tooling; 5. The assembled water pump shaft should rotate flexibly.



### Inspection of clutch active friction plate

1. If there are scratches or fading marks on the clutch friction plate, it should be replaced.

Measure the thickness of each clutch lining .

Maintenance limit: 2.85mm



2. Check whether the surface of the clutch disc is twisted , and use a feeler gauge ( flatness ) when checking.

Service limit: 0.14 mm

3. Check the clearance between the clutch cover and the friction plate.

Service limit: 0.6 mm

Overrunning clutch cover

Overrunning clutch wedge

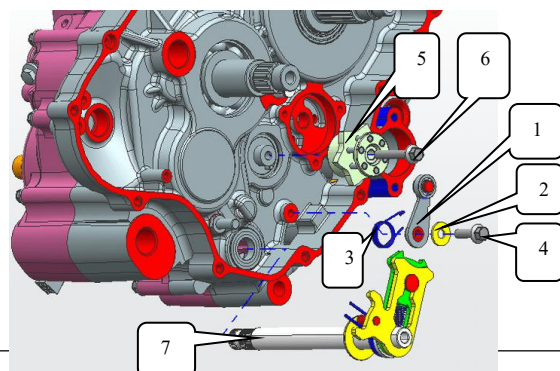
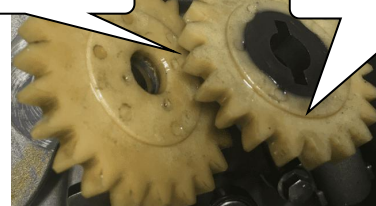


Right body oil pump inner and outer rotor combination



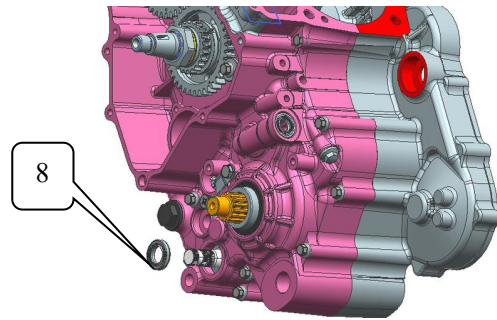
Oil pump bridge gear

Oil pump gear combination



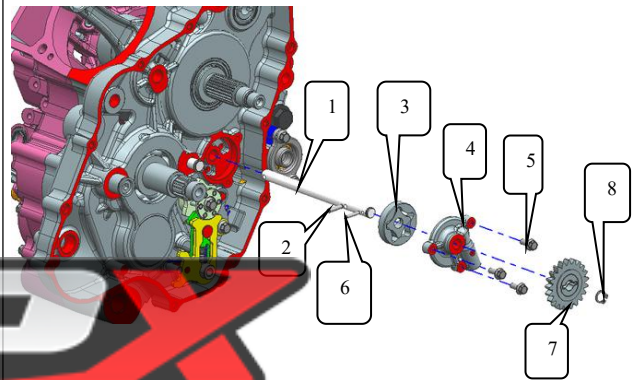
### Inspection of clutch cover

Check whether the tooth grooves on the drum shape of the outer cover **are notched or scratched due to friction of the clutch disc** . If it is serious, the outer cover needs to be replaced.



### Inspection of the overrunning clutch

Remove the collar on the end face of the overrunning clutch, check whether the wedge of the overrunning clutch is worn or damaged, and whether the wedge spring is stretched or broken,

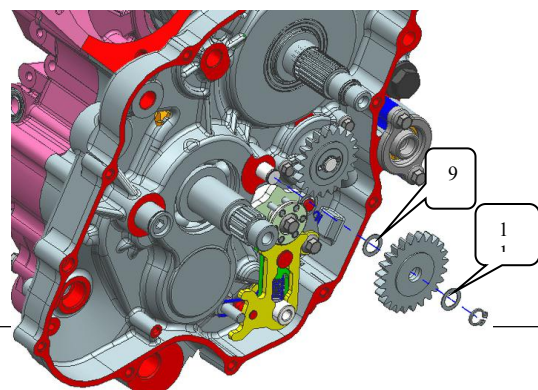


### Inspection of the right body oil pump

1. Check whether the inner and outer rotors of the oil pump are worn or damaged . If the wear and damage are serious, you need to replace the new oil pump rotor assembly;

2. Check whether the combination of the oil pump bridge gear and the oil pump gear is cracked, and if so , it needs to be replaced with a new oil pump bridge gear and oil pump gear combination

3. Check whether the right oil pump cover is worn or damaged , if so, replace it with a



new right oil pump cover.

### Assembly of the gearshift mechanism

#### mechanism

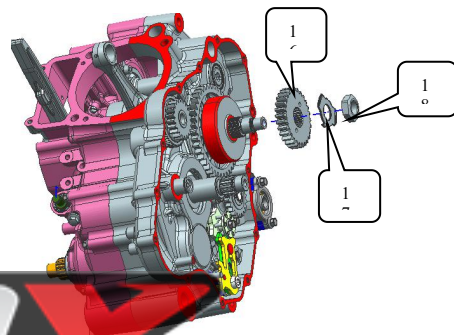
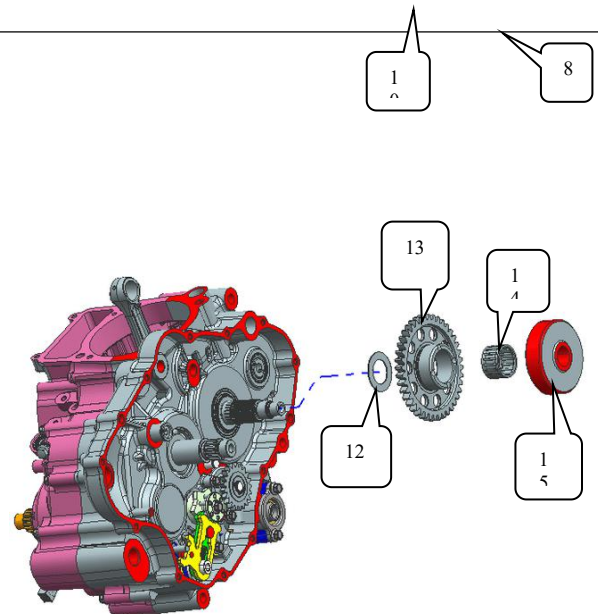
1. Install the positioning plate combination (1) and the flat washer (2), snap the positioning plate spring (3) into the corresponding position of the positioning plate, and fasten with M6×20 bolts (4);

2. Install the five-star plate assembly (5) on the speed change drum, take a M6×35 bolt (6), apply 3 to 4 threads of thread tightening glue on the thread , and fasten the bolt;

3. Take the NC250 shift arm assembly (7) and put it into the corresponding position (note: the shift arm return spring is clamped into the right shift arm positioning bolt);

4. Test whether the shifting is correct and smooth.

5. Take the oil seal (8) of the LY350 reverse gear shift drum and install it on the oil seal hole of the left shift arm with a tooling



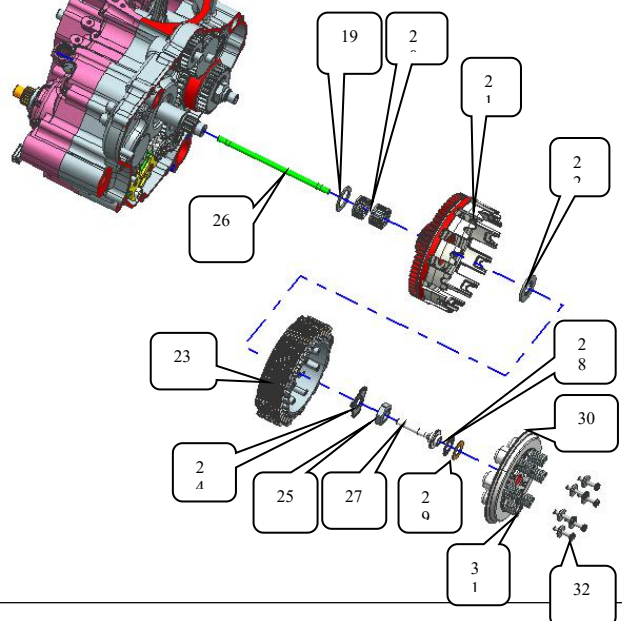
### Assembly of the right body oil pump

#### pump

1. Pass the oil pump shaft (1) through the corresponding hole of the box;

**Note:** There are 2 pin holes on the shaft facing the right case

2. Pass the oil pump pin (2) through the oil pump shaft (1), and then install the oil pump rotor assembly (3) into the



corresponding oil pump hole on the right body (the marked surface of the oil pump rotor assembly should face the same direction),

3. Install the oil pump cover plate assembly (4) on the oil pump, and fasten it with 3 M5×18 bolts (5).

4. Pass the oil pump pin (6) through the oil pump shaft, then install the oil pump gear assembly (7) on the oil pump shaft, and finally install the retaining ring (8) on the retaining ring groove of the oil pump shaft.

**Notice:**

1. When installing the oil pump rotor, the marked surfaces of the inner and outer rotors should face the same direction;

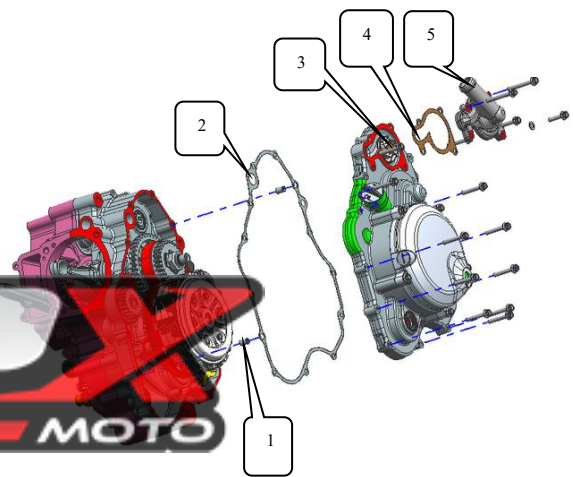
2. Tightening torque of oil pump cover bolts: 7~9 Nm;

3. After the cover plate is assembled, make sure that the oil pump shaft rotates flexibly.

5. Install the oil pump bridge gear washer (9) on the oil pump bridge gear shaft, install the oil pump bridge gear (10) on the oil pump bridge gear shaft, and then install the oil pump bridge gear washer (11) Install the oil pump bridge gear, and finally install the retaining ring (8) on the retaining ring groove of the oil pump bridge gear shaft.

**Installation of starting gear and overrunning clutch**

1. Install the large starting gear washer (12) on the right crank,



2. Install the large starting gear (13), needle bearing (14) and overrunning clutch (15) on the right crank.

**Notice:**

**Before installing the starter gear, evenly apply oil on the inner hole of the starter gear .**

**Installation of driving gear**

1. Install the driving tooth (16) on the right crank,
2. Install the drive tooth lock nut washer (17) on the drive tooth,
3. Apply 3 to 4 threads of thread tightening glue on the locking nut (18) of the driving teeth, install it on the right crank and tighten it.

**Tightening torque: (115~125)N•m**

**Thread fastener name: Loctite 263**



**Installation of the clutch**

1. Install the clutch cover washer (19), needle bearing (20), clutch cover (21) and clutch center sleeve washer (22) on the main shaft;

**NOTE: Apply oil evenly to the clutch needles.**

2. First install the clutch center sleeve assembly (23) and the clutch lock nut washer (24) on the main shaft, apply 3 to 4 threads of thread tightening glue to the clutch lock nut (25), install it on the main shaft and tighten it. solid;

**Notice:**

**Tightening torque of clutch lock nut:  
80~90N m**

3. Then install the clutch push rod (26)

into the center hole of the main shaft, then install the clutch push rod (27) into the center hole of the main shaft, and then install the thrust bearing (28) and the push rod washer (29) to the top. on the rod,

4. Install the clutch pressure plate (30), the clutch pressure plate spring (31), and the pressure plate screw (32), and use a torque wrench to fasten the pressure plate screw.

**Tightening torque: 8~10N m**

#### **Assembly of the starter motor**

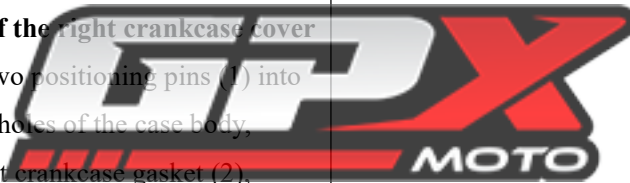
After smearing oil evenly on the cogging end of the starter motor, assemble the starter motor in place, and fasten it with 2 bolts M6 × 25, the **tightening torque is 11~13N • m.**

#### **Installation of the right crankcase cover**

1. Install the two positioning pins (1) into the positioning pin holes of the case body, remove the old right crankcase gasket (2), install the new gasket, assemble the right crankcase cover in place and use 11 bolts M6 × 35 tightening, **tightening torque: 11~13N m**

2. Install the water pump impeller (3) on the shaft of the water pump and tighten it. **The tightening torque is 2~4N • m;**

3. After installing the water pump cover gasket (4), assemble the water pump cover (5) in place and fasten with 2 bolts M6 × 45 and 2 bolts M6 × 25.



## Magnetic motor and balanced main and

### driven gear

1. Maintenance instructions
2. Removal of left crankcase cover
3. Disassembly of magneto stator and rotor
4. Removal and inspection of balance main and driven gears
5. Removal of left oil pump
6. Inspection of left crankcase cover
7. Inspection of magneto stator and rotor
8. Inspection of balanced main and driven gears
9. Inspection of left body oil pump
10. Installation of left body oil pump
11. Installation of balanced main and driven gears
12. Installation of magneto stator and rotor
13. Installation of left crankcase cover

#### Maintenance notice

The removal and installation of the magneto and the balance main and driven gears described in this section can be completed only by removing the left crankcase cover **without removing the engine** .

#### Removal of left crankcase cover

Remove the fastening bolts of the left front cover and take off the left crankcase cover.



#### Disassembly of the magneto stator

##### stator

1. Remove the 2 bolts M5×10 fastening screws of the sensor;
2. Remove the 2 screws M5×40 fastening screws of the stator coil, and then remove the magneto stator assembly from the left crankcase cover.



#### Disassembly of the magneto rotor

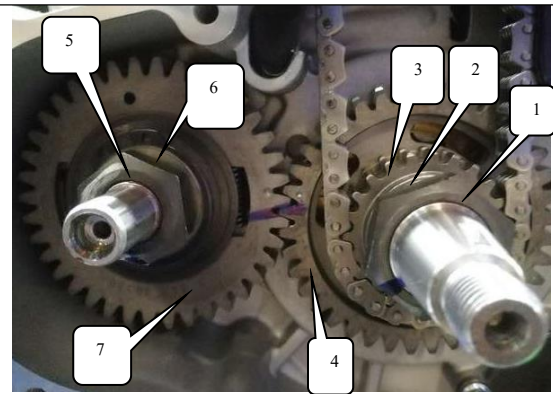
Remove the magneto rotor lock nut, and **use a special tool to remove the magneto rotor** .





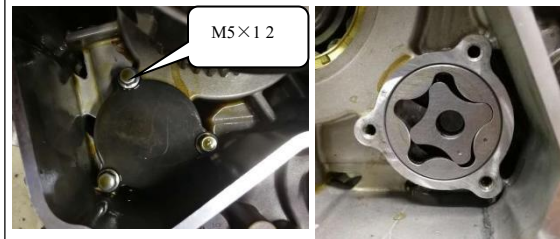
**Notice:**

- 1. When disassembling the magneto rotor, it can only be disassembled with special tools, and it is not allowed to knock the magneto rotor ;**
- 2. The magneto rotor is accidentally impacted during disassembly and assembly. If the magneto rotor falls to the ground or is struck by foreign objects, the magneto rotor should be replaced with a new one.**



**Dismantling of balance main and driven teeth**

1. Remove the balance driving gear locking nut (1) and the driving gear locking nut washer (2) respectively;
2. Remove the crankshaft timing drive sprocket (3) and balance drive gear (4);
3. Remove the balance driven gear lock nut (5) and the CB125 clutch disc washer (6);
4. Remove the balance gear driven wheel (7), the NC250 crankshaft sleeve, and the balance shaft flat key.



**Removal of the left body oil pump**

**pump**

1. Remove the 3 GB/T16674 small plate bolts M5 x 1.2 that fasten the left oil pump cover plate;
2. Remove the oil pump cover, remove the left oil pump rotor assembly, and keep the oil pump pins properly to avoid loss.

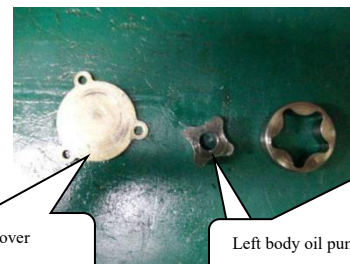


**Inspection of left crankcase cover**

Check whether the balance shaft oil seal of the left crankcase cover is damaged. If so, the balance shaft oil seal must be replaced.

**Inspection of magneto stator and**

**rotor**



Left body oil pump cover

Left body oil pump rotor combination

1. Check whether the magnetic tile of the magneto rotor is cracked or damaged, and if so, replace it with a new magneto rotor.

2. Check whether the magneto stator coil is black, if so, replace it with a new magneto stator.

### Check the balance of the main and driven gears

1. Check whether the balance main and driven gears are worn or damaged.

2. Whether the buffer spring of the balance driven gear is broken, if it is broken, it needs to be replaced with a new gear.

### Left Body Oil Pump Inspection

1. Check the left body oil pump rotor assembly for wear and damage;

2. Check the left body oil pump cover for wear and damage.

### Installation of the left body oil pump

1. Install the left body oil pump pin (1) into the corresponding hole of the oil pump shaft, and then install the left body oil pump (2) into the corresponding hole of the left body;

2. Fasten the left cover plate (4) of the oil pump with 3 bolts M5 × 1 2(3).

#### Notice:

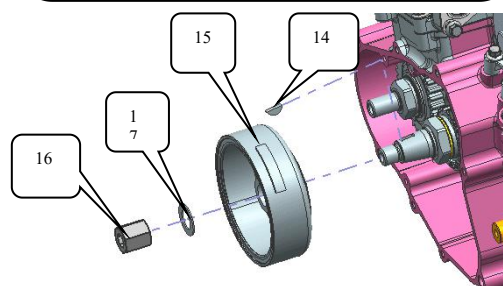
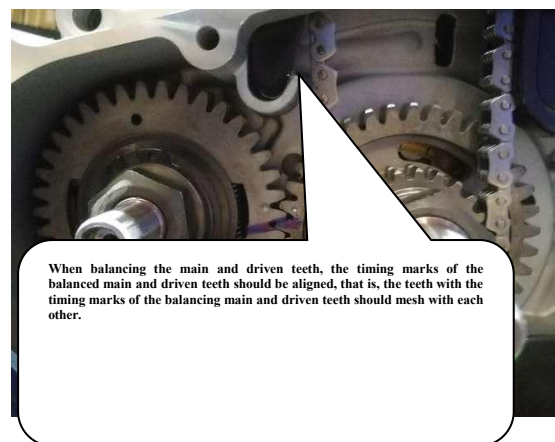
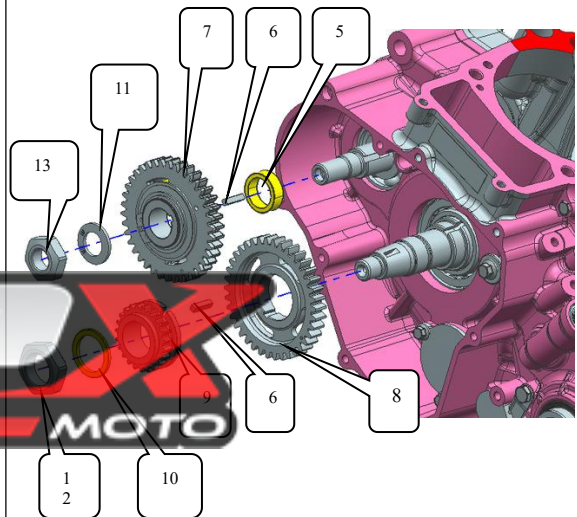
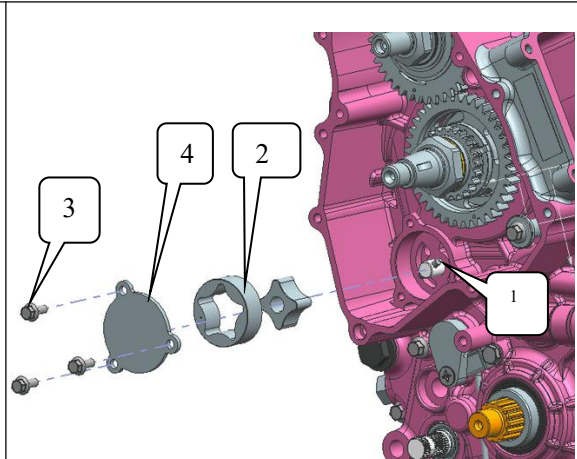
1. When installing the oil pump rotor, the marked surfaces of the inner and outer rotors should face the same direction;

2. Tightening torque of the bolts of the left oil pump cover plate: 7~9N m;

3. After tightening, check whether the oil pump shaft rotates flexibly.

### Installation of balanced main and driven gears

1. First install the NC250 crankshaft sleeve (5) on the balance shaft, then install the NC250 balance shaft flat key (6) into the keyway of the balance shaft, and finally install the balance driven



gear assembly (7) on the balance shaft ;

2. First install the balance driving gear (8) on the left crank, then install the NC250 balance shaft flat key (6) into the keyway of the crankshaft, and then install the NC450 crankshaft timing sprocket (9) on the left crank;

**Notice:**

**When installing the balance master and driven teeth, the timing marks of the balance master and driven teeth should be aligned, that is, the teeth with the timing marks of the balance master and driven teeth should mesh with each other.**

3. Put the balance driving gear nut lock washer (10) and the CB125 clutch disc washer (11) on the crankshaft timing driving sprocket (9) and the balance driven gear assembly (7) respectively, and lock them on the balance shaft. Nut M24×1(12) Clutch lock nut M16×1(13) Apply 3~4 threads of thread tightening glue, then install it on the crankshaft and balance shaft and fasten it.

**The tightening torque of the balance driven gear lock nut: 80~90N · m, and the tightening torque of the balance driven gear lock nut: 115~125N · m.**

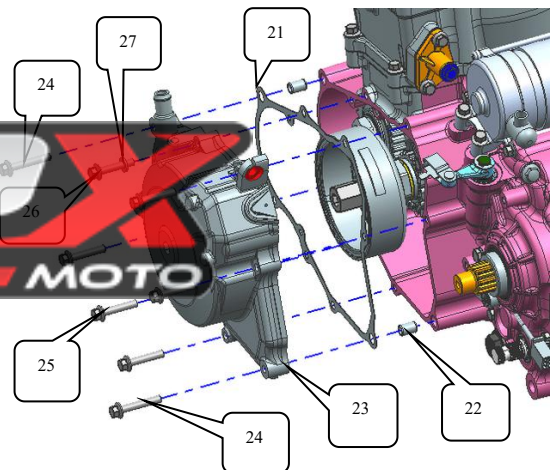
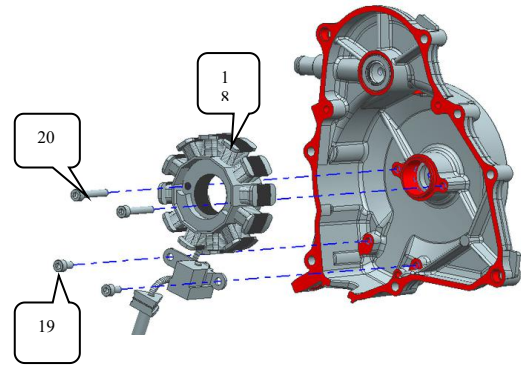
**Installation of the magneto rotor**

1. One magneto semicircular key (14), installed in the semicircular keyway of the crankshaft;

2. Install the magneto rotor (15) on the left crank, then apply 3 to 4 threads of thread tightening glue on the magneto nut (16), then install it and the washer (17) on the left crank and tighten.

**Notice:**

**Tightening torque of magneto rotor lock nut: 80~90N · m.**



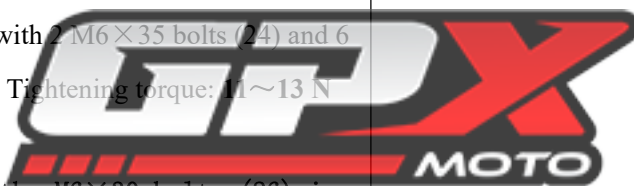
### Installation of magneto stator

Fasten the magneto stator assembly (18) to the left crankcase cover with 2 screws M5×10 (19) and 2 screws M5×40 (20). **Tightening torque: 7~9N·m.**

### Installation of the left crankcase cover

1. Remove the old gasket (21) and install a new gasket;
2. Install the two positioning pins (22) on the box body;
3. Assemble the left crankcase cover (23) in place and fasten it with 2 M6×35 bolts (24) and 6 M6×30 bolts (25). **Tightening torque: 11~13 N·m.**

**Note:** One of the M6×30 bolts (26) is coated with Sanhe glue on the disk, and inserted into the flat washer (27), and inserted into the corresponding position as shown in the figure



## Crankcase, crankshaft, transmission, balance shaft

### repair

1. Maintenance instructions 9. Inspection of oil filter parts and oil filter
2. Crankcase decomposition 10. Assembly of transmission/crankshaft/balance shaft
3. Removal of crankshaft 11. Box closing
4. Inspection of crankshaft 12. Assembly of oil filter
5. Inspection of shift fork/shift fork shaft/shift drum
6. Inspection of left and right box bearings
7. Installation of transmission drum and gear
8. Inspection of main and auxiliary shaft components

### Maintenance notice

This section introduces the installation and inspection of the transmission, crankshaft and balance mechanism. When performing the above work, the crankcase should be separated first, and the disassembly of other parts of the engine should be carried out before the crankcase is separated.

#### Work before crankcase separation

Disassembly of the cylinder head

Cylinder/Piston Removal

Dismantling of clutch, oil pump, shifting mechanism and balance teeth

Disassembly of the magneto



#### Maintenance parameters of each component

project		Standard value mm	Maintenance limit mm
shift fork	Inner diameter of countershaft right shift fork / countershaft left shift fork inner diameter	$\phi 12.016 \sim \phi 12.043$	$\phi 12.045$
	Spindle fork inner diameter	$\phi 12.016 \sim \phi 12.043$	$\phi 12.045$
	Jaw thickness	4.8~4.9	4.8
shift fork shaft	Outer diameter of main shaft fork shaft	$\phi 11.973 \sim \phi 12$	$\phi 11.95$
	Outer diameter of countershaft fork shaft	$\phi 11.973 \sim \phi 12$	$\phi 11.95$
	Cylindricity	0.006	----
crankshaft	Inner diameter of connecting rod small end	$\phi 20.015 \sim \phi 20.025$	$\phi 20.04$
	Big end side clearance of connecting rod	Axial	0.15~0.4
		radial	0.008~0.016
balance shaft	Shaft diameter	$\phi 19.98 \sim \phi 19.993$	$\phi 19.96$

### Disassembly of the crankcase

1. Place the left crankcase of the engine upwards;
2. Remove the fastening screws of 3 bolts  $M6 \times 70$ , 3 bolts  $M6 \times 65$  and 6 bolts  $M6 \times 45$ , separate the left crankcase from the right crankcase, and remove the 2 positioning pins.

### Removal of crankshaft/balance shaft/main and auxiliary shafts

Take out the crankshaft assembly, balance shaft, shift fork shaft, shift fork, shift drum, and main and countershaft components from the box.

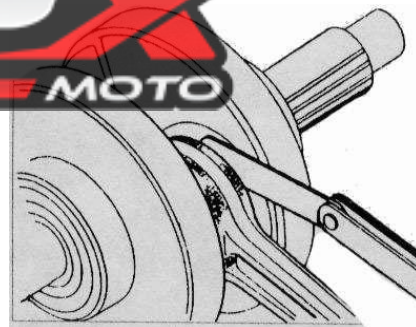
**Notice:**

**When taking out the main and auxiliary shaft assemblies, make sure that no parts are left behind .**



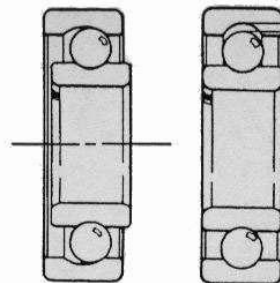
### crankshaft inspection

Use a thickness gauge to measure the backlash at the big end of the connecting rod.  
Service limit: 0.7 mm



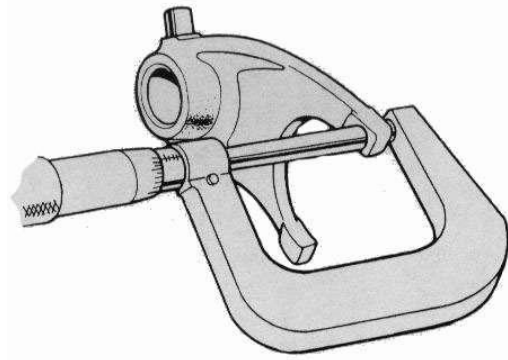
### Inspection of left and right case bearings

1. Check whether all the bearings of the left and right boxes rotate flexibly; if the rotation is not flexible or there is a phenomenon of hairpin, the bearings of the same type should be replaced



Measure the thickness of the prongs.

Service limit: 4.7 mm



Inspect gear drum surfaces and grooves for wear or damage



### Inspection of main and countershaft components

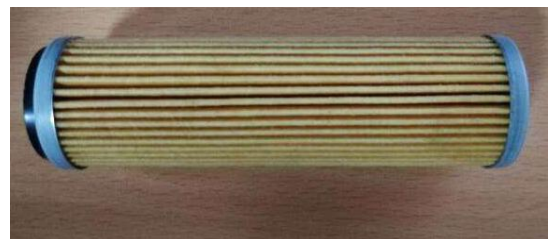
Check whether the gears of the main and countershaft assemblies have excessive or abnormal wear, and check whether the collars between the gears are deformed or fallen off.



### Inspection of oil filter parts and oil filter

1. Check the cleanliness of the oil filter parts and oil filter screen; rinse the oil filter parts and oil filter screen with poor cleanliness with clean gasoline;

2. Check whether the oil filter parts and oil filter are damaged; if there is damage, replace the new oil filter parts and oil filter.



### Assembly of transmission/crankshaft/balance shaft

1. Install the balance shaft (1) and crankshaft (2) into the corresponding holes of the left body,
2. Install the main and auxiliary shaft assemblies (3) into the corresponding holes of the left body, and then assemble the forks (4), (5), (7) to the corresponding positions,

#### Notice:

1. The shift fork marked with --R is installed on the right side of the countershaft;
2. The fork marked with --L is installed on the left side of the secondary shaft;
3. Load the fork marked --C into the spindle.

3. Install the shift drum (5) into the corresponding hole of the left body, then fit the other end of the shift fork into the corresponding slot of the shift drum, and finally install the shift fork shafts (8) and (9) to the corresponding shift fork middle.

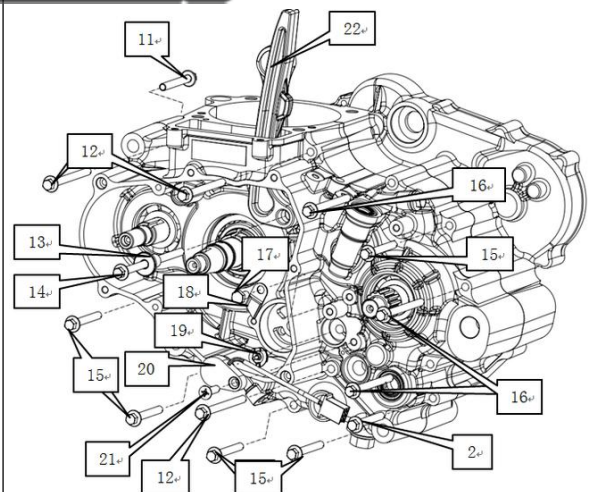
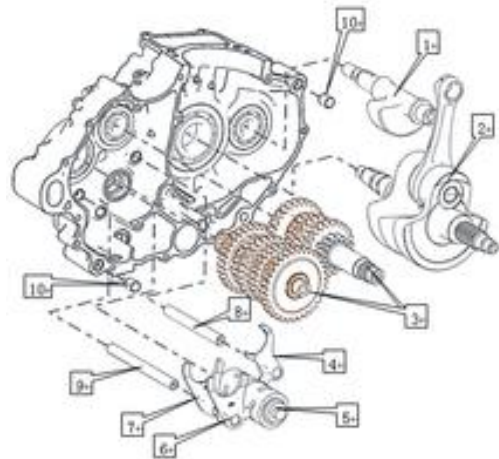
#### Notice:

The long fork shaft passes through the forks marked - R and - L, and the short fork shaft passes through the forks marked - C.



### Close the box

1. Apply a layer of sealant evenly on the box-fitting surface of the right box, install the positioning pin (10) into the corresponding hole of the left box, and then fit the right box to the left box;
2. Take 6 M6×45 screws (15), 3 M6×65 screws (16), 3 M6×70 screws (12), and 1 M6×40 bolt (11), apply 3 to 4 threads glue, then insert it into the corresponding bolt holes of the crankcase, and fasten it with a pneumatic gun;
3. Take the tension plate (22), the tension plate bushing (13), and one M6×105 bolt





(14), apply 3 to 4 thread glues to the bolts, and first fit the tension plate bushing to the tension plate In the corresponding hole, tighten the tension plate in the corresponding hole of the left body with screws;

4. Put the CG125D-2# gear display moving contact (19) into the corresponding slot of the speed change drum, then take the gear display wire harness (20), install it into the corresponding hole on the left body, and use 1 M6×20 The screws (21) are fastened ;

5. Take 1 M6×12 bolt (17), press the gear display wire harness under the CB125 foot-2# wire retaining plate (18), and fasten it to the corresponding position of the left body.

**Tightening torque: 11 to 13 N • m.**

**Assembly of the oil filter**

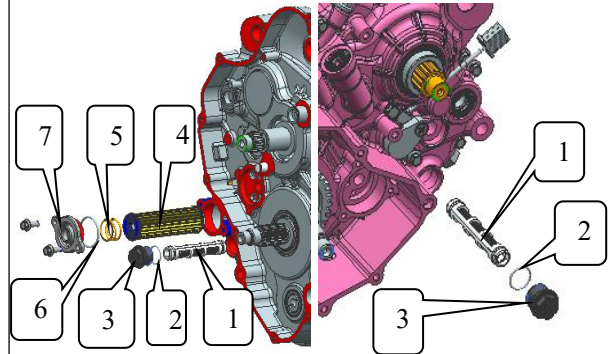
**1. Assembly of the left body oil filter**

Take 1 oil filter assembly (1), apply a small amount of oil to its 0-ring, and install it into the corresponding oil filter hole. Install the oil filter cover 0-ring (2) on the oil filter cover, apply an appropriate amount of grease to the inner hole of the oil filter cover (3), and fasten it on the box body;

**Tightening torque: 11 to 13 N • m.**

**2. Assembly of the right body oil filter**

a. Take 1 oil filter assembly (1), apply a small amount of oil on its 0-ring, install it into the corresponding oil filter hole, and install the oil filter cover 0-ring (2) to the oil Put on the filter cover, pour an appropriate amount of



This end is the closed end of the oil fine filter



This end is the open end of the oil fine filter, which should face the left casing during assembly.

oil into the inner hole of the oil filter cover (3), and fasten it on the box body;

**Tightening torque: 11 to 13 N • m.**

b. Take the NC250 oil filter part (4) and install it into the corresponding hole in the right case body

c. Put the NC250 reverse fine filter spring (5) on the NC250 oil filter part, put the fine filter cover O-ring (6) into the fine filter cover (7) sealing ring groove, take 2 GB16674 Set the small plate bolt M6 ×16 into the corresponding hole of the fine filter cover and fasten it in the corresponding position of the right body

**Tightening torque: 7 to 9 N • m.**

**Notice:**

**When installing the fine oil filter, the open end should face the left casing.**



(1) Camshaft assembly

(2) NC450 camshaft pressure plate

(3) Screw M6×12

(4) NC450 intake rocker arm

combination

(5) NC450 exhaust rocker arm

combination

(6) NC250 rocker shaft positioning

bolt

(7) O-ring

(8) NC450 valve rocker arm shaft

(9) Flat washer

(10) Bolt M6×18

(11) NC450 timing chain combination

(12) NC450 timing driven sprocket

(13) Bolt M6×10

(14) NC450 pressure reducing valve  
return torsion spring

(15) NC450 camshaft pressure reducing  
valve block combination

(16) Flat washer

(17) Bolt M6×16

