GPX 300 FSE
Engine manual

ZS182MN (NC300S)

send
move
machine
dimension
build
hand
book

Chongqing Zongshen Engine Manufacturing Co., Ltd.

Prepare: Proofread: Review: Approve:

■ Main performance parameters of engine

project				Specification
engine	model			ZS182MN
	Type			Single-cylinder, water-cooled, four-stroke, four-valve, overhead double cam, balance shaft structure
	Bore size × stroke			φ82×53.6mm
	Cylinder working volume			283.1ml
	compression ratio			11.6:1
	Maximum power/corresponding speed			23(1±5%)kW/9000(1±5%)r/min
	Maximum torque / corresponding speed			25(1±5%)Nm/7000(1±5%) r/min
	valve phase	intake	turn on	14° before top dead center
			closure	41° after BDC
		exhaust	turn on	46° before BDC
			closure	9° after TDC
	Lubrication method			pressure + splash
	Starting method			Electric/foot start
	idle speed			1600±100r/min
	lubricating oil	Specification		SJ-10W/40
		capacity	first raise	1700ml
			maintenance refill	1500ml
	Net weight (without oil)			36.0Kg
Transmission system	clutch			manualwetmulti-piece
	transmission			Constant mesh two-stage transmission six-speed transmission
	Gear shift			Left foot manipulation reciprocating
	Primary reduction ratio			2.91
	gear ratio	1st gear		2.58
		2nd gear		1.8
		gear 3		1.33
		4th gear		1.1
		5th gear		0.96
		6th gear		0.88
Ignition system	ignition method			Inductive energy storage
	spark plug			TORCH/R_CR8EI

	spark plug gap	0.7 ±0.1 mm

■ Cylinder head parts

1. Matters needing attention

◆ The camshaft journal is lubricated by the oil passage on the cylinder head bracket, and no foreign matter can enter the oil passage, otherwise it will easily lead to engine damage;

◆ During assembly, the camshaft hole of the cylinder head, the camshaft hole of the cylinder head bracket, and the camshaft journal must be coated with an appropriate amount of lubricating oil;

◆ Cylinder head bracket and cylinder head must be used in pairs.

2. Main parameters and maintenance standards of cylinder head components

serial number	project		standard value	maintenance limit	Remark
1	valve spring free length		41.7	40.9	
2	valve clearance	Intake valve	0.10-0.15	< 0.05 or > 0.25	
		exhaust valve	0.15-0.20	< 0.10 or > 0.30	
3	Camshaft base circle runout		0.01	0.03	
4	valve guide bore		5.005-5.015	5.035	
5	valve stem diameter	Intake valve	4.972-4.987	4.96	
		exhaust valve	4.960-4.975	4.94	

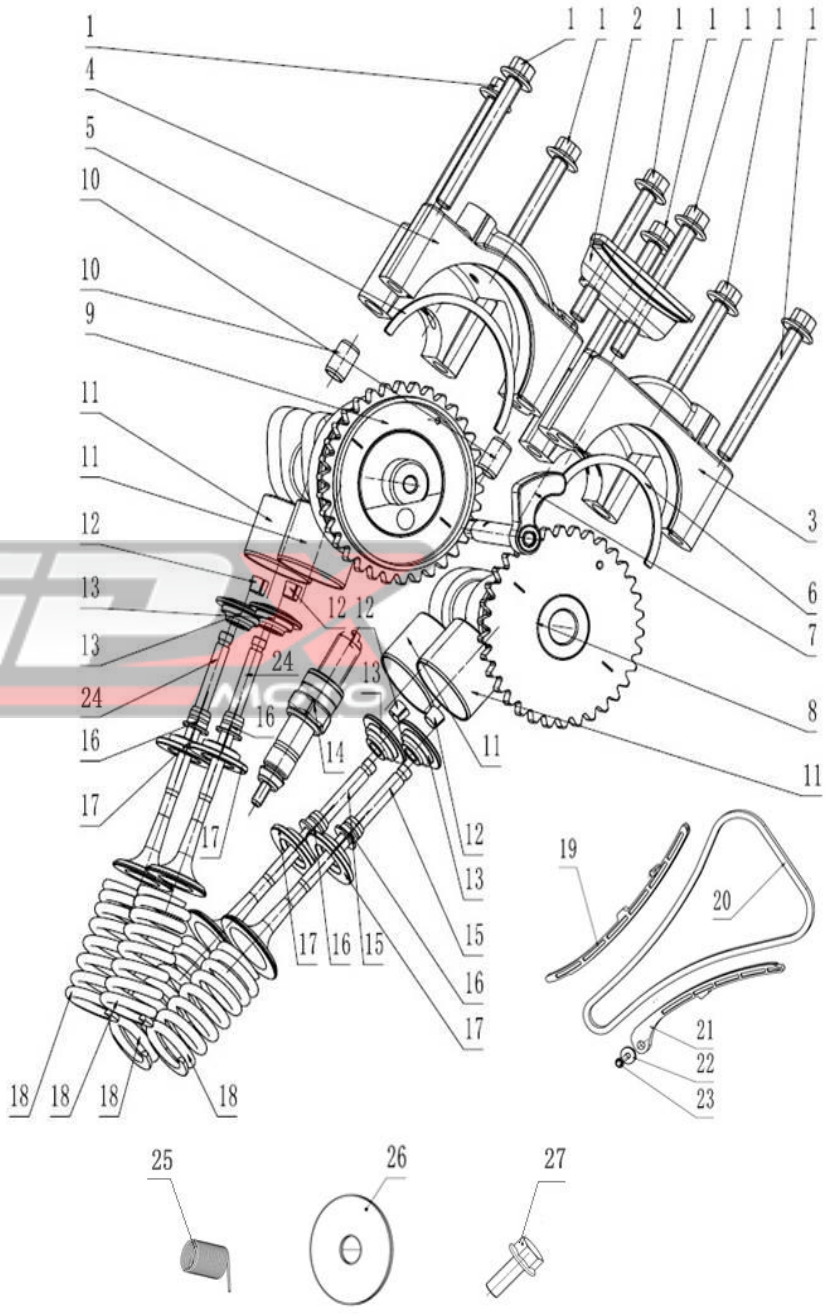
3. Failure phenomenon and cause analysis

serial number	fault phenomenon	Cause Analysis	Remark
1	Low cylinder pressure	valve clearance too small	
		Poor valve seal	
		Incorrect gas timing	
		Broken valve spring	
		Air leakage at the installation part of spark plug and cylinder head	
		The cylinder head gasket combination is not tightly sealed	
		Cracks or blisters in the cylinder head	
2	Exhaust with black smoke	valve guide wear	
		Oil shield leaking or damaged	
		Cylinder head gasket combination leakage	
3	Excessive or abnormal	Excessive valve clearance	

	noise	Stuck valve or broken valve spring	
		Incorrect gas timing	
		Camshaft wear	

◆、Cylinder head assembly drawing

No	Part name
1	NC250S cylinder head bracket fixing bolt
2	NC250S chain pressure plate
3	NC250S air intake bracket combination
4	NC250S exhaust bracket combination
5	NC250S exhaust cam bearing C-ring
6	NC250S intake cam bearing C-ring
7	NC250S exhaust camshaft pressure reducing valve block combination
8	NC250S intake camshaft parts
9	NC250S exhaust camshaft components
10	NC250S cylinder head bracket positioning pin
11	NC250S valve tappet (DLC coating)
12	HIPER50 valve lock clip
13	NC250S valve spring upper seat
14	NC250S spark plug (TORCH/R_CR8EI)
15	NC250S intake valve
16	HIPER50 oil shield combination
17	NC250S valve spring lower seat
18	NC250S valve spring (2#)
19	NC250S chain guide plate
20	NC250 Double Cam Timing Chain Combination
21	NC250S tension plate
22	NC250 Tension Plate Bushing
23	GB16674 Small plate bolt M5×25 (blue white zinc)
	GB16674 Small Plate Bolt M5×



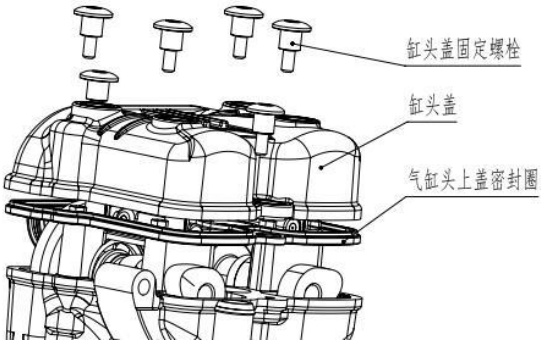
◆、Removal of cylinder head cover

1、 Use the M5 Allen wrench to remove the 6 pieces on the cylinder head cover

Cylinder head cover fixing bolts, as shown on the right;

2. Remove the cylinder head cover;

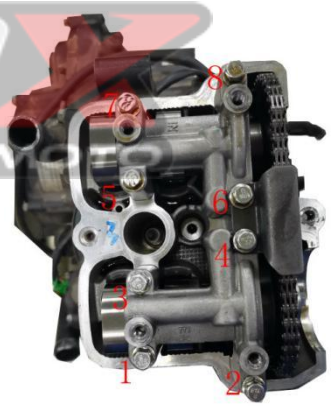
3. Remove the sealing ring of the upper cover of the cylinder head.



◆、Removal of cylinder head

1. Use a 10# wrench to remove the M8 nut on the tensioner, use an 8# wrench to remove and remove the two M6×20 bolts that fasten the tensioner, and then remove the tensioner combination and the tensioner gasket ;

2、 Remove the GB/T16674 small plate M6×25 bolts connecting the cylinder head and cylinder block;

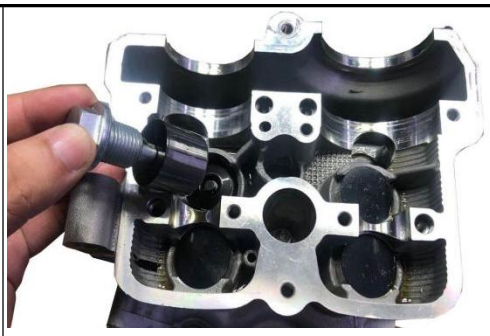


3、 Remove 8 M6×50 NC250S cylinder head brackets
bolts, and then remove the intake and exhaust camshaft brackets in turn,
Intake and exhaust camshaft C-rings, intake and exhaust camshafts;

4、 Remove 4 NC250 cylinder head and cylinder block bolts M10×1.25, and then remove 4 cylinder head and cylinder block bolt washers 10.5×2×20.

◆, dismantling of cylinder head

1. Take out the four valve tappets with magnetic iron;



2. Use the valve disassembly tool to press down the valve spring and remove the valve lock clip;

3. Remove the valve spring upper seat, valve spring and valve .

Notice:

1. When disassembling the valve tappet, pay attention to record the specification of the valve holding, record the valve tappet specification corresponding to the corresponding valve, and assemble it according to the corresponding valve tappet when assembling;
2. 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;
3. All the removed parts should be marked to ensure that the original assembly position is reached during assembly.

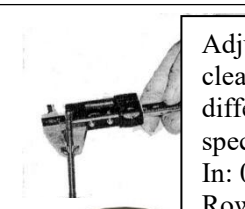
◆, valve and valve spring inspection

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: Φ4.96mm

Exhaust: Φ4.94mm

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



Adjust the valve clearance according to different valve tappet specifications (
In: 0.1-0.15mm;
Row: 0.15-0.2mm)

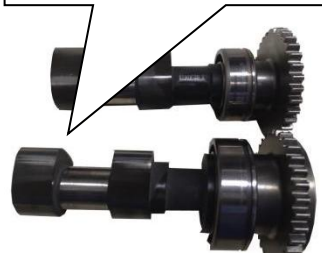
3. Check the valve spring for abnormal wear, and measure the spring
length:
Free length: 41.7mm
Service limit: 40.9 mm

The surface of the convex hull of the camshaft is phosphating. If the phosphating layer is worn and there is no obvious unevenness when touched by hand, it is regarded as normal wear and tear.

◆. Inspection of camshaft components

1、 Check whether the camshaft tip, base circle and journal are worn, whether the camshaft bearing rotates flexibly, and whether the sprocket is pitted. part;

2、 Check whether the pressure reducing valve throwing block combination has cracks, the spring does not rebound, and whether the pressure reducing valve centrifugal throwing block and the mandrel are loose. If so, replace the pressure reducing valve throwing block combination.



◆、 Cylinder head inspection

1. Check whether the sealing performance of the cylinder head is good. If the sealing performance of the cylinder head is poor, a new cylinder head or valve should be replaced;
2. Check the spark plug hole and valve seat for cracks;
3. Check whether the cylinder head is deformed, and check the flatness of the cylinder head with a knife edge ruler and a feeler gauge.

Cylinder head end face flatness inspection

◆、 Inspection and grinding of valve seat

Completely remove the carbon deposits in the combustion chamber, apply a thin layer of red oil evenly on the valve seat, put the valve on the valve seat, tap the valve lightly and do not rotate, and then pull out the valve, if the working surface of the valve contacts If the marks are intermittent, the valve seat should be ground and repaired.

First, remove the carbon deposits on the intake and exhaust valve seats, then coat the

valve seat with abrasive, and then use a rubber-headed grinding tool to suck up the valve and grind the valve seat.	

◆, valve guide inspection

Use a dial indicator to measure the inner diameter of each valve guide and record it. Maintenance limit: Φ5.035 mm **Notice:** Before measuring the inner diameter of the valve guide, the carbon deposits in the guide should be completely removed. If the valve guide is severely worn, only the cylinder head can be changed, and the guide cannot be changed alone	

◆、 Assembly of cylinder head

1. Install the lower seat of the valve spring and the oil baffle to the valve guide; 2. After lubricating the intake and exhaust valve rods, install the valve guide, and install the valve spring, valve spring upper seat and valve lock clip; 3. Then use the valve disassembly tool to press down the valve spring, and then install the valve lock clip into the valve spring seat; 4. Check whether the valve lock clip is in place; 5. Check the air tightness of the assembled cylinder head assembly. If there is no leakage of the cylinder head assembly, proceed to the next step.	

◆, valve clearance adjustment

1. Install the disassembled valve tappets into the corresponding valve tappet holes in the order in which they were disassembled; 2. Install the intake and exhaust camshafts into the holes of the intake and exhaust camshaft	

brackets, and install the bracket positioning pins, intake and exhaust camshaft C-rings, and intake and exhaust camshaft brackets in sequence; Tighten the two bolts of the positioning pin (5N.m), then pre-tighten the other two diagonally, and finally tighten to 10N.m; after the torque tightening is completed, turn the camshaft to check whether the camshaft rotates flexibly. Carry out the next valve clearance inspection. If it cannot rotate flexibly, it needs to be disassembled and assembled again (the camshaft must be able to rotate after the torque is tightened. If it cannot rotate after repeated disassembly and assembly, the cylinder head needs to be replaced); 3. Check the valve clearance with a feeler gauge, as shown in the figure: Valve Clearance Requirements: Intake: 0.1-0.15mm Exhaust: 0.15-0.20mm Repair limit: 0.05mm> air intake or air intake > 0.25mm; 0.10mm > exhaust or exhaust > 0.30mm. If the valve clearance exceeds the maintenance limit, it is necessary to adjust the valve clearance by replacing the valve tappet specification.	

◆、 Cylinder head installation

1. Replace the new cylinder head gasket combination , install the positioning pin, and assemble the cylinder head with the adjusted valve clearance. 2. Assemble the cylinder head and cylinder block bolts and gaskets to the AB bolt holes, and then fasten the bolts. Tightening torque: 55 ~ 60N.m; 3. Install the two cylinder head and cylinder body connecting screws GB/T16674 small plate	

bolts M6×25 into the connecting holes of the cylinder head and cylinder body and fasten them. Tightening torque: 11～13N.m;

4. Install the intake and exhaust camshafts on the cylinder head, and then install the timing chain on the timing driven sprockets on the intake and exhaust camshafts, and then check whether the engine is in the timing position (timing). See the picture on the right for the position), if it is not in the timing position, you need to re-adjust the timing position of the engine, and then assemble the large sight hole cover and the bolts of the rocker shaft positioning plate to the left front cover;

NC300S engine timing adjustment method:

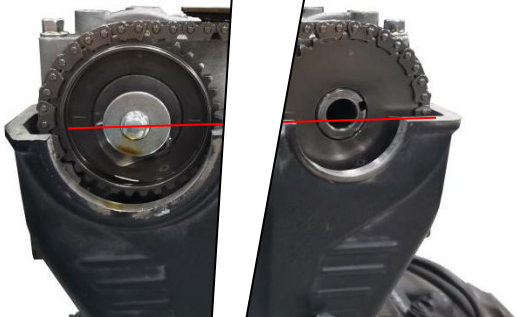
(1) Use a 17mm sleeve to rotate the magneto lock nut counterclockwise, and observe whether the timing line "T" on the magneto rotor and the timing mark on the left front cover are aligned through the observation hole on the left front cover. ;

(2) After the above timing marks are aligned, pay attention to observe whether the timing marks on the intake and exhaust timing driven sprockets are parallel to the upper end face of the cylinder head;

The engine is in the correct timing position only if (1) (2) are satisfied at the same time.

5. Snap the C-rings of the intake and exhaust camshafts into the grooves of the camshaft bearings, install four locating pins, assemble the intake and exhaust camshaft brackets on the intake and exhaust camshafts, and place the two The bolts pass through the chain pressure plate hole and are assembled on the chain side, and

The four timing lines of the intake and exhaust sprockets are parallel to the end face of the cylinder head at the same time



the remaining 6 bracket positioning bolts are installed in the corresponding bracket bolt holes in sequence;

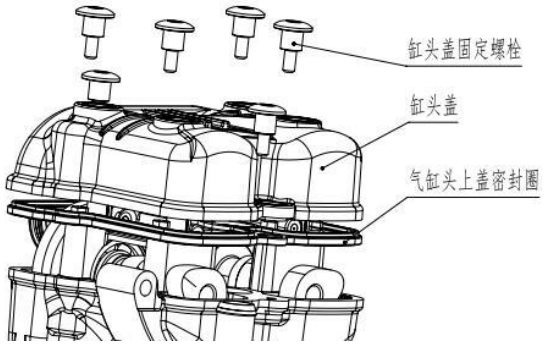
Cylinder head bracket bolt tightening (take the intake bracket as an example): first pre-tighten the two bolts of the bracket positioning pins (pre-tightening torque 5N.m), then pre-tighten the other two, and finally fasten the four bracket bolts to 10N.m (the exhaust bracket bolts are tightened with the intake air). After the bolts are tightened, turn the intake and exhaust camshafts by hand, and then proceed to the next step if they rotate flexibly. If the step 5 cannot be repeated flexibly, if the cylinder still cannot be rotated after repeated repetitions, the cylinder head needs to be replaced;

6. Install the tensioner into the corresponding hole on the cylinder body, and fasten it with 2 GB/T16674 small plate bolts M6 × 20, and finally assemble the tensioner spring, sealing ring and bolts in place.

◆、Installation of cylinder head cover

1. Assemble the cylinder head sealing ring to the cylinder head cover;

2. Assemble the cylinder head cover on the cylinder head, then fix the cylinder head cover with the cylinder head cover fixing bolts (there are Derbi125 head cover bolt buffer washers between the bolts and the cylinder head cover), and the tightening torque of the cylinder head cover fixing bolts is 10N. m.



■ Cylinder block and piston

1. Matters needing attention

◆The lubricating oil of the cylinder head goes to the cylinder head through the oil hole next to the AB bolt on the left body of the engine. Before installing the cylinder block, make sure that the oil hole next to the AB bolt on the left body is unobstructed, otherwise the engine will be

damaged easily;

◆ Do not allow dust or dust to penetrate into the crankcase.

2. Main parameters and maintenance standards of cylinder block and piston

serial number	project			standard value	maintenance limit	Remark
1	gas cylinder body	Bore		82-82.01	82.1	
		Cylindricity		0.005	0.01	
		Cylinder surface flatness		0.03	0.05	
		Cylinder clearance		0.035-0.045	0.07	
2	live stuffed	Skirt diameter, H=7		81.96-81.97	81.94	
		Pin hole diameter		16.001-16.006	16.015	
		Piston pin and piston pin hole clearance		0.001-0.012	0.025	
3	live stuffed ring	closed gap	one ring	0.15-0.30	0.45	
			Erhuan	0.30-0.45	0.6	
			oil ring	0.20-0.70	1.4	
		backlash	one ring	0.03-0.07	0.08	
			Erhuan	0.02-0.06	0.08	
4	Piston pin outer diameter			15.992-16	15.988	

3. Failure phenomenon and cause analysis

serial number	fault phenomenon	Cause Analysis	Remark
1	low cylinder pressure	Abnormal wear of cylinder block or piston rings	
2	Exhaust with black smoke	Abnormal wear of cylinder, piston or piston rings	
		Incorrect installation of piston rings	
		Scratches or scratches on the piston or cylinder walls	
3	engine overheating	Excessive carbon deposits on the piston	
		Insufficient or poor coolant flow	
4	knocking or abnormal noise	Piston or cylinder is worn	
		Excessive carbon deposits on the piston	

◆、Removal of cylinder block

1. Remove the cylinder head gasket combination;
2. Remove the positioning pin;
3. Remove the chain guide plate;
4. Remove the cylinder block.

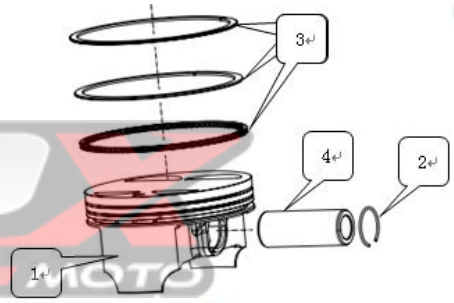
◆、Cylinder block inspection

1. Check whether the cylinder block is worn or damaged;
2. Measure the inner diameter of the cylinder and take three positions, namely the top, middle and bottom of the piston stroke, and measure two directions at right angles to each other.
3. Maintenance limit: 82.1mm.

◆、Removal of piston and piston ring

1. Remove the piston pin retaining ring with needle nose pliers;
2. Remove the piston pin;
3. Remove the piston;
4. Remove the piston ring.

Note: Do not drop the retaining ring into the crankcase when removing the piston pin retaining ring



◆、Inspection of piston and piston ring

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

   Maintenance limit: 81.94 mm;

2. Calculate the cylinder clearance

   Maintenance limit: 0.07mm;

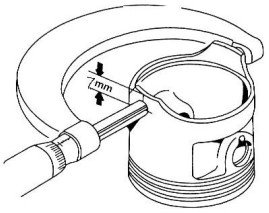
3. Measure the inner diameter of the piston pin hole

   Maintenance limit: ϕ16.015 mm

4. Check whether the piston and piston ring groove are worn, and measure the side clearance between the piston ring and the piston ring groove

   Maintenance limit: one ring: 0.08mm

   Second ring: 0.08 mm



5. Put the piston ring into the cylinder, and then measure the closing gap

Maintenance limit: one ring: 0.45mm

Second ring: 0.60mm

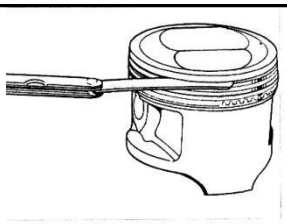
Oil ring: 1.40 mm

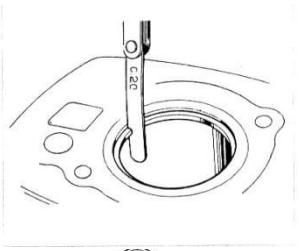
6. Measure the outer diameter of the piston pin

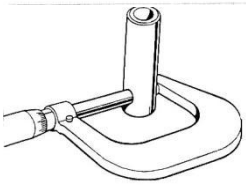
Service limit: 15.988 mm

7. Calculate the clearance between the piston pin hole and the piston pin

Service limit: 0.025 mm







◆、Installation of piston ring

1. Clean the piston ring groove;

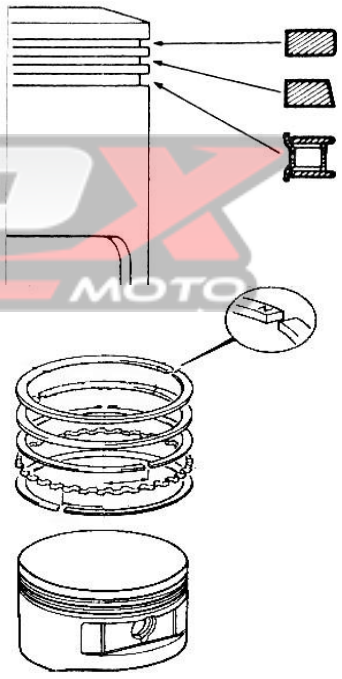
2. Install the piston ring;

Notice:

(1) During installation, the piston and piston ring should be prevented from being damaged;

(2) When installing the piston ring, the first ring and the second ring should face the top of the piston, and the openings should be staggered by 180°, and the opening direction should be towards the direction of the piston skirt; the openings of the two oil rings must be staggered by 120°~180° and cannot be aligned. Piston pin holes and piston rings 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.

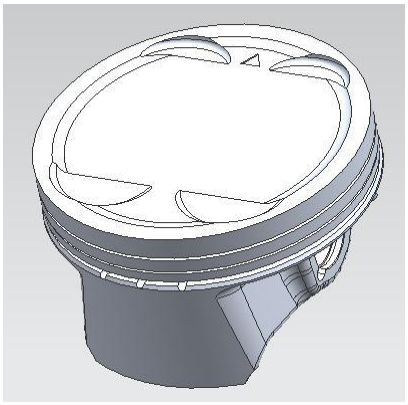


◆、Piston installation

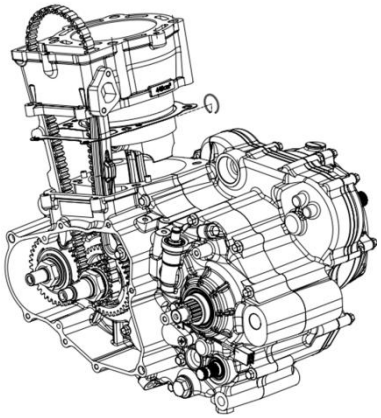
1. Install the piston pin retaining ring into the piston retaining ring groove;
2. Install the piston and piston pin on the small end of the connecting rod;

Notice:
(1) When assembling the piston, the side marked with the " △ " symbol on the top of the piston faces the exhaust side of the engine;
（2） If the piston pin retaining ring is seriously deformed, it must be replaced with a new retaining ring .

3. Install the piston pin retaining ring on the other side.



◆、Installation of cylinder block

1. Install cylinder block positioning pins and new cylinder block gaskets; 2. Apply lubricating oil evenly on the surface of cylinder block, piston and piston ring; 3. Assemble the cylinder block in place; 4. Fit the chain guide plate in place. Note: When installing the cylinder block, avoid damaging the piston rings	

■ Right cover, clutch, starting mechanism, shifting mechanism

1. Matters needing attention

◆After removing the right cover, the disassembly, installation and maintenance of the clutch, oil pump and shifting mechanism can be carried out without removing the engine;

◆In the case of clutch operation, if a malfunction occurs, the free stroke of the clutch handle can usually be adjusted to obtain a better correction.

2. Main parameters and maintenance standards

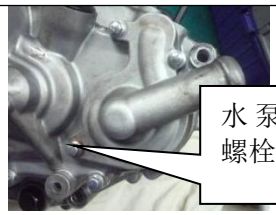
serial number	project		standard value	maintenance limit	Remark
1	Leave combine device	spring free length	32.3-33.3	32.3	
		Active sheet free thickness	2.95-3.05	2.85	
		Flatness of follower plate	0.1	0.14	
		Cover and friction plate clearance	0.1-0.3	0.6	
2	Oil Pump	Inner and outer rotor radial clearance	0.06-0.15	/	
		Gap between rotor and cover plate	0.04-0.1	/	

3. Failure phenomenon and cause analysis

serial number	fault phenomenon	Cause Analysis	Remark
1	Clutch slips when accelerating	Not enough free travel	
		Clutch release spring force attenuation	
		clutch disc wear	
2	Too much pressure on the handle	Clutch cable stuck, damaged or dirty	
		Lifting mechanism damaged	
3	After the clutch is released, the vehicle moves slowly	Free travel is too large	
		Clutch friction plate wear	
4	Difficulty operating the clutch	Clutch cover chute has burrs	
5	low oil pressure	Oil pump failure	
		Cracked oil pump drive gear	
6	Shift pedal does not rebound	Broken return spring	
		The transmission shaft interferes with the crankcase cover	
7	Difficulty shifting gears	Bent or worn stop plate	
		Incorrect clutch adjustment	
8	shift gear shift	The shift positioning plate spring is broken or not elastic enough	
9	Cylinder temperature too high	Water pump impeller failure	
10	Difficulty with electric start	Starter motor failure	

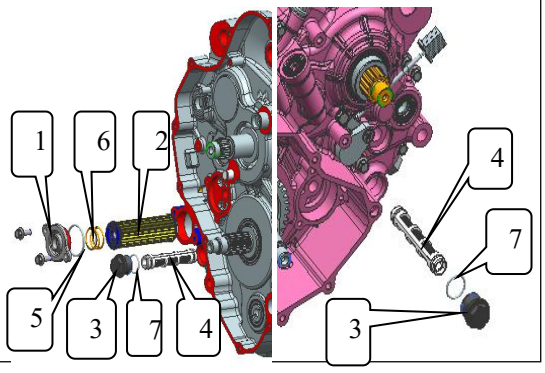
◆、Removal of water pump impeller

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 and impeller when no water flows out from the drain bolt.



◆、Removal of right crankcase cover

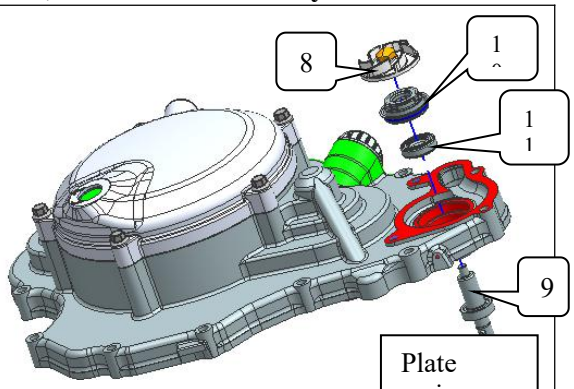
1. Drain the engine oil first (remove the two fastening bolts M6×16 of the oil fine filter cover (1) on the right side, take off the oil fine filter cover (1), and take out the NC250 reverse fine filter spring (6), take out the fine filter part (2), remove the oil filter cover (3) of the left and right 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.	

◆, water pump shaft, water seal components, oil seal disassembly

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;

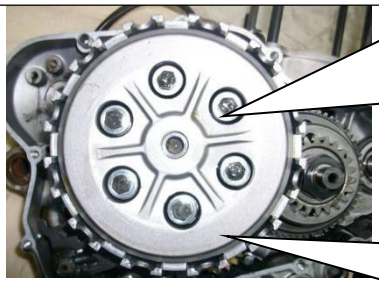
2. Remove the clutch pressure plate, clutch lever and friction plate;

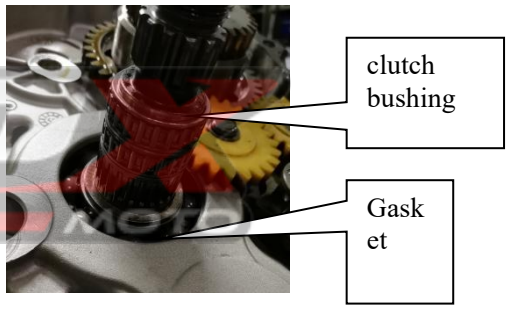
3、 Remove the clutch lock nut and washer;

4、 Remove the clutch center sleeve, outer cover, clutch sleeve and gasket;

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

Note: When loosening the clutch pressure plate bolt, it should be loosened in a cross manner twice or three times.



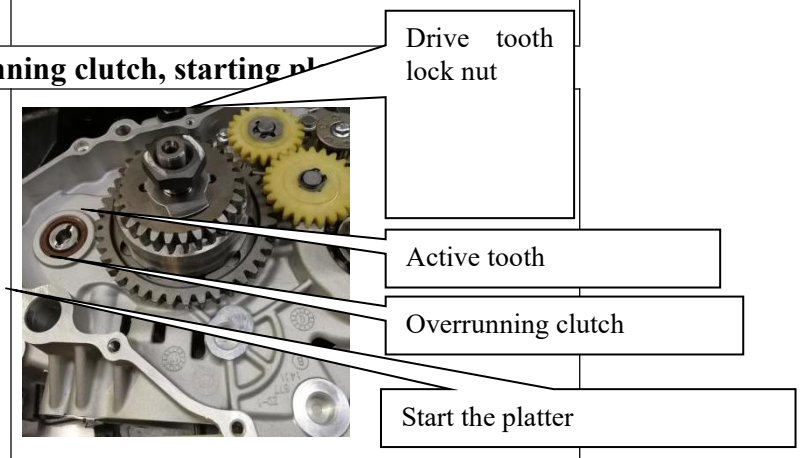


◆, Dismantling of driving gear, overrunning clutch, starting pl

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

2. Remove the overrunning clutch and start the big gear.

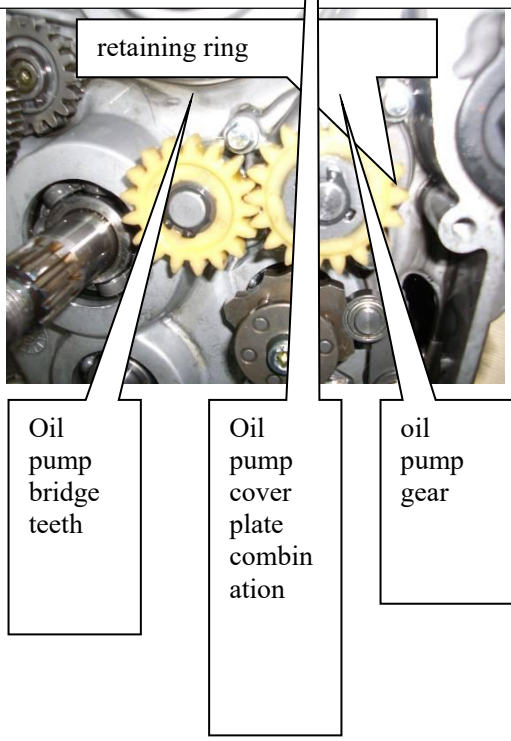
Note: When removing the starter gear assembly, remove the starter gear washer together with the starter gear, and keep the washer in a safe place



◆、Removal of the right oil pump

1. Remove the retaining ring of the oil pump bridge gear and 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 three GB/T16674 small plate bolts M5×18 on the right oil pump cover plate, and remove the oil pump cover plate combination and the oil pump inner and outer rotor combination.

Note: 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 stored to avoid loss.



◆、Double gear disassembly

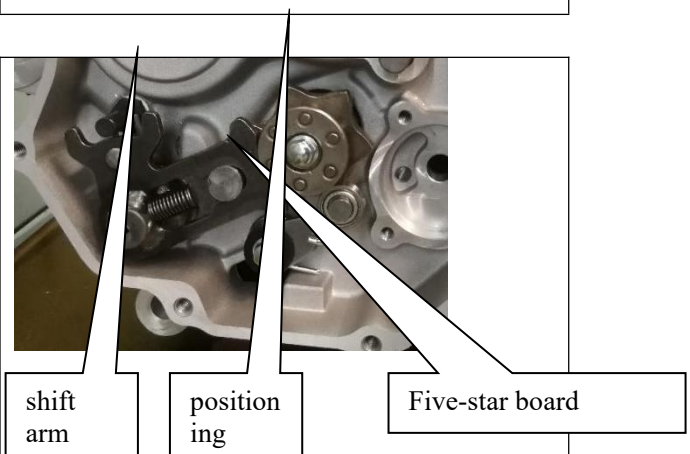
First remove the GB/T894.4 retaining ring 15 on the double gear shaft retaining ring groove, then remove the double gear washer, and finally remove the double gear

◆, start the motor disassembly

Remove the starter motor fastening screw and remove the starter motor

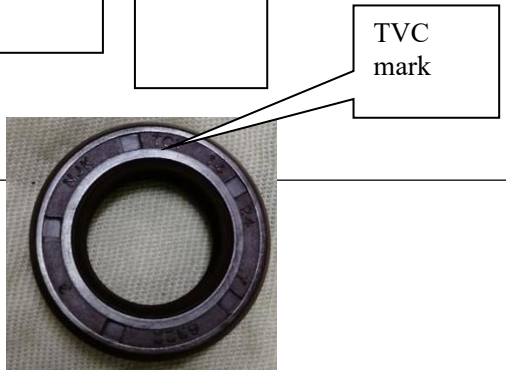
◆、Removal of shifting mechanism

1. Remove the five-star board fastening screws GB/T70.1 M6×35, and remove the five-star board
2. Remove the shift arm parts;
3. Remove the fixing screws of the positioning plate combination, and remove the positioning plate washer and the positioning plate combination.



◆、Check the 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:
1. Confirm whether the state of the oil seal is correct. The end face of the NC250 crankshaft oil seal should be marked with "TCV";
2. The marked side should face outwards during assembly.

2. Check whether the oil seal of the starting shaft is damaged. If the oil seal is found to be broken, it needs to be replaced with a new oil seal.

3. 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;

4. 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 there is, it is necessary to replace the new water seal components, oil seals and new water pump shafts ;

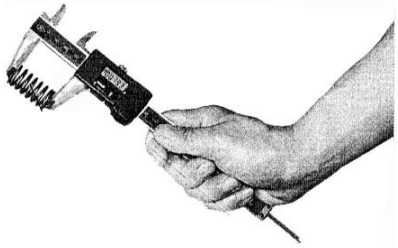
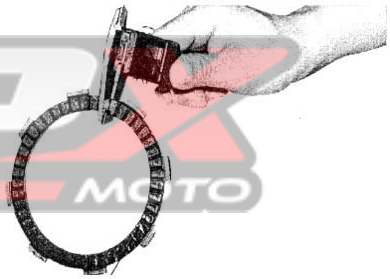
When replacing the water seal assembly, oil seal and water pump shaft, pay attention to:
(1) Apply an appropriate amount of oil to the shaft hole of the NC250 water pump. Use special tooling to press-fit the NC250 water pump shaft oil seal in place, with the end face mark of the oil seal facing outward;
(2) Press-fit the NC250 water pump shaft water seal in place with special tooling, 0.5mm lower than the end face, and the water seal end face mark faces inward when assembling the water seal;
(3) Apply an appropriate amount of grease on the main lip of the water seal (grease

model: MYSTIK JT-6); (4) Press the new water pump shaft in place with special tooling; (5) Install the GB/T893.1 retaining ring 22 to the shaft hole of the water pump In the retaining ring groove, the assembled water pump shaft should rotate flexibly.	

◆、Check the start axis

Check whether the gear of the starting shaft is worn or not. If the engine only has an electric start, this step is not necessary.	

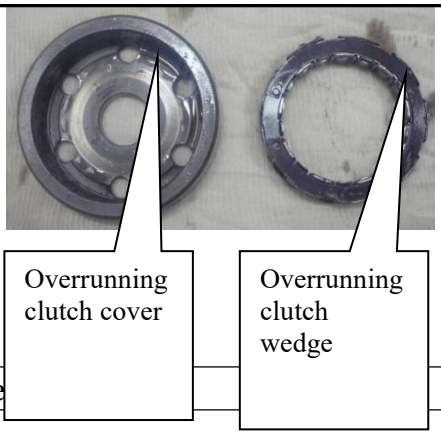
◆, clutch inspection

1. Measure the free length of the clutch spring Maintenance limit: 32.3mm 2. 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 3. Check whether the surface of the clutch disc is twisted Service limit: 0.14 mm 4. Check the gap between the clutch cover and the friction plate Service limit: 0.6 mm 5. Check whether the tooth slot on the outer cover drum is caused by the friction of the clutch disc. Scratches and scratches are produced, and the cover needs to be replaced if it is serious.	  

◆, inspection of active teeth

Check whether the driving teeth are worn or damaged. If the wear and damage are serious, the driving teeth need to be replaced with new ones.	

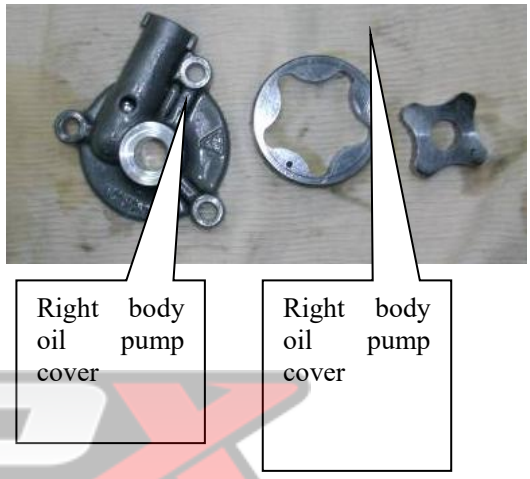
◆. Inspection of overrunning clutch

Remove the retaining ring on the end face of the overrunning clutch and check whether the wedge of the overrunning clutch is worn or damaged	

◆, start the inspection of the big plate tee

Check the starter gear for wear or damage	

◆. Inspection of the oil pump of the right body

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.	

◆、Inspection of starting motor and double gear

Check whether the cogging of the starter motor is damaged. Check the double gear for wear and damage	

◆、Inspection of shifting mechanism

Check whether the rollers of the positioning plate are worn and whether the rollers rotate freely	

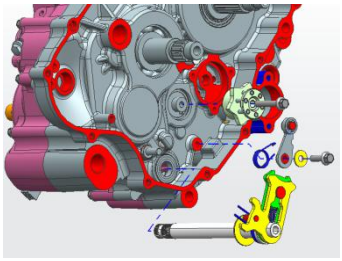
◆、Check the start axis

Install the start shaft into the corresponding start shaft hole of the right body, if only electric start is needed, this step is not required	

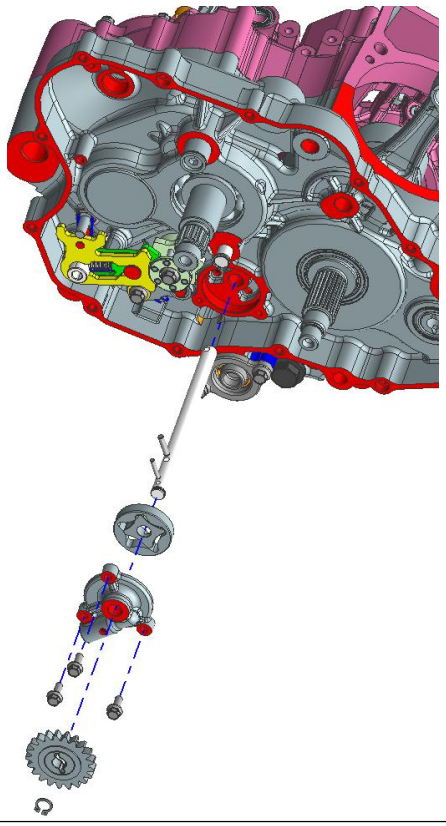
◆、Assembly of double gears

1. Install the double gear on the double gear shaft of the right body, 2. Install the double gear washer on the end face of the double gear 3. Install the GB/T894.1 retaining ring 15 on the retaining ring groove on the double gear shaft.	

◆、Assembly of shifting mechanism

1. Install the positioning plate assembly on the right body and fasten it; 2. Put the five-star plate on the speed change drum, pay attention to align the gap with the pin of the speed change drum, install the fastening screws and fasten them; 3. Install the shift arm. After the shift arm is assembled, first check whether the shift is correct, and then continue to install the machine.	

◆. Assembly of the right body oil pump

1. Install the oil pump pin into the pin hole on the oil pump shaft; 2. Install the rotor assembly into the hole of the right box body; use 3 GB/T16674 small plate screws M5×18 to fasten the oil pump cover plate combination to the oil pump rotor; 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. 3. Install the oil pump gear assembly on the oil pump shaft and install the GB/T894.1 retaining ring 10 into the retaining ring groove on the oil pump shaft; 4. Install the oil pump bridge gear washer on	

the oil pump bridge gear shaft, install the oil pump bridge gear on the oil pump bridge gear shaft, and then install the oil pump bridge gear washer on the oil pump bridge gear. , and finally install the GB/T894.1 retaining ring 10 on the retaining ring groove of the oil pump over-bridge gear shaft.	

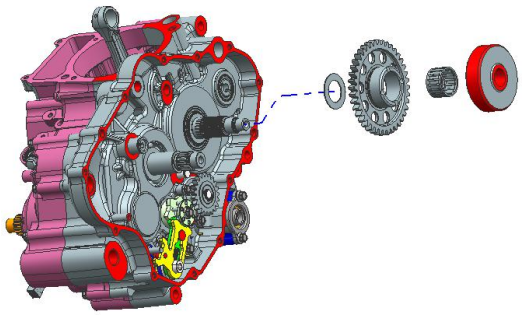
◆、Starting the assembly of large plate teeth and overrunning clutch

1. Install the large starting gear washer on the right crank,
2. Install the large starting gear and the overrunning clutch on the right crank.

Notice:

1、 Before installing the starting gear, apply a layer of grease evenly on the inner hole of the starting gear;

2、 When assembling the overrunning clutch, be careful not to reverse the wedge



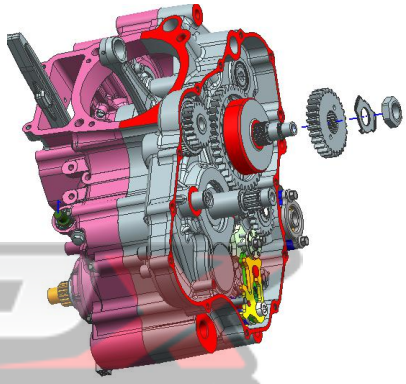
◆, the assembly of active teeth

1. Install the driving gear on the right crank;
2. Install the drive tooth lock nut washer on the drive tooth;
3. Apply 3 to 4 threads on the active tooth locking nut.

Fix glue, install it on the right crank and tighten.

Notice:

Tightening torque of driving gear lock nut: 150～160N m



◆, the assembly of the clutch

1. Install the clutch cover washer, clutch sleeve, clutch cover and clutch center sleeve washer on the main shaft;

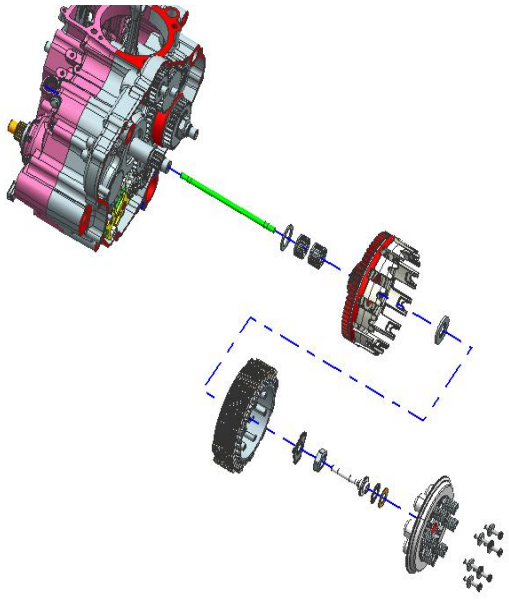
NOTE: Apply grease evenly to the inner ring of the clutch sleeve.

2. First install the clutch center sleeve and the clutch lock nut washer on the main shaft, apply 3 to 4 threads of thread tightening glue on the clutch lock nut to install it on the main shaft and fasten it;

Notice:

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

3. First install the clutch friction plate on the clutch center sleeve and clutch cover, then

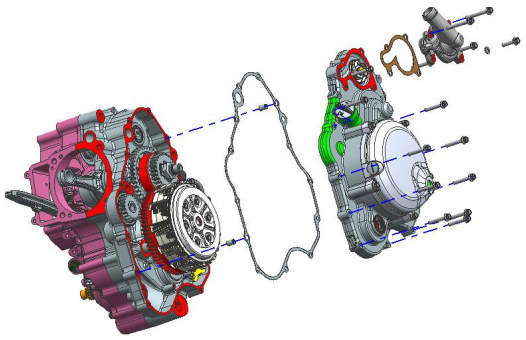


install the clutch push rod into the center hole of the main shaft, then install the clutch pull rod into the center hole of the main shaft, and then install the thrust bearing and pull rod washer. to the lever, 4. Install the clutch pressure plate, clutch pressure plate spring, and pressure plate screws, and use a torque wrench to tighten the pressure plate screws. Tightening torque: 8~10N • m.	

◆, start the motor assembly

After smearing oil evenly on the cogging end of the starter motor, assemble the starter motor in place, and fasten it with 2 GB/T16674 small plate bolts M6 × 25, the tightening torque is 11～13N m	

◆. Assembly of the right crankcase cover

1. Remove the old right crankcase gasket, install a new gasket, assemble the right crankcase cover in place and fasten it with 10 GB/T16674 small plate bolts M6×30, tightening torque: 11～13N m ; 2. Install the water pump impeller on the water pump shaft and fasten it. Fastening torque: 2～4N m; 3. After installing the water pump cover gasket, assemble the water pump cover in place and fasten it with 3 GB/T16674 small plate bolts M6×35 and 1 GB/T16674 small plate bolt M6×20.	

■ Left cover, balance gear, magneto

◆, matters needing attention

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

◆For the inspection of the magneto, please refer to the method in the chapter on the battery charging system.

◆、Removal of left crankcase cover

Remove the left crankcase cover fastening bolts and remove the left crankcase cover	

◆、Removal of magneto stator

1. Remove the 2 GB/T818 screws M5×10 (color zinc) ML35-HIPER fastening screws of the sensor; 2. Remove the 2 GB/T70.1 screws M5×30 fastening screws of the stator coil, and then remove the magneto stator assembly from the	

left crankcase cover.

◆、Removal of 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 the disassembly and assembly process. If the magneto rotor falls to the ground or is struck by foreign objects, the magneto rotor should be replaced with a new one.

Special tool for rotor removalSpecial tool for rotor removal

◆、Removal of balance main and driven teeth

1. Remove the timing chain, remove the chain tension plate, and then remove the balance driving gear locking nut and driving gear locking nut washer respectively;
2. Remove the crankshaft timing drive sprocket and balance drive gear;
3. Remove the balance driven gear lock nut and the CB125 clutch disc washer;
4. Remove the balance gear driven wheel, NC250 crankshaft sleeve and balance shaft flat key.

◆. Disassembly of the left body oil pump

1. Remove the 3 GB/T16674 small plate bolts M5×1 0 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.

◆、Check the 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

1. Check whether the magnetic tile of the magneto stator is cracked or damaged, and if so, replace it with a new magneto rotor. 2. Check whether the magneto rotor is worn or damaged, and if so, replace it with a new one.	

◆、Check the balance main and driven teeth

Check the balance main and driven gears for wear or damage	

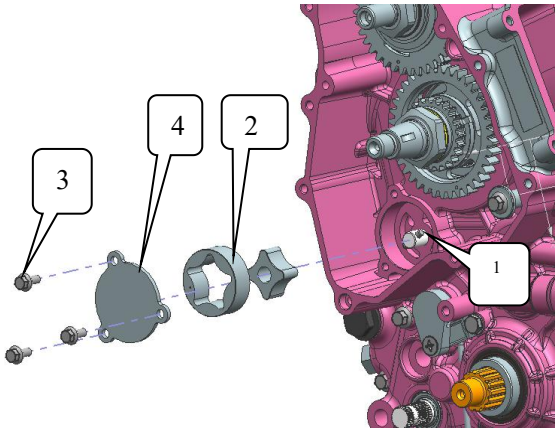
◆. Inspection of the left body oil pump

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 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: 7～9N m;
3. After tightening, check whether the oil pump shaft rotates flexibly.

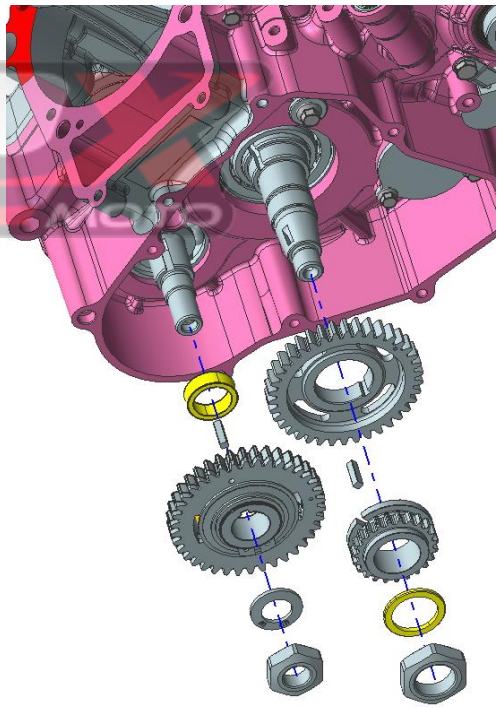


◆、Installation of balanced main and driven gears

1. First fit the NC250 crankshaft shaft onto the balance shaft, install the NC250 balance shaft flat key 4×4×13 into the keyway of the balance shaft, and finally install the balance shaft driven gear on the balance shaft;
2. Install the balance driving gear on the left crank first, and then install the NC250 crankshaft timing sprocket 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 and the CB125 clutch disc washer on the crankshaft timing driving sprocket and the balance shaft driven gear respectively, and apply on the balance shaft lock nut M24×1 clutch lock nut M16×1 After 3~4 threads of thread tightening glue, install it on the crankshaft and balance shaft and tighten it.



	Notice: Tightening torque of the lock nut of the balanced main and driven teeth: 80～90N・m.	

◆, the installation of magneto

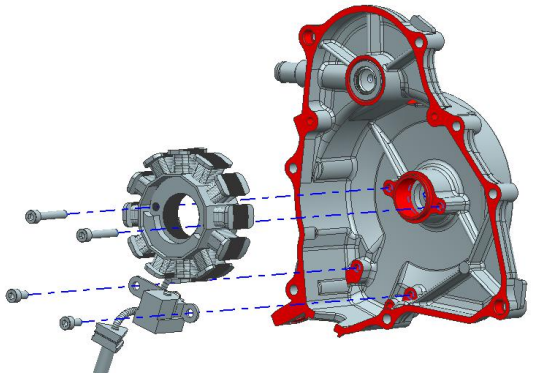
1. First install the magneto rotor on the left crank, then apply 3-4 threads of thread tightening glue on the magneto nut, then install it on the left crank and fasten it.

2. Fasten the magneto stator assembly to the left crankcase cover with 2 GB/T818 M5×10 and 2 GB/T70.1 M5×30 screws.

Notice:

1、 Tightening torque of magneto rotor lock nut: 85～90N m;

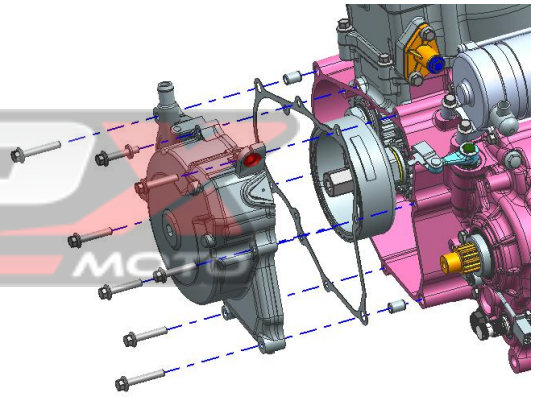
2、 Tightening torque of magneto stator : 7～9N • m.



◆、Installation of left crankcase cover

1. Remove the old gasket and install a new gasket;

2. Assemble the left crankcase cover in place and fasten it with 8 GB/T16674 small plate bolts M6×35. Tightening torque: 11～13 N •m.



■ Crankcase, transmission mechanism

1. Matters needing attention

◆This section introduces the installation and inspection of the transmission, crankshaft and balance mechanism. When doing the above work, the crankcase should be disassembled first, and other parts of the engine should be disassembled before the crankcase is disassembled. Work before crankcase removal:

Disassembly of the cylinder head

Disassembly of cylinder and piston

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

Disassembly of the magneto

2. Main parameters and maintenance standards

serial number	project		standard value	maintenance limit	Remark
1	shift fork	Inner diameter of countershaft fork	14.016-14.043	14.045	
		Spindle fork inner diameter	12.016-12.043	12.045	
		Fork jaw thickness	4.8-4.9	4.8	
2	shift fork shaft	Outer diameter of main shaft fork shaft	11.973-12	11.95	
		Outer diameter of countershaft fork shaft	13.973-14	13.95	
		Cylindricity	0.006	/	
3	crankshaft link	Inner diameter of connecting rod small end	16.015-16.025	16.04	
		Backlash at the big end of the connecting rod	0.15-0.4	0.6	
4	balance shaft	Shaft diameter	19.98-19.993	19.96	

3. Failure phenomenon and cause analysis

serial number	fault phenomenon	Cause Analysis	Remark
1	Difficulty shifting gears	Shift fork bending deformation	
		Bending deformation of shift fork shaft	
2	skip	Shift gear pawl is worn	
		Bent or worn shift fork	
		Shift fork shaft bent	
3	crankshaft noise	The connecting rod big end bearing is worn	
		connecting rod bending	
		Crankshaft bearing worn	
4	gear shift noise	Shift gear is worn	
		The spline shaft is worn	

◆、Removal of crankcase

1. Place the left crankcase of the engine upwards; 2. Remove 8 GB/T16674 small plate bolts M6×65 and 5 GB/T16674 small plate bolts M6×45 fastening screws, separate the left crankcase from the right crankcase, and remove 2 positioning pins.	

◆Removal of crankshaft, balance shaft, main and auxiliary shafts

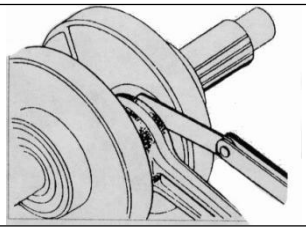
Take out the crankshaft assembly, balance shaft, shift fork shaft, shift fork, shift drum, and main and countershaft components from the box.

Notice:
Make sure that no parts are left behind when taking out the main and auxiliary shaft assemblies

◆、Crankshaft inspection

Put the crankshaft on the V-iron and measure the backlash at the big end of the connecting rod with a thickness gauge

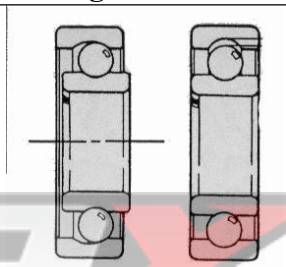
Maintenance limit: 0.5mm



◆, inspection of left and right crankcase 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;

2. Remove the crankshaft bearings of the left and right cases to check their radial runout and end runout. If noise or large radial runout and end runout are found, the crankshaft bearing should be replaced with a new one.



◆、Inspection of shift fork, shift fork shaft and shift drum

Check each shift fork for wear, bending or any other malfunction, measure the inner diameter of the shift fork

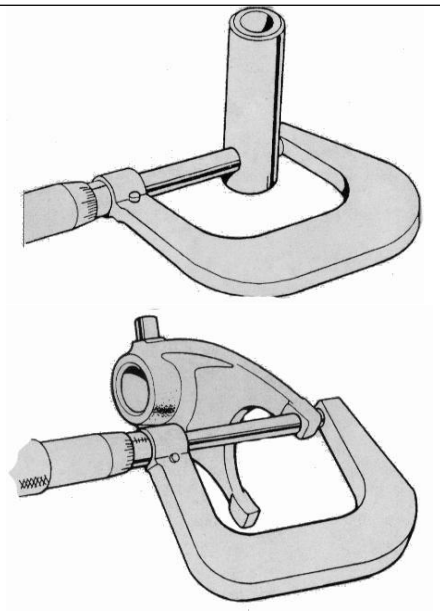
Main shaft fork maintenance limit: ϕ12.45 mm

Maintenance limit value of countershaft fork: ϕ14.45 mm

Check the main and counter shaft fork shafts for wear, damage or bending, measure the outer diameter

Maintenance limit value of main shaft fork shaft: ϕ11.95 mm

Maintenance limit value of countershaft fork shaft: ϕ13.95 mm

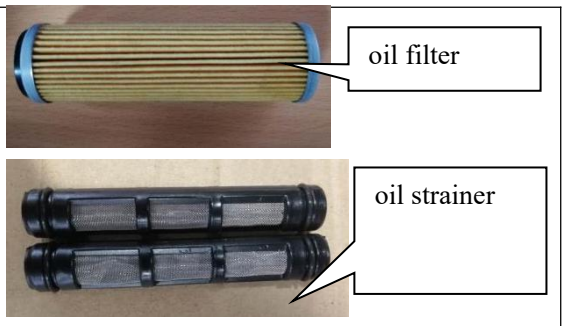


Measure the thickness of the prongs Service limit: 4.7 mm Inspect gear drum surfaces and grooves for wear or damage	

◆, inspection of main and auxiliary shafts

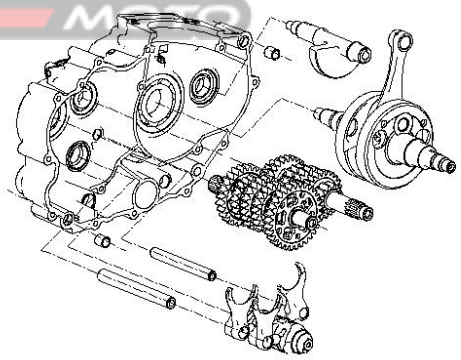
Check whether the gears of the main and countershaft assemblies have excessive or abnormal wear, and check whether the collars between the gears are deformed or fallen off.	

◆. 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 crankshaft and balance shaft into the corresponding holes of the left body,
2. Install the main and auxiliary shaft components into the corresponding holes of the left body, and then assemble the fork to the corresponding position.



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

3. Install the shift drum into the corresponding hole of the left body, then install the other end of the shift fork into the corresponding slot of the shift drum, and finally install the shift fork shaft into the corresponding shift fork.

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

◆、Assembly of box and oil filter

1. Apply a layer of sealant evenly on the closing surface of the right box, install the positioning pins into the corresponding holes of the left box,	

then put the right box on the left box, and put 5 GB/T16674 small Disk bolts M6×45 and 8 GB/T16674 small plate bolts M6×65 pass through the corresponding bolt holes of the left body and fasten them; tightening torque: 11～13 N m;

2. Install the oil fine filter parts into the corresponding holes of the box,

Then install the oil fine filter cover on the stud bolts, and then tighten with 2 GB/T6177.1 nuts M5, tightening torque: 7～9 N m;

3. Install the oil filter screen combination into the corresponding holes of the left and right boxes, and then fasten it with the oil filter screen

Notice:
When installing the oil filter, the open end should face the left case

cover. The tightening torque is 11-13 N • m.

oil filter closed end

oil filter open end