CBS300 发动机
维修手册
CBS300 Engine
Maintenance Manual

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主要性能技术参数
Main Technical Parameters

项目 Item			规格 Specification
发动机 Engine	型号 Model number		ZS174MN-3
	型式、汽缸数 Type and number of cylinders		单缸、水冷、四冲程、顶置单凸轮式 Single-cylinder, water-cooling, four-stroke, single overhead camshaft
	缸径×行程 Bore × stroke		φ74×65mm
	汽缸工作容积 Displacement		279.5ml
	压缩比 Compression ratio		10.2~10.7：1
	化油器形式 Carburetor type		真空膜片式 Vacuum membrane
	空气滤清器 Air filter		纸滤芯 Paper filter element
	润滑方式 Lubrication method		压力+飞溅 Pressure + splash
	起动方式 Starting method		电起动 Electric
	最大功率/相应转速 Max. power/corresponding speed		18.5(1±5%)kW/8500(1±5%)rpm
	最大扭矩/相应转速 Max. torque/corresponding speed		22(1±5%)N.m/7000(1±5%)rpm
	怠速 Idle speed		1400±100 r /min
传动系统 Transmission System	离合器 Clutch		手动湿式多片式 Manual wet multi-plate
	变速器 Transmission		常啮合两级传动六档变速 Constant mesh, two-stage transmission, 6-speed gearshift
	变速方式 Gearshift method		左脚操纵往复式 Reciprocating operation by left foot
	初级减速比 Primary reduction ratio		3.091
	齿轮速比 Gear ratio	第 1 档 1st gear	2.58
		第 2 档 2nd gear	1.86
		第 3 档 3rd gear	1.44
		第 4 档 4th gear	1.16
		第 5 档 5th gear	1
		第 6 档 6th gear	0.857

项目 Item			规格 Specification
点火系统 Ignition System	点火方式 Ignition method		电容储能式 Capacitor discharge
	火花塞 Spark plug		CR8EB
	火花塞间隙 Spark plug gap		0.7mm-0.8mm
油　料 Fuel	燃油牌号 Fuel grade		≥RQ90
	发动机机油 Engine oil	规格 Specification	SJ 10W/40
		容量 Capacity	1.3L

汽缸头和气门
Cylinder Head and Valve

维修须知
Maintenance Instructions

注意事项：
Notes:

- 凸轮轴是由缸头上油道孔供油润滑的，缸头上的油道绝对不能有异物进入，并保持畅通。
  The camshaft is lubricated with oil supplied through the cylinder head oil passage hole, which shall never have foreign matters and shall be kept unblocked.
- 在安装汽缸头之前，缸头定位销一定要装配好。
  Before installation of cylinder head, the cylinder head dowel pins shall be well assembled.
- 凸轮轴不能有划伤痕迹，装配时先打上机油。
  The camshaft shall have no scratch marks and be applied with oil before being assembled.

各部件维修参数
Maintenance parameters of components

项目 Item	标准值 mm Standard Value (mm)	维修极限值 mm Maintenance Limit Value (mm)
摇臂与缸头盖摇臂开档的轴向间隙 Axial clearance between rocker arm and cylinder head cover	0.05～0.3	0.5

项目 Item	标准值 mm Standard Value (mm)	维修极限值 mm Maintenance Limit Value (mm)
摇臂与摇臂轴的径向间隙 Radial clearance between rocker arm and rocker arm shaft	0.016～0.045	0.08
气门间隙 Valve clearance	0.02～0.04	------
凸轮轴基圆跳动 Camshaft base circle run-out	0.02	0.04

项目 Item			标准值 mm Standard Value (mm)	维修极限值 mm Maintenance Limit Value (mm)
气门 Valve	气门杆外径 Outer diameter of valve stem	进气 Intake	φ4.972～φ4.987	φ4.96
		排气 Exhaust	φ4.96～φ4.975	φ4.94
	气门导管内径 Inner diameter of valve guide	进气 Intake	φ5～φ5.015	φ5.025
		排气 Exhaust	φ5～φ5.015	φ5.025
	气门密封带宽度 Width of valve sealing strip		1.5	----
汽缸头 Cylinder head	平面度 Planeness		0.04	0.05
	气门座工作面宽度 Width of valve seat working surface		0.8	----

故障排除

Troubleshooting

缸内气压低：

Low pressure in cylinder:

1、 气门

Valve

---------- 气门间隙调整不正确

Incorrect adjustment of valve clearance

---------- 气门密封不严

Insufficient sealing of valve

---------- 配气正时不对

Incorrect valve timing

---------- 气门弹簧断裂

Breakage of valve spring

2、 汽缸头

Cylinder head

---------- 火花塞与汽缸头连接不紧密

Loose connection between spark plug and cylinder head

---------- 汽缸头垫损坏

Damage of cylinder head gasket

---------- 汽缸头有裂纹或砂眼

Cracks and sand holes on cylinder head

3、 缸体、活塞、活塞环

Cylinder body, piston, piston ring

---------- 活塞环间隙过大或断裂

Excessive clearance or breakage of piston ring

---------- 活塞有裂纹或过度磨损

Cracks or excessive wear of piston

---------- 缸体内径过大或砂眼

Excessive inner diameter of cylinder body or sand holes on it

排气有黑烟

Exhaust having black smoke

1、 气门导管磨损

Wear of valve guide

2、 挡油罩渗漏或损坏

Leakage or damage of oil shield

3、 汽缸头垫渗漏

Leakage of cylinder head gasket

4、 活塞环间隙过大

Excessive clearance of piston ring

噪音过大或异响

Excessive or abnormal noise

1、 气门调整不正确

Incorrect adjustment of valve

2、 气门卡住或气门弹簧断裂

Valve getting stuck or valve spring getting broken

3、 上摇臂过度磨损

Excessive wear of upper rocker arm

4、 配气正时不准

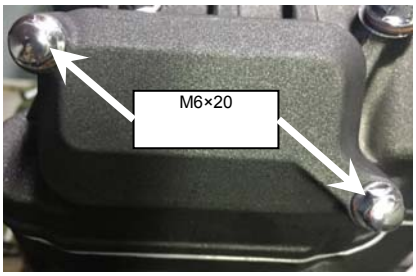
Inaccurate valve timing

5、 凸轮轴磨损

Wear of camshaft

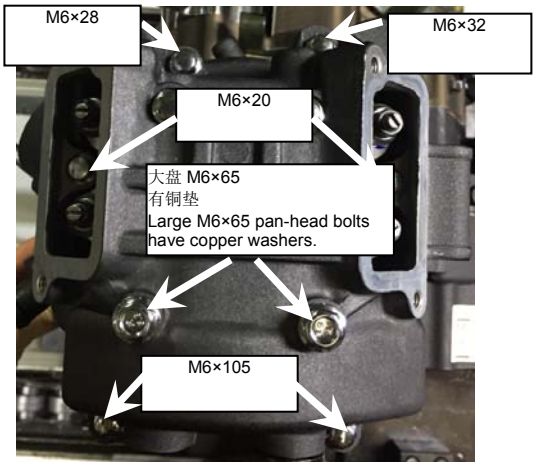
汽缸头盖的拆卸
Removal of Cylinder Head Cover

1、 拆下汽缸头盖进气、排气两侧气门室盖的 4 颗 GB/T16674 小盘 M6×20 的紧固螺栓。
Remove the 4 small GB/T16674 M6×20 pan-head fastening bolts on intake and exhaust valve chamber covers of cylinder head cover.



2、 拆下气缸头进气、排气两侧的气门室盖。
Remove intake and exhaust valve chamber covers of cylinder head.

3、 拆下紧固缸头盖的 2 颗 GB/T16674 小盘螺栓 M6×105、2 颗 GB/T16674 小盘螺栓 M6×20、1 颗 GB/T16674 小盘螺栓 M6×32，1 颗 GB/T16674 小盘螺栓 M6×28，2 颗 GB5789 大盘螺栓 M6×65。
Remove the 2 small GB/T16674 M6×105 pan-head bolts, 2 small GB/T16674 M6×20 pan-head bolts, 1 small GB/T16674 M6×32 pan-head bolt, 1 small GB/T16674 M6×28 pan-head bolt and 2 large GB5789 M6×65 pan-head bolts on cylinder head cover.

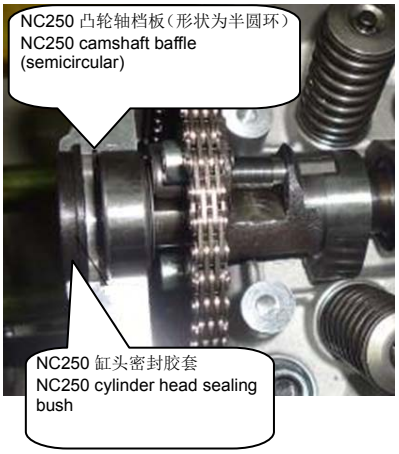


注意：
Note:
2 颗大盘螺栓各有一铜垫片(φ6.2×2×φ13)。
Each of the 2 large pan-head bolts has a copper gasket (φ6.2×2×φ13).

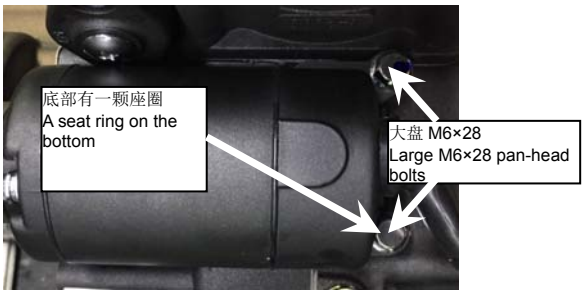
4、 拆下缸头盖。
Remove the cylinder head cover.

汽缸头的拆卸
Removal of Cylinder Head

1、 拆下 NC250 缸头密封胶套，NC250 凸轮轴档板（形状为半圆环）。
Remove the NC250 cylinder head sealing bush and the NC250 camshaft baffle (semicircular).

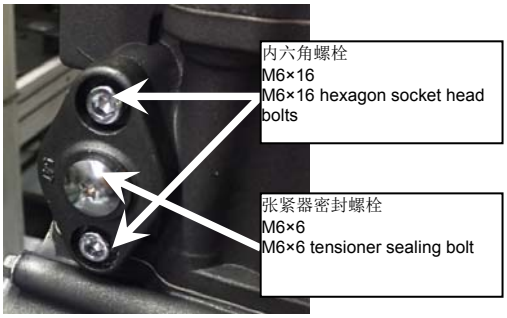


2、 拆下 2 颗紧固启动电机的 GB5789 大盘螺栓 M6×28，拆下启动电机。
Remove the 2 large GB5789 pan-head bolts fastening the starting motor, and remove the starting motor.



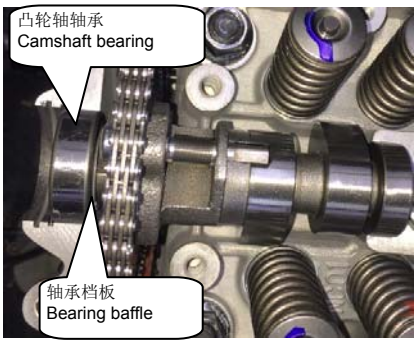
注意：
Note:
电机底部靠近废管侧有一颗电机安装座圈，不要遗漏。
There is a motor mounting seat ring near the waste pipe side on the motor bottom, which shall not be omitted.

3、 拆下 CB125Z 张紧器密封螺栓 M6×6，拆下 2 颗紧固张紧器的 GB70.1 内六角螺栓 M6×16，然后在拆下张紧器，张紧器密封垫。
Remove the CB125Z tensioner sealing bolt (M6×6), the 2 pieces of GB70.1 M6×16 hexagon socket head bolts fastening the tensioner, and then the tensioner and tensioner sealing gasket.

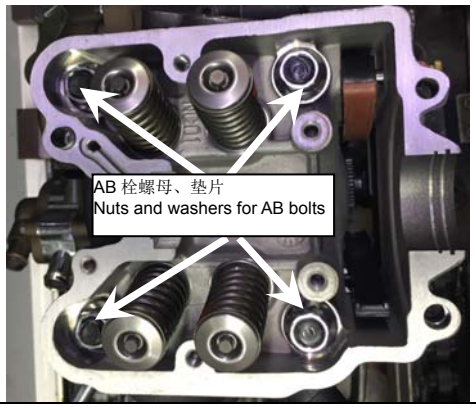


注意：
Note:
避免张紧器上的 O 形圈掉落
Prevent the O-ring on tensioner from falling off.

4、 拆下凸轮轴轴承 6201、轴承档板。
Remove camshaft bearing 6201 and bearing baffle.
5、 拆下凸轮轴组合。
Remove the camshaft assembly.



6、 拆下 4 颗 AB 栓螺母 M10×1.25，然后拆下 4 颗平垫圈（10.5×2×20）。
Remove four AB bolt nuts (M10×1.25) and then remove the 4 flat washers (10.5×2×20).
7、 拆下气缸头。
Remove the cylinder head.



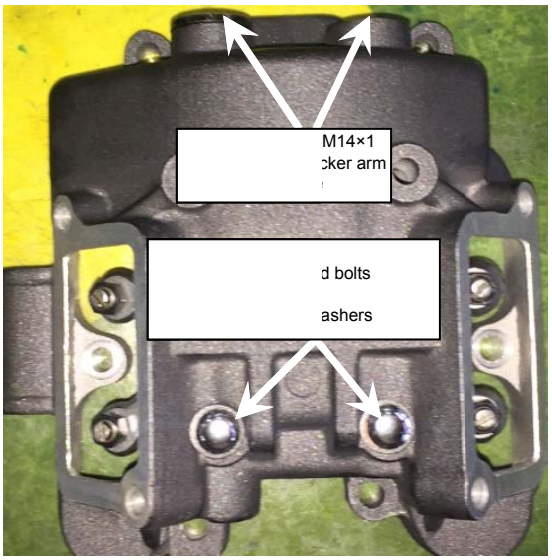
汽缸头盖的分解
Disassembling of Cylinder Head Cover

1、 拆下缸头盖上 2 颗 NC250 摇臂轴定位板螺栓 M14×1。
Remove the 2 pieces of NC250 rocker arm shaft locating plate bolts (M14×1) on the cylinder head cover.

注意：
Note:
螺栓上带有 O 形圈 φ9.4×2.4。
There are O-rings (φ9.4×2.4) on the bolts.

2、 拆下顶部 2 颗 GB16674 小盘螺栓 M6×18，2 颗铜垫片(φ6.2×1×φ10)。
Remove the 2 small GB16674 M6×18 pan-head bolts and the 2 copper gaskets (φ6.2×1×φ10).

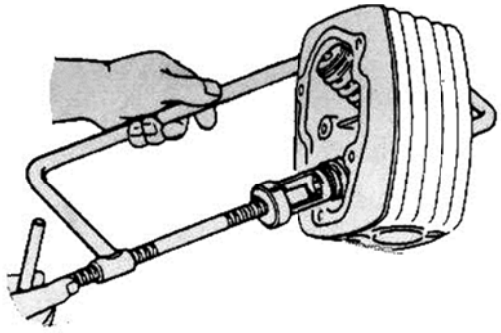
3、 取下进、排气摇臂轴，进、排气摇臂。
Remove the intake and exhaust rocker arm shafts as well as intake and exhaust rocker arms.



气缸头的分解
Disassembling of Cylinder Head

用气门拆卸器将气门弹簧压下，拆下气门锁夹；然后放松气门拆卸器，取下气门弹簧座，气门弹簧和气门。

Use the valve extractor to press down the valve spring and remove the valve and remove the valve collet; then loosen the valve extractor and remove the valve spring retainers, valve spring and the valve.



注意：
Note:

1. **为了防止气门弹簧产生永久变形，不能过份的压缩气门弹簧，只需能拆下气门锁夹即可；**
   To avoid permanent deformation of valve spring, it shall not be pressed excessively but as moderately as the valve collet can be removed.
2. **拆下的全部零件均应作好标记，确保在装配时达到原来的装配位置。**
   All the parts removed shall be well marked so as to mount them to their original locations during assembling.

气门和气门弹簧的检查
Inspection of Valve and Valve Spring

检查气门是否弯曲、烧伤或气门杆有不正常的磨损，测量气门杆外径。维修极限值：

Check the valve for bending and burning, and the valve stem for abnormal wear; measure the outer diameter of valve stem. Maintenance limit values:

进气：φ4.96mm

Intake: φ4.96mm

排气：φ4.94mm

Exhaust: φ4.94mm

接触面的宽度维修极限值：1.5mm

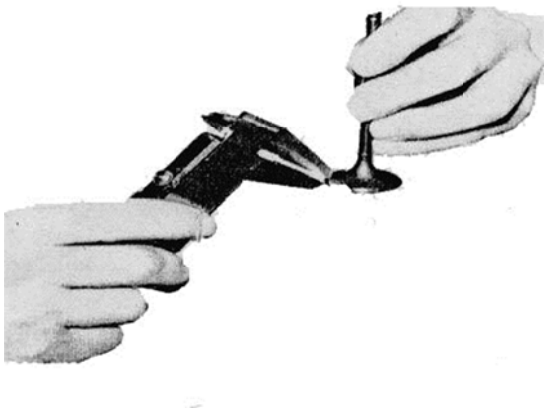
Maintenance limit value for width of contact surface: 1.5mm

注意：

Note:

如果气门接触面很粗糙，磨蚀不均匀或与气门座接触不正常，不能保证密封性能，均应更换气门。

If the contact surface of valve is very rough, unevenly abraded or in abnormal contact with valve seat, which cannot guarantee the sealing performance, the valve shall be replaced.



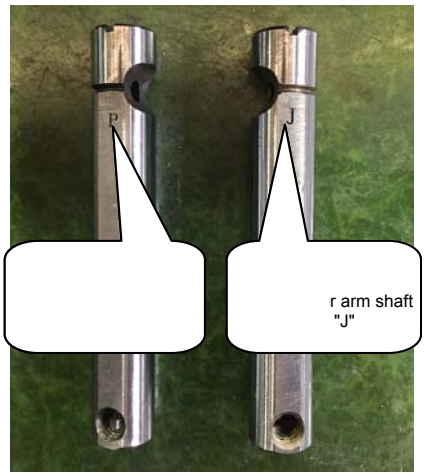
摇臂及摇臂轴的检查
Inspection of Rocker Arm and Rocker Arm Shaft

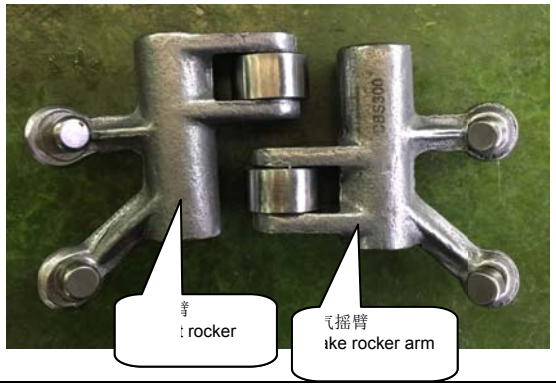
检查摇臂是否有磨损、毁坏、摇臂滚轮的轴向间隙，如磨损、毁坏现象严重或摇臂滚轮的轴向间隙偏大则均需更换新的摇臂。

Check the rocker arm for wear and damage, and the rocker arm roller for axial clearance; for any wear and damage or for excessive axial clearance of rocker arm roller, the rocker arm shall be replaced with a new one.

检查摇臂轴是否有磨损现象，如果磨损现象严重则需更换新的摇臂轴。

Check the rocker arm shaft for wear; in case of serious wear, the rocker arm shaft shall be replaced with a new one.





凸轮轴部件的检查
Inspection of Camshaft Components

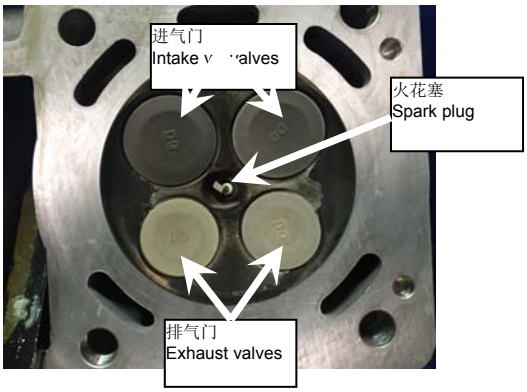
1、 检查凸轮轴表面是否有磨损、毁坏现象及凸轮轴两端的轴承转动是否灵活，如磨损现象严重或轴承转动有发卡的现象，则应更换新的凸轮轴部件。

Check the camshaft surface for wear and damage, and the bearing rotation for flexibility at both ends of camshaft; in case of serious wear or unsmooth bearing rotation, camshaft components shall be replaced with new ones.

2、 检查凸轮轴减压阀甩块组合是否有裂纹、破裂等现象及减压阀离心甩块与减压阀芯轴是否有松动的现象，如果有则需更换减压阀甩块组合。

Check the reducing valve flail block assembly of camshaft for crack and fracture, and the reducing valve flail block and spindle for looseness; if any, the reducing valve flail block assembly shall be replaced.

汽缸头的检查
Inspection of Cylinder Head



1、 检查汽缸头的密封性是否良好，如果缸头的密封性较差，则应更换新的气缸头和气门。

Check the cylinder head for airtightness; for poor airtightness, the cylinder and valve shall be replaced with new ones.

2、 检查火花塞孔及气门座是否有裂纹。

Check spark plug hole and valve seat for any crack.

3、 检查汽缸头是否变形，并用刀口尺和塞尺检查汽缸头的平面度。

Check the cylinder head for deformation, and check the planeness of cylinder head with knife straight edge and feeler gauge.

气门导管的检查
Inspection of Valve Guide

测量每一根气门导管的内径，并作好记录。

Measure the inner diameter of each valve guide, and record it.

维修极限值：

Maintenance limit values:

进气：φ5.025 mm

Intake: φ5.025 mm

排气：φ5.025 mm

Exhaust: φ5.025 mm

注意：

Note:

测量气门导管的内径前，应先将导管内的积碳完全清除干净。

Before the inner diameter of valve guide is measured, the carbon deposit inside the pipe shall be completely cleared away.

若气门导管磨损严重则需要更换缸头。

If the valve guide is heavily worn, the cylinder head shall be replaced.

测量气门座接触面的宽度
Width Measurement of Valve Seat Contact Surface

维修极限值：1.5 mm

Maintenance limit value: 1.5 mm

如查气门座太宽、太窄或有凹痕，则应更换气门及缸头。

If the valve measured is too wide, too narrow or pitted, the valve and cylinder head shall be replaced.

汽缸头的组装
Assembling of Cylinder Head

1、 将气门弹簧下座、挡油罩装到气门导管上。
Mount the lower valve spring retainer and oil shield onto the valve guide.

2、 将进、排气门杆涂上润滑油后，装入气门导管，装好气门弹簧、气门弹簧上座及气门锁夹。
Apply lubricating oil on intake and exhaust valve stems and mount them in the valve guide; then mount the valve spring, upper valve spring retainer and valve collet.

3、 再用气门拆卸器压下气门弹簧，然后将气门锁夹装入气门弹簧座内。
Press down the valve spring with the valve extractor, and then mount the valve collet in the valve spring retainer.

注意：
Note:
1、 为防止气门弹簧产生永久形，不能过分地压缩弹簧，以能装入气门锁夹即可。
To avoid permanent deformation of valve spring, it shall not be pressed excessively but as moderately as the valve collet can be mounted.
2、 锁夹需正确卡入气门的环槽内，安装好后用胶榔头从气门轴向轻搞击气门上座，确保锁夹安装到位。
Mount the collet properly into the circular valve groove, and then tap the upper valve seat slightly and axially from the valve, to ensure the collet is mounted in position.

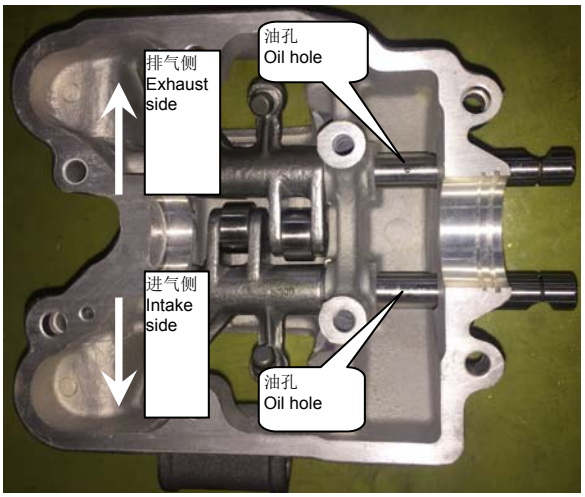
4、 对组装好的汽缸头组合进行气密性检测，若汽缸头组合无泄露则可进行下一步操作。
Carry out the airtightness detection of the assembled cylinder head assembly; if no leakage is found, the next step of operation can be executed.

6、 将张紧板安装到缸头上。
Mount the tensioning plate onto the cylinder head.

气缸头盖的组装
Assembling of Cylinder Head Cover

先将进、排气摇臂放到缸头盖内，再分别将进、排气摇臂轴穿过缸头盖和进气排气摇臂轴孔装配到位，再安装 2 颗 GB16674 小盘螺栓 M6×18 将摇臂轴紧固，最后将 NC250 摇臂轴定位板螺栓装到缸头盖上相应的孔中并紧固。

Firstly, put the intake and exhaust rocker arms in the cylinder head cover, and then put intake and exhaust rocker arms through cylinder head cover and intake & exhaust rocker arm shaft holes respectively to mount them in place; fasten the rocker arm shafts with 2 small GB16674 M6×18 pan-head bolts; finally, put the NC250 rocker arm shaft locating plate bolt in the corresponding hole on cylinder head cover and tighten it.

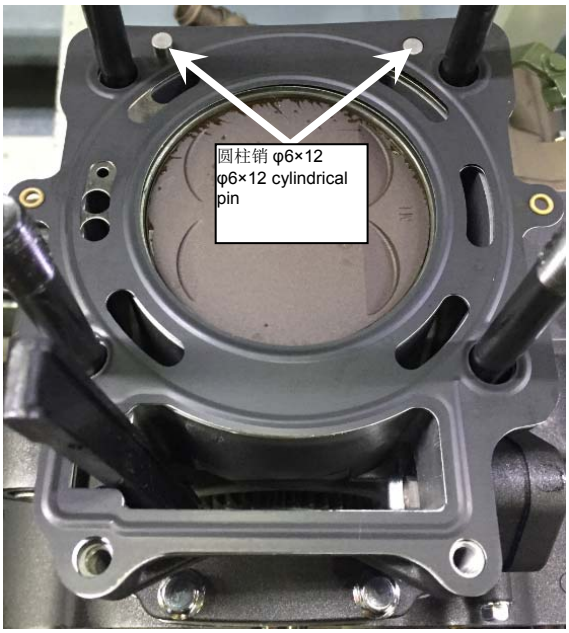


注意：
Note:

1. **装摇臂轴时，摇臂轴有切边的面应朝缸头盖顶部，有油孔的一侧朝底部。注意进、排气不要错装。**
   During mounting of rocker arm shafts, the trimmed side of rocker arm shaft shall face the top of cylinder head cover, and the side with oil hole shall face the bottom. Pay attention to not misplacing the intake and exhaust rocker arm shafts.
2. **缸头盖部装好后，转动摇臂，摇臂应转动灵活，无卡滞现象，**
   After assembling of cylinder head cover, rotate the rocker arms, which shall rotate flexibly and be free of clamping.
3. **小盘螺栓 M6×18 紧固力矩：8~10N·M**
   Tightening torque of small M6×18 pan-head bolts: 8~10N·M
4. **摇臂轴定位板螺栓紧固扭矩：8～16N·m。**
   Tightening torque of rocker arm shaft locating plate bolt: 8～16N·m

汽缸头的安装
Installation of Cylinder Head

1、 装上新汽缸头密封垫，再装上 2 颗圆柱销 φ6×12。
Mount the new cylinder head sealing gasket, and then mount 2 cylindrical pins (φ6×12).



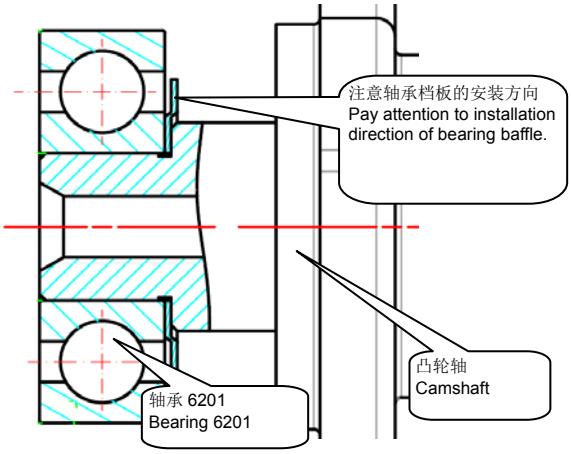
2、 将缸头装到 A、B 栓上。
Mount the cylinder head on AB bolts.

3、 在右图所指位位置打硅胶。
Apply silica gel at the position indicated in the picture on the right.

4、 再将垫圈放到 A、B 栓上，然后将 ZS500A、B 栓螺母装到 A、B 拴上并紧固。
Put washers on AB bolts, and then mount ZS500 nuts on AB bolts and tighten them.

注意：
Note:
1. **不能让尘土和渣滓进入汽缸内；**
   Prevent dust and dross from entering the cylinder.
2. **A、B 栓螺母紧固扭矩：40～45N.m。**
   Tightening torque of AB bolts: 40～45N.m

5、 将凸轮轴装到缸头上，再将正时链条装到凸轮轴上的正时从动链轮上，再安装轴承档板、轴承 6201，然后检查发动机是否处在正时位置，若不在正时位置需重新调整发动机的正时位置。
Mount camshaft onto cylinder head, and timing chain onto timing driven sprocket of camshaft; install bearing baffle and bearing 6201, and then check whether the engine is in the timing position; if not, the timing position of engine shall be readjusted.



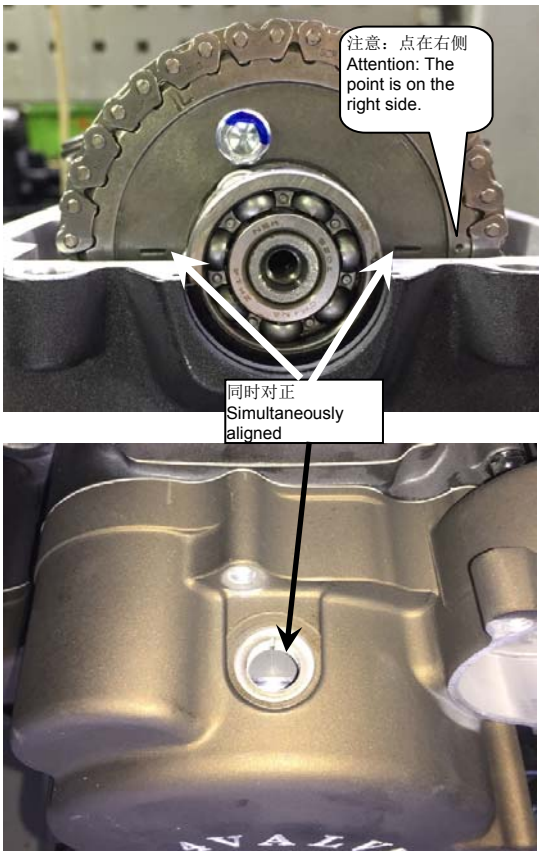
CBS300 发动机正时调整的方法：
Method for timing adjustment of CBS300 engine:

(1) 拆下左前盖的大视孔盖及小视孔盖；
Remove the large and small hole caps of the left front cover.

(2) 用 14#套筒旋转磁电机锁紧螺栓，同时通过小视孔观察磁电机转子上的正时刻度线“｜”（非电喷状态带“T”标识）与左前盖上的正时标记是否对正；
Rotate the lock bolt of magnetor with the #14 socket, and observe through the small hole whether the timing scale mark “｜” (marked with “T” in the status other than electronic injection) on the magnetor rotor is aligned with the timing mark on the left front cover.

(3) 上述正时标记对正后注意观察正时从动链轮上的正时标记是否与合盖面在同一平面上；
After alignment of above-mentioned timing marks, pay attention to observing whether the timing mark on timing driven sprocket and the cover closing face are on the same plane.

只有同时满足（2）（3）发动机才处于正确的正时位置。
The engine is in the correct timing position only when items (2) and (3) are satisfied simultaneously.



6、 调整好正时位置后将大视孔盖和小视孔盖装配到左前盖上。
Mount the large and small hole caps onto the left front cover after adjusting the timing position.

7、 将张紧器装到缸体上对应的孔中，并用 2 颗 GB70.1 内六角螺栓 M6×16 紧固，最后将张紧器张紧，装配张紧器密封螺栓 M6×6。
Mount the tensioner in the corresponding hole on the cylinder body and fasten it with 2 pieces of GB70.1 M6×16 hexagon socket head bolts; then stress the tensioner and mount the tensioner sealing bolt (M6×6).

注意
Note
安装张紧器前，先用薄片顺时针旋转螺杆将发条弹簧收回。2 颗紧固螺栓安装好后，取出薄片，使弹簧弹出，张紧器处于张紧状态。
Before installing the tensioner, rotate the bolt clockwise with a slice to retract the clockwork spring; after mounting 2 fastening bolts, take out the slice to pop up the spring and make the tensioner in the tensioning state.

8、 将 NC250 凸轮轴挡板装到缸头的挡板槽中，最后将 NC250 缸头密封胶套装到缸头的密封胶套槽中。
Mount the NC250 camshaft position plate in the position plate groove on the cylinder head, and then mount the NC250 cylinder head sealing bush in the sealing bush groove of cylinder head.

气缸头盖的安装
Installation of Cylinder Head Cover

1、 将气缸头盖与缸头结合面清理干净，在气缸头盖接合面均匀涂抹一层硅橡胶平面密封剂；
Clean up the jointing faces of cylinder head cover and cylinder head, and apply a layer of silicon rubber as the planar sealant on the jointing face of cylinder head cover.

2、 将缸头盖装到缸头上；
Mount cylinder head cover onto cylinder head.

3、 将 2 颗 GB/T16674 小盘螺栓 M6×105、2 颗 GB/T16674 小盘螺栓 M6×20、1 颗 GB/T16674 小盘螺栓 M6×32、1 颗 GB/T16674 小盘螺栓 M6×28、2 颗 GB5789 大盘螺栓 M6×65、2 颗铜垫片 φ6.2×2×φ13 装配到位并紧固。
Mount in place 2 small GB/T16674 M6×105 pan-head bolts, 2 small GB/T16674 M6×20 pan-head bolts, 1 small GB/T16674 M6×32 pan-head bolt, 1 small GB/T16674 M6×28 pan-head bolt, 2 large GB5789 M6×65 pan-head bolts and 2 copper gaskets (φ6.2×2×φ13), and tighten them.

注意
Note
紧固扭矩：11～13N·m
Tightening torque: 11～13N·m

4、 调节进、排气门的间隙，气门的间隙值：0.02～0.04mm。
Adjust the clearance of intake and exhaust valves; clearance value of valves: 0.02～0.04mm

5、 将气门室盖装到缸头盖上并用 GB/T16674 小盘螺栓 M6×20 紧固，紧固扭矩：11～13N.m。
Mount the valve chamber covers onto the cylinder head cover and tighten them with small GB/T16674 M6×20 pan-head bolts; tightening torque: 11～13N.m

6、 将启动电机安装到左盖对应的孔内，用 2 颗 GB5789 大盘螺栓 M6×28 紧固，注意不要遗漏 1 颗电机安装座圈。
Mount the starting motor in the corresponding hole of left cover and fasten it with 2 large GB5789 M6×28 pan-head bolts; pay attention to not omitting 1 motor mounting seat ring.

汽缸及活塞
Cylinder and Piston

维修须知
Maintenance Instructions

总则
General

注意事项：
Notes:

- 缸头润滑油是经由发动机右体 AB 栓旁边的油孔到汽缸头的，在安装汽缸之前，应确保右体 AB 栓旁边的油孔畅通。
  Cylinder head lubricating oil is supplied to the cylinder head through the oil hole beside the AB bolt on the right engine body; before cylinder installation, make sure the oil hole beside AB bolt of right body is unblocked.
- 不能使灰尘或尘埃渗入曲轴箱内。
  Prevent dust or dirt from entering the crankcase.

各部规格
Parameters of Components

项目 Item		标准值 mm Standard Value (mm)	维修极限值 mm Maintenance Limit Value (mm)
汽缸 Cylinder	汽缸内径 Inner diameter of cylinder	φ74～φ74.01	φ74.018
	圆度 Roundness	0.004	0.008
	缸面平面度 Planeness of cylinder face	0.03	0.06
活塞 活塞环活塞销	活塞外径 Outer diameter of piston	φ73.96～φ73.97	φ73.94
	活塞销孔内径 Inner diameter of piston pin hole	φ16.001～φ16.006	φ16.015

项目 Item			标准值 mm Standard Value (mm)	维修极限值 mm Maintenance Limit Value (mm)
Piston, Piston Ring and Piston Pin	活塞环闭合间隙 Closure clearance of piston ring	顶环/第二环 Top ring/second ring	0.2～0.35	0.5
		油环 Oil ring	0.2～0.7	1.4
	活塞环与活塞环槽间隙 Clearance between piston ring and piston ring groove	顶环 Top ring	0.03～0.07	0.08
		第二环 Second ring	0.02～0.06	0.08
	汽缸与活塞间隙 Clearance between cylinder and piston		0.035～0.045	0.07
	活塞销外径 Outer diameter of piston pin		φ15.994～φ16	φ15.99
	活塞销与活塞销孔间隙 Clearance between piston pin and piston pin hole		0.001～0.012	0.025
连杆小端 Small End of Connecting Rod	内径 Inner diameter		φ16.015～φ16.025	φ16.04
	连杆小端与活塞销间隙 Clearance between small end of connecting rod and piston pin		0.015～0.03	0.05

故障排除
Troubleshooting

压缩力低或不稳定
Low or unstable compressing force

汽缸或活塞环有磨损。
Wear of cylinder or piston ring

排出过量的黑烟
Excessive black smoke discharged

汽缸、活塞或活塞环有磨损
Wear of cylinder, piston or piston ring

活塞环的安装不正确
Incorrect installation of piston ring

活塞或汽缸壁有刮痕或刮伤
Scratched piston or cylinder wall

过热
Overheating

活塞积碳过多
Excessive carbon deposit of piston

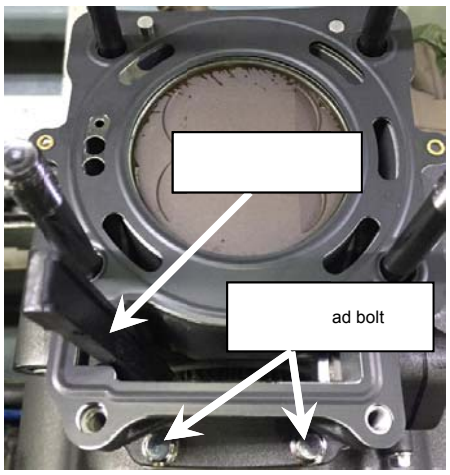
有爆震或不正常的噪音
Knocking or abnormal noise

活塞或汽缸有磨损
Worn piston or cylinder

活塞积碳过多
Excessive carbon deposit of piston

汽缸的拆卸
Removal of Cylinder

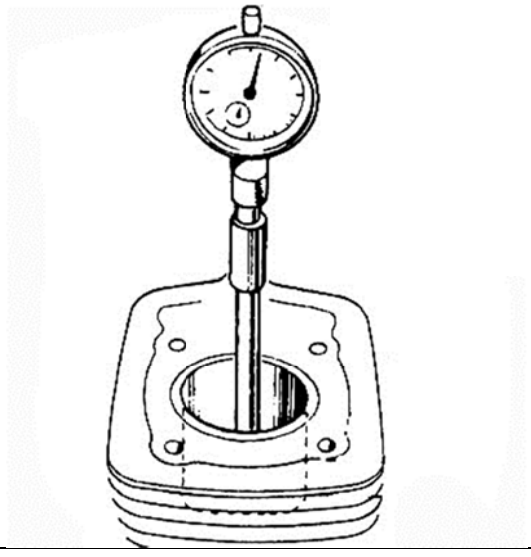
1、 取下气缸头密封垫、链条导向板。
Remove the cylinder head sealing gasket and chain slide.
2、 拆下 2 颗 GB5789 大盘螺栓 M6×30。
Remove the 2 large GB5789 M6×30 pan-head bolts.
3、 拆下缸体上的水管卡箍，拆下水管。
Remove the water pipe clamp and the water pipe.
4、 最后拆下汽缸体、缸体纸垫、缸体定位销。
Finally, remove cylinder body, its paper gasket and dowel pin.



缸体的检查
Inspection of Cylinder Body

1、 检查缸体是否有磨损或毁坏。
Check the cylinder body for wear or damage.
2、 测量汽缸内径，应量取三个位置，即活塞行程的顶部、中部和底部，测量时应对互成直角的两个方向进行测量。
Measure the inner diameter of cylinder at three positions, namely the top, midpoint and bottom of piston stroke; the measurement shall be at the mutually rectangular directions.

维修极限值：φ74.018mm
Maintenance limit value: φ74.018mm



活塞的拆卸

Removal of Piston

用尖嘴钳拆下活塞销挡圈，取下活塞销及活塞。

Remove the piston pin retainer with a pair of needle-nose pliers, and then remove piston pin and piston.

注意：

Note:

拆活塞时挡圈时不能将挡圈坠入曲轴箱内

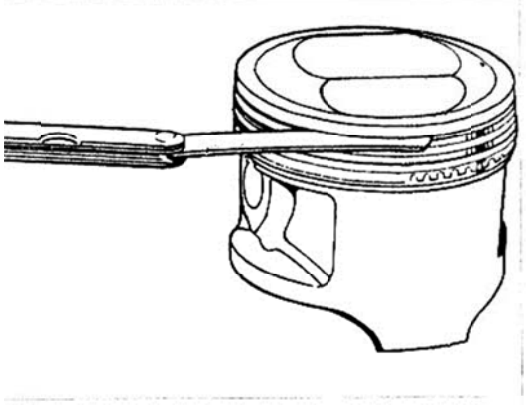
Prevent the retainer from falling into the crankcase when removing the retainer.

活塞、活塞环的检查

Inspection of Piston and Piston Ring

拆下活塞环；

Remove the piston ring;



注意：在拆卸时，不得损坏活塞环。

Note: avoid damaging the piston ring when removing it.

测量活塞环与活塞环凹槽之间的间隙，维修极限值：第一环： 0.08mm

Measure the clearance between piston ring and piston ring groove; maintenance limit value for the first ring: 0.08mm

第二环：0.08 mm

for the second ring: 0.08mm

油环：0.08 mm

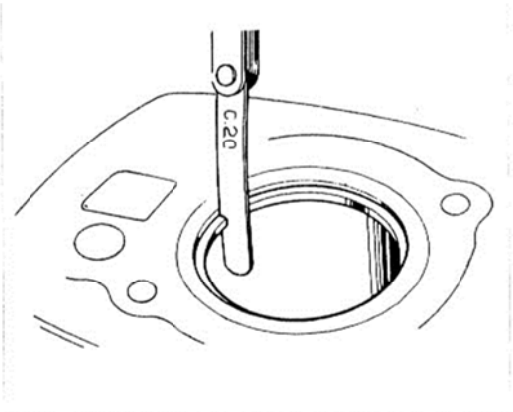
for the oil ring: 0.08mm

检查活塞是否有磨损或裂痕，活塞环凹槽是否有磨损。

Check the piston for wear or crack, and the piston ring groove for wear.

将活塞环插入汽缸内，然后量取端隙。

Insert the piston ring in the cylinder, and then measure the end clearance.



维修极限值：

Maintenance limit value:

第一环：0.5mm

The first ring: 0.5mm

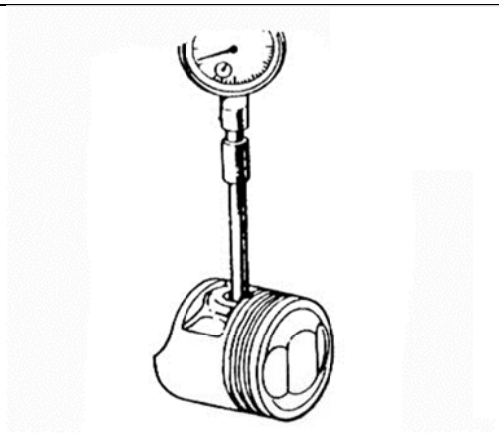
第二环：0.5mm

The second ring: 0.5mm

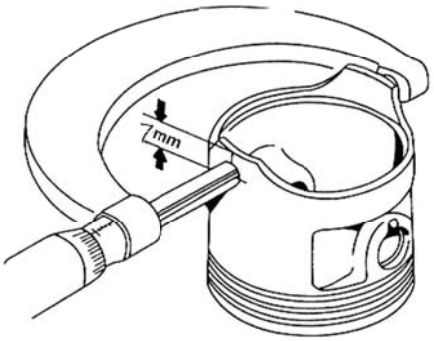
油环：1.4 mm

Oil ring: 1.4mm

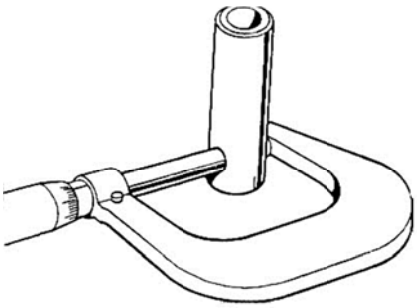
测量活塞销孔内径。
Measure the inner diameter of piston pin hole.
维修极限值：φ16.015 mm
Maintenance limit value: φ16.015 mm



测量位于距活塞裙部 7 mm 高处的外径
Measure the outer diameter of piston at the position that is 7mm from piston skirt.
维修极限值：φ73.94 mm
Maintenance limit value: φ73.94 mm
算出汽缸与活塞之间的间隙。
Work out the clearance between cylinder and piston.
维修极限值：0.07mm
Maintenance limit value: 0.07mm



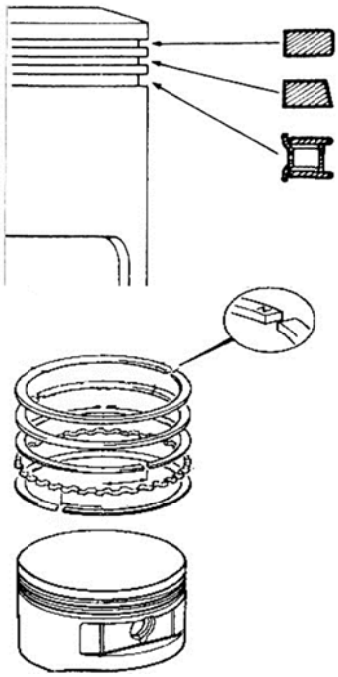
量取活塞销外径
Measure the outer diameter of piston pin.
维修极限值：15.99 mm
Maintenance limit value: 15.99 mm
算出活塞与活塞销之间的间隙
Work out the clearance between piston and piston pin.
维修极限值：0.025 mm
Maintenance limit value: 0.025 mm



活塞环的安装
Installation of Piston Ring

1、 将活塞环凹槽彻底清洗干净。
Clean up the piston ring groove.

2、 装上活塞环。
Mount the piston ring.



注意：
Note:

1、 在安装时，应防止活塞和活塞环受到毁损；
Avoid damaging the piston and piston ring when mounting them.

2、 安装活塞环时，不能将一环、二环装错，
Avoid misplacing the first and second rings when mounting the piston ring.

3、 一环、二环有记号的一面朝向活塞顶部；
The marked sides of the first and second rings shall face the piston top.

4、 装好后，活塞环应转动灵活。
After installation, piston ring shall be capable of rotating flexibly.

3、 油环中各环之间的间隙，应该与隔环的间隙相配合始可；安装油环时，应先安装隔环，然后再安装边导轨。
Clearance between rings in the oil ring shall match the clearance between retainers; during installation of oil ring, retainers shall be mounted firstly, followed by side rail.

活塞的安装
Installation of Piston

将活塞、活塞销及新活塞销挡圈装好。
Mount the piston, piston pin and new piston ring retainer.

注意：
Note:

1. 安装活塞时，印有“IN”记号一侧应朝发动机的进气侧；
During piston installation, the side marked with “IN” shall face the intake side of engine.

2. 活塞销挡圈如变形严重必须更换新的挡圈；
Severely deformed piston pin retainer must be replaced with a new one.

3. 不能让活塞销挡圈坠入曲轴箱内。
Prevent the piston pin retainer from falling into the crankcase.

气缸体的安装

Installation of Cylinder Body

1、 装缸体定位销、新的气缸体密封垫。
Mount the cylinder body dowel pin and new sealing gasket.

2、 在汽缸体、活塞及活塞环表面均匀的涂抹一层机油。
Evenly apply a layer of engine oil on surfaces of cylinder body, piston and piston ring.

3、 先将活塞环之间的开口相互错开 120°后，再轻轻的把气缸体装配到位。
Stagger the opening of piston ring for 120°, and then slightly mount the cylinder body in place.

4、 将链条导向板装配到位。
Mount the chain slide in place.

5、 安装 2 颗 GB5789 大盘螺栓 M6×30。
Mount 2 large GB5789 M6×30 pan-head bolts.

注意：安装气缸体时，要避免毁坏活塞环。
Note: Avoid damaging the piston ring when mounting the cylinder body.

离合器、主动齿、机油泵、换档机构
Clutch, Driving Gear, Oil Pump, Gearshift Mechanism

维修须知
Maintenance Instructions

说明：
Note:

在拆下右曲轴箱盖后，有关离合器、油泵和换档机构的拆卸、安装和维修工作无需拆下发动机也可以进行

After removal of right crankcase cover, the removal, installation maintenance of clutch, oil pump and gearshift mechanism can be conducted without removing the engine.

技术规格
Technical specifications

项目 Item		标准值 mm Standard Value (mm)	维修极限值 mm Maintenance Limit Value (mm)
离合器 Clutch	摩擦主动片自由厚度 Freedom thickness of friction and drive plates	3.12～3.28	2.8

	离合器从动片平面度 Planeness of clutch driven plate	0.08	0.13
	离合器外罩与摩擦片间隙 Clearance between clutch housing and friction plate	0.1～0.25	0.5

故障排除
Troubleshooting

离合器
Clutch

离合器的操作，若发生故障，通常可借调整离合器手把自由行程而得到较好的校正。
In case of failure in clutch operation, it can be usually corrected by adjusting the free stroke of clutch handle.

加速时离合器打滑

Clutch slipping during acceleration

1、 自由行程不够
Inadequate free stroke

2、 离合器从动片弯曲
Bending of clutch driven plate

手把压力过大
Excessive pressure of handle

1、 离合器索缆粘结，毁损或不洁
Bonded, damaged or unclean clutch cable

2、 提升机构损坏
Damage of lifting mechanism

油压太低
Too low oil pressure

1、 油泵有故障
Faulty oil pump

换档踏板不能回弹
Failure in rebound of shift pedal

放开离合器后，车辆会慢慢驶动

Vehicle will move slowly after clutch is released.

1、 自由行程太
Excessive free stroke

2、 离合器从动片弯曲
Bending of clutch driven plate

离合器操作困难
Difficulty in clutch operation

1、 离合器外罩滑槽有毛刺
Clutch housing sliding groove having burrs

换档困难
Difficulty in gear shifting

1、 止动板弯曲或磨损
Bending or wear of stop plate

2、 离合器调整不正确
Incorrect clutch adjustment

换档齿轮跳档
Skipping of change gear

1、 定位板弹簧断裂或弹力不够
Breakage or inadequate elastic force of locating plate spring

缸温过高
Excessive temperature of cylinder

1、 定位板弹簧断裂
Breakage of locating plate spring

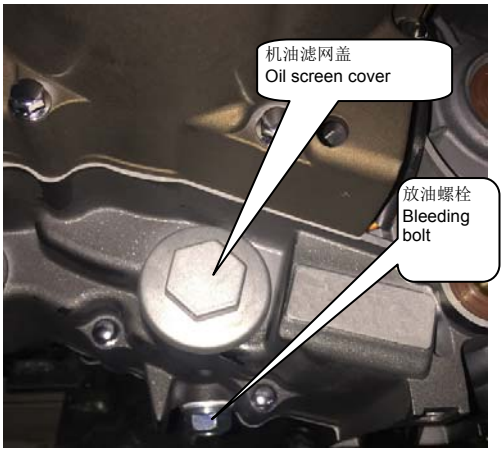
2、 变速轴与曲轴箱盖相干扰|
Interference between variable shaft and crankcase cover

1. 水泵齿轮或叶轮有故障
Faulty water pump gear or impeller

右曲轴箱盖拆卸

Removal of Right Crankcase Cover

1、 先将机油放干（拆下发动机左侧的机油滤网盖，取出箱体里的机油滤网组合，或拆下底部放油螺栓，等待箱体里的机油流完为止）；
Firstly, discharge the engine oil completely (remove the oil screen cover on the left side of engine and take out the oil screen assembly, or remove the bleeding bolt on the bottom and wait until the oil is completely discharged);



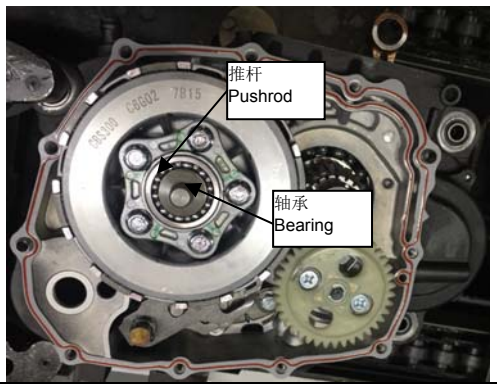
2、 拆下 10 颗 GB16674 小盘螺栓 M6×40，1 颗 GB16674 小盘螺栓 M6×50，
Remove the 10 small GB16674 M6×40 pan-head bolts and 1 small GB16674 M6×50 pan-head bolt.

3、 最后取下右曲轴箱盖，密封垫、2 颗定位销
Finally, remove the right crankcase cover, sealing gasket and 2 dowel pins.

离合器拆卸

Removal of Clutch

1、 依次取下离合器推杆、轴承 16003
Remove the clutch pushrod and bearing 16003 in sequence.



2、 用扩张钳将挡圈（φ20）拆下，取下中心套组件
Dismantle the retainer (φ20) with a pair of expansion pliers, and remove the central bush assembly.

3、 依次取下离合器花键垫片，取下外罩，取下轴套
Remove clutch spline gasket, housing and shaft sleeve in sequence.

机油泵的拆卸
Removal of Oil Pump

1、 拆下 2 颗机油泵安装螺栓 GB819.1 螺钉 M6×30；
Remove the 2 oil pump holddown bolts (GB819.1 M6×30);

2、 拆下机油泵，取出 2 个 O 形圈(φ9.4×2.4)；
Remove the oil pump and take out the 2 O-rings (φ9.4×2.4);

变档机构的拆卸
Removal of Gearshift Mechanism

1、 拆下换挡臂部件；
Remove the shift arm components;

2、 拆下五星板紧固螺栓、弹簧垫片，取下五星板及 GB119.1 圆柱销 φ4×10
Remove the pentagram-shaped plate fastening bolt and spring shim, and then remove the pentagram-shaped plate and GB119.1 φ4×10 cylindrical pin.

3、 拆下定位板紧固螺钉 GB5783 大盘 M6×20，拆下定位板弹簧及定位板组合。
Remove the large pan-head locating plate fastening bolt (GB5783 M6×20), the locating plate spring and the locating plate assembly.

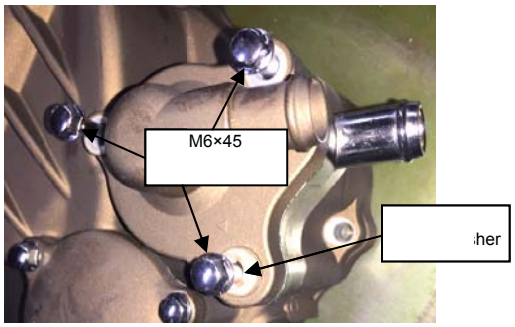
主动齿、机油泵驱动齿的拆卸
Removal of Driving Gear and Oil Pump Drive Gear

1、 取下主动齿轮锁紧螺母及碟形垫圈；
Remove the driving gear locknut and disc washer;

2、 取下机油泵驱动齿、主动齿、盘形齿垫圈。
Remove oil pump drive gear, driving gear and disc gear washer.

水泵的分解
Disassembling of Water Pump

1、 拆下 3 颗水泵盖螺栓 GB16674 小盘 M6×45；
Remove the 3 small pan-head GB16674 M6×45 water pump cover bolts.



注意：
Note:
不要遗漏放水螺栓下面的铜垫片
Do not omit the copper gasket beneath the drain bolt.

2、 用扩张钳取下水泵齿挡圈，取下水泵齿轮。
Remove the water pump gear retainer with a pair of expansion pliers, and remove the water pump gear.

3、 拆下水泵。
Remove the water pump.

离合器中心套组件的分解
Disassembling of Clutch Central Bush Assembly

1、 拆下离合器盖板螺栓；
Remove the clutch cover bolts;

2、 将弹簧、压盘取下，最后取下摩擦片
Remove the spring and pressure plate, and then remove the friction plate.

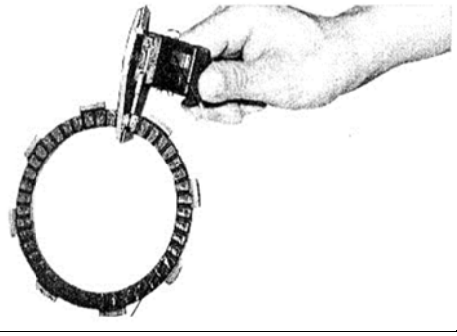
右曲轴箱盖的检查
Inspection of Right Crankcase Cover

1、 检查右曲轴箱盖曲轴油封是否有破损情况，如果发现油封破裂则需更换新的油封；
Check the crankshaft oil seal of right crankcase cover for damage; if any, the oil seal shall be replaced with a new one.

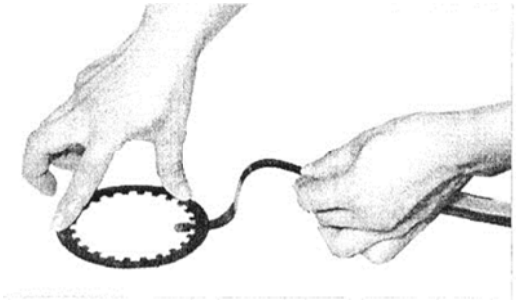
更换曲轴油封时注意两点：
Pay attention to the following two points when replacing the crankshaft oil seal:
1. **确认油封的状态是否正确，；**
   Confirm whether the oil seal is in the correct status;
2. **装配时有标记的面应朝外。**
   During assembling, the marked side shall face outward.

离合器摩擦片的检查
Inspection of Clutch Friction Plate

如离合器摩擦片出现擦伤或褪色的痕迹，则应更换。测量每片离合器摩擦片厚度。
The scratched or discolored clutch friction plate shall be replaced. Measure the thickness of each clutch friction plate.
维修极限值：2.5mm
Maintenance limit value: 2.5mm



检查离合器从动片表面是否有扭曲，检查时要用测隙规进行。
Check the clutch driven plate for distorted surface with a clearance gauge.
维修极限值：0.11 mm
Maintenance limit value: 0.11mm



检查离合器外罩与摩擦片的间隙。
Check the clearance between clutch housing and friction plate.
维修极限值：0.6 mm
Maintenance limit value: 0.6mm

离合器外罩的检查
Inspection of Clutch Housing

检查外罩鼓型上的齿槽是否因离合器盘摩擦而产生缺口、伤痕，如严重则需更换外罩。
Check the gear grooves on drum-shaped part of housing for any gap and scars due to friction of clutch disc; for serious gap or scars, the housing shall be replaced.

主动齿的检查
Inspection of Driving Gear

检查主动齿是否有磨损及损坏，如磨损和损坏的现象比较严重，则需更换新的主动齿。
Check the driving gear for wear and damage; in case of serious wear and damage, the driving gear shall be replaced with a new one.

机油泵的检查
Inspection of Oil Pump

1、 检查机油泵转子是否磨损，旋转是否灵活，若有则需更换新的机油泵。
Check the oil pump rotor for wear and flexible rotation; for any wear and inflexible rotation, the oil pump shall be replaced with a new one.

变档机构的检查
Inspection of Gearshift Mechanism

检查定位板滚轮是否有磨损及滚轮转动是否灵活。
Check the locating plate roller for wear and flexible rotation.

水泵的装配
Assembling of Water Pump

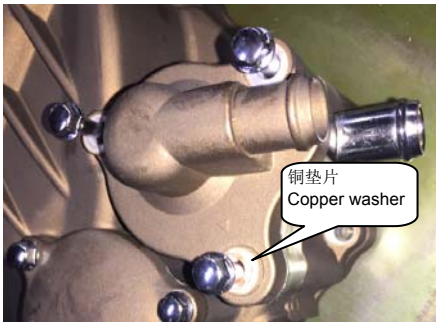
1、 在水泵 O 形圈及右盖相应孔中涂少量机油
Apply a small amount of engine oil on water pump O-rings and in corresponding holes on the right cover.

2、 将水泵安装到右盖对应孔中，注意水泵底部要安装 1 个 O 型圈（φ7×2）
Mount the water pump in corresponding holes on the right cover, and pay attention to mounting 1 O-ring (φ7×2) at the bottom of water pump.

3、 取下旧的水泵盖密封圈，将新的水泵盖密封圈安装到水泵盖上
Remove the old water pump cover seal ring, and mount a new one onto the water pump cover.

4、 安装 2 颗定位销，将水泵盖盖装到水泵上；
Mount 2 dowel pins, and mount the water pump cover onto the water pump.

5、 用 3 颗 GB16674 小盘螺栓 M6×45 将水泵盖紧固，注意放水螺栓要换用新的铜垫片 φ6.2×1×φ12。
Fasten the water pump cover with 3 small GB16674 M6×45 pan-head bolts, and pay attention to changing a new copper gasket for the drain bolt.



注意
Note
水泵盖螺栓紧固扭矩：11~13 N·m
Tightening torque of water pump cover bolts: 11~13 N·m

6、 安装水泵齿轮，安装水泵齿档圈
Mount water pump gear and water pump gear retainer.

注意
Note
齿轮方向需要安装正确，如右图示。
The mounting direction of gear shall be correct, as shown in the picture on the right.

主动齿的安装
Installation of Driving Gear

1、 将盘形齿垫圈、主动齿轮、机油泵驱动齿依次安装到右曲柄上。
Mount the disc gear washer, driving gear and oil pump drive gear onto the right crank in sequence.

2、 将主动齿锁紧螺母垫圈装到主动齿上。
Mount the driving gear locknut washer onto the driving gear.

3、 在主动齿锁紧螺母上涂抹 3～4 牙螺纹紧固胶，将其装到右曲柄上并紧固。
Apply the thread locker on 3～4 threads of driving gear locknut, mount it onto the right crank and tighten it.

注意：
Note:
主动齿锁紧螺母紧固扭矩：50～65 N·m
Tightening torque of driving gear locknut: 50～65 N·m

换档机构的装配
Assembling of Gearshift Mechanism

1、 将定位板组合装到右体上并紧固；
Mount the locating plate assembly onto the right body and tighten it.

2、 将五星板装入变速鼓上，注意缺口对准变速鼓销子，装上紧固螺钉并紧固；
Mount the pentagram-shaped plate in the gear shift drum and pay attention to aligning the opening with the gear shift drum pin; mount the fastening bolts and tighten them.

注意：
Note:
1、 五星板螺栓涂 271 紧固胶
Apply the 271 thread locker on the pentagram-shaped plate bolt.
2、 力矩： 8~12N·m
Torque: 8~12N·m

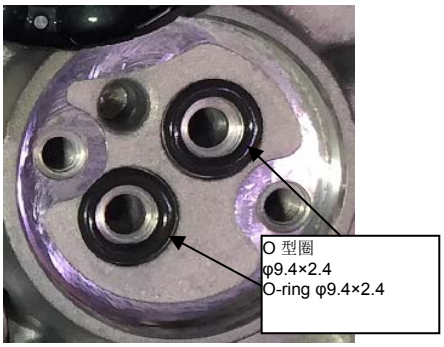
3、 装上变档臂，变档臂装配后先检测变档是否正确，变档无误后再继续装机。
Mount the shift arm, and then confirm whether gear shifting is correct; continue the assembling if gear shifting is inspected correct.

机油泵的装配

Assembling of Oil Pump

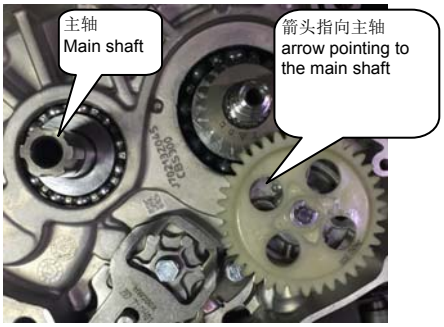
1、 将 2 个 O 型圈（φ9.4×2.4）放到对应的沉孔中

Put 2 O-rings (φ9.4×2.4) into corresponding holes.



2、 将机油泵安装到相应的位置，注意箭头指向主轴

Mount the oil pump to the corresponding position, and pay attention to arrow, which shall point to the main shaft.



3、 用 2 颗 GB819.1 螺钉 M6×30 将机油泵紧固
Fasten the oil pump with 2 pieces of GB819.1 M6×30 bolts.

注意：
Note:
1. **装机油泵时，箭头指向离合器；**
   During installation of oil pump, the arrow shall point to the clutch.
2. **机油泵螺栓紧固扭矩：8～12 N.m；**
   Tightening torque of oil pump bolts: 8～12 N.m

离合器的安装
Installation of Clutch

1、 将离合器轴套、离合器外罩、花键和离合器中心套垫圈装到主轴上；
Mount clutch shaft sleeve, clutch housing, spline and clutch central bush washer onto the main shaft.

注意：离合器轴套内圈均匀涂抹润滑脂。
Note: Evenly apply lubricating grease on inner ring of clutch shaft sleeve.

2、 将档圈装到主轴相应槽中；
Mount the retainer in the corresponding groove on main shaft.

3、 将轴承、推杆依次安装到离合器上，
Mount bearing and pushrod onto clutch in sequence.

右曲轴箱盖的安装
Installation of Right Crankcase Cover

装上定位销，装上新的密封垫，将右曲轴箱盖装配到位并用 10 颗 GB/T16674 小盘螺栓 M6×40 紧固，1 颗 GB/T16674 小盘螺栓 M6×50 紧固，**紧固扭矩：11～13N·m**。
Mount the dowel pin and new sealing gasket; mount the right crankcase cover in place and fasten it with 10 small GB/T16674 M6×40 pan-head bolts and 1 small GB/T16674 M6×50 pan-head bolt; **tightening torque: 11～13N·m**

磁电机及平衡主、从动齿
Magnetor, Driving and Driven Balance Gears

维修须知
Maintenance Instructions

本节所介绍磁电机和平衡主、从动齿的拆卸和安装，只要拆下左曲轴箱盖，无需拆下发动机即可完成。

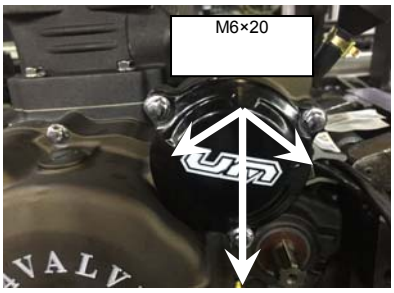
As long as the left crankcase cover is removed, the removal and installation of magnetor, driving and driven balance gears introduced in this section can be completed without removing the engine.

关于磁电机的检查可参阅蓄电池充电系统章节的方法。

For inspection of magnetor, refer to the methods introduced in the section with respect to battery charging system.

左曲轴箱盖的拆卸
Removal of Left Crankcase Cover

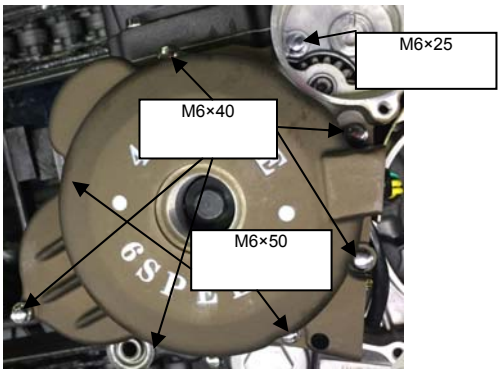
1、 拆下 3 颗双联齿轮盖螺栓 GB16674 小盘 M6×20，将双联齿轮盖、双联齿轮、双联齿轮轴依次取下
Remove the 3 small GB16674 M6×20 pan-head bolts of duplicate gear cover, and then remove the duplicate gear cover, duplicate gear and duplicate gear shaft in sequence.



2、 拆下压线板螺栓 GB16674 小盘 M6×12，取下压线板
Remove the small GB16674 M6×12 pan-head bolts of cable crimping board, and remove the cable crimping board.

3、 拆下左盖螺栓：5 颗 GB16674 小盘螺栓 M6×40、2 颗 GB16674 小盘螺栓 M6×50、1 颗 GB16674 小盘螺栓 M6×25
Remove the left cover bolts: 5 small GB16674 M6×40 pan-head bolts, 2 small GB16674 M6×50 pan-head bolts and 1 small GB16674 M6×25 pan-head bolt.

4、 取下左盖，左盖 2 定位销、纸垫。
Remove the left cover, its two dowel pins and payer gasket.



磁电机定子的拆卸
Removal of Magnetor Stator

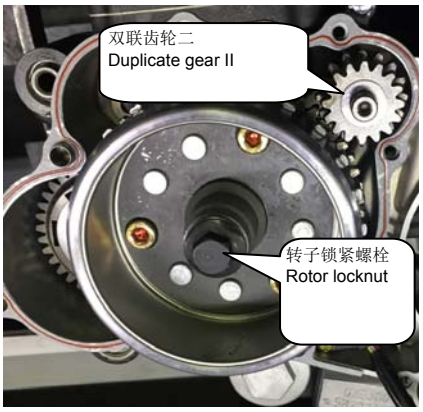
1、 拆下传感的 2 颗 GB5783 螺栓 M5×16 紧固螺钉；
Remove the 2 pieces of GB5783 M5×16 fastening bolts of the sensor.

2、 拆下定子线圈的 3 颗 GB5783 螺栓 M5×25 紧固螺钉，然后从左曲轴箱盖上拆下磁电机定子组合。
Remove the 3 pieces of GB5783 M5×25 fastening bolts of the stator coil, and then remove the magnetor stator assembly from the left crankcase cover.

磁电机转子、启动大齿轮、双联齿二的拆卸
Removal of Magnetor Stator, Large Starting Gear and Duplicate Gear II

1、 拆下磁电机转子锁紧螺栓，用专用工具拆下磁电机转子。
Remove the magentor rotor locknut, and then remove the magnetor rotor with the special tool.

2、 取下启动大齿轮、双联齿轮二。
Remove the large starting gear and duplicate gear II.

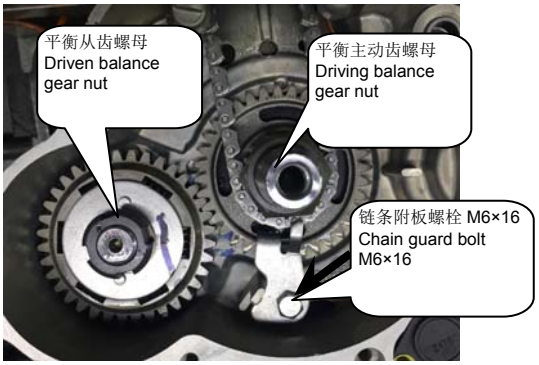


注意：
Note:

1. **磁电机转子拆卸时只能用专用工具拆卸，不允许敲击磁电机转子；**
   The magnetor rotor can be removed only with the special tool, and it is not allowed to knock the magnetor rotor.
2. **磁电机转子在拆卸及装配过程中受到意外冲击，如磁电机转子摔落着地或受到异物敲击，则应更换新的磁电机转子。**
   Provided that the magnetor rotor is impacted by accident during removing and assembling, such as falling onto the ground or being knocked by a foreign object, it shall be replaced with a new one.

平衡主、从动齿的拆卸
Removal of Driving and Driven Balance Gears

1、 拆下链条护板螺栓 GB5783 大盘 M6×16，取下链条护板、正时链条，然后依次拆下平衡主动齿锁紧螺母，垫片，正时主动链轮，平衡主动齿；
Remove the large GB5783 M6×16 pan-head bolt of chain guard and take down chain guard and timing chain; then remove driving balance gear locknut, gasket, timing drive sprocket and driving balance gear in sequence.



2、 依次拆下平衡从动齿锁紧螺母，垫片，平衡从动齿，平键(4×4×13)，垫片(φ20×5×φ25)；
Remove the driven balance gear locknut, gasket, driven balance gear, flat key (4×4×13) and gasket (φ20×5×φ25) in sequence.

注意
Note
拆卸正时主动链轮需要在拆下凸轮轴的情况下进行
The removal of timing drive sprocket can be carried out only after the camshaft is removed.

档显线束的拆卸
Removal of Gear Indication Harness

1、 拆下 2 颗档显螺钉。
Remove the 2 gear indicator bolts.
2、 拆下档显线束。
Remove the gear indication harness.

注意
Note
将档显自带的 O 形圈一起取出。
Take out the gear indicator together with its O-ring.

左曲轴箱盖的检查
Inspection of Left Crankcase Cover

检查左曲轴箱盖的是否有破损等情况。
Check the left crankcase cover for breakage, etc.

磁电机定子、转子的检查
Inspection of Magnetor Stator and Rotor

1、 检查磁电机转子的磁瓦是否有裂纹或破损情况如有则需更换新的磁电机转子。
Check the magnetic shoe of magnetor rotor for crack or breakage; in any, the magentor rotor shall be replaced with a new one.
2、 检查磁电机转子是否磨损或损坏，如有则需更换新的磁电机转子。
Check the magnetor rotor for wear or damage; if any, it shall be replaced with a new one.

平衡主、从动齿轮的检查
Inspection of Driving and Driven Balance Gears

检查平衡主、从动齿轮是否磨损或损坏。
Check the driving and driven balance gears for wear or damage.

平衡主、从动齿轮的安装

Installation of Driving and Driven Balance Gears

1、 先将平衡主动齿、正时主动链轮、垫片依次安装到左曲柄上；

Firstly, mount the driving balance gear, timing drive sprocket and gasket onto the left crank in sequence.

2、 安装主动齿轮锁紧螺母

Mount the driving gear locknut.

注意：

Note:

1、 主动齿轮锁紧螺母及左曲柄螺纹上的机油需清洗干净

Oil on driving gear locknut and left crank threads shall be cleaned up.

2、 平衡轴锁紧螺母 M24×1 从第二牙开始打上 3～4 牙（整圈）乐泰 263 螺纹紧固胶

Apply the Loctite 263 thread locker on 3～4 threads (whole circle) of balance shaft locknut (M24×1), starting from the second thread.

3、 平衡主动齿锁紧螺母紧固扭矩：120N·m。

Tightening torque of driving balance gear locknut: 120N·m

2、 将垫片、平衡从动齿、平键、弹簧垫片依次安装；

Mount the gasket, driven balance gear, flat key and spring shim in sequence.

3、 安装平衡从动齿轮锁紧螺母。
Mount the driven balance gear locknut.

注意：
Note:

1、 装平衡主、从动齿时要对正平衡主、从动齿的正时标记，即平衡主、从动齿有正时标记的齿要相互啮合。
Align the timing mark on driving balance gear with that on driven balance gear when mounting the driving and driven balance gears; namely, the driving and driven balance gear teeth with timing marks shall mesh with each other.

2、 螺母上从第二牙开始打上 3～4 牙（整圈）乐泰 263 螺纹紧固胶并紧固螺母
Apply the Loctite 263 thread locker on 3～4 threads (whole circle) of nut, starting from the second thread; tighten the nut.

3、 平衡从动齿锁紧螺母紧固扭矩：70~80N·m。
Tightening torque of driven balance gear locknut: 70~80N·m

磁电机转子的安装
Installation of Magnetor Rotor

1、 将启动大齿轮、双联齿轮二安装到对应位置。
Mount the large starting gear and duplicate gear II to the corresponding positions.

注意
Note
双联齿轮二两端各有一垫片φ10.5×0.5×φ18。
Each end of the duplicate gear II has one gasket (φ10.5×0.5×φ18).

2、 将磁电机转子装到左曲柄上，用锁紧螺栓将其紧固。
Mount the magnetor rotor onto the left crank, and fasten it with the locknut.

注意：
Note:
1、 在螺纹一端从第二牙开始打 3～5 牙（整圈）回天 7262 螺纹锁固密封厌氧胶；
Apply the HUITIAN 7262 anaerobic thread locker on 3～5 threads (whole circle) of the locknut, starting from the second thread.
2、 磁电机转子锁紧螺母紧固扭矩：60～70N·m。
Tightening torque of magnetor rotor locknut: 60～70N·m

磁电机定子的安装

Installation of Magnetor Stator

1、 将磁电机定子组件用 2 颗 GB5783 螺栓 M5×16 和 3 颗 GB5783 螺栓 M5×25 紧固到左曲轴箱盖上。

Fasten the magnetor stator assembly onto the left crankcase cover with 2 pieces of GB5783 M5×16 bolts and 3 pieces of GB5783 M5×25 bolts.

注意：
Note:
紧固扭矩：8～12N·m
Tightening torque: 8～12N·m

档显线束的安装

Installation of Gear Indication Harness

1、 将档显安装到相应位置。

Mount the gear indicator to the corresponding position.

注意：
Note:
安装前确认 O 形圈在档显上并完好，若发生损坏需更换。
Before installation, make sure the O-ring is intact on the gear indicator, and replace it in case of damage.

2、 用 2 颗档显螺钉将档显固定。

Fasten the gear indicator with 2 pieces of gear indicator bolts.

档显螺钉扭矩：5~7N·m
Torque of gear indicator bolts: 5~7N·m

左曲轴箱盖的安装

Installation of Left Crankcase Cover

1、 装上两颗定位销，装上新的密封垫 ；

Mount two dowel pins and a new sealing gasket.

2、 将左曲轴箱盖装配到位

Mount the left crankcase cover in place.

3、 用 5 颗 GB16674 小盘螺栓 M6×40、2 颗 GB16674 小盘螺栓 M6×50、1 颗 GB16674 小盘螺栓 M6×25 安装到对应位置。

Mount the 5 small GB16674 M6×40 pan-head bolts, 2 small GB16674 M6×50 pan-head bolts and 1 small GB16674 M6×25 pan-head bolt to corresponding positions.

注意
Note
1、 图右图所示螺栓涂三和胶。
Apply the SANVO sealant for the bolt shown in the picture on the right.
2、 紧固扭矩：11～13 N·m。
Tightening torque: 11～13 N • m

4、 将档显线、磁电机定子线束安装到相应位置，并用压线板固定。
Mount the gear indicator line and magnetor stator harness to corresponding positions, and fasten them with the cable crimping board.

5、 用 GB16674 螺栓 M6×12 将压线板固定。
Fasten the cable crimping board with GB16674 M6×12 bolts.

注意
Note
紧固扭矩：**8～12 N·m**
Tightening torque: **8～12 N·m**

双联齿盖的安装
Installation of Duplicate Gear Cover

1、 将双联齿轮轴、双联齿轮安装到相应位置，盖上双联齿轮盖。
Mount the duplicate gear shaft and duplicate gear to corresponding positions, and then mount the duplicate gear cover.

2、 用 3 颗双联齿轮盖螺栓 GB16674 小盘 M6×20 将双联齿轮盖紧固。
Fasten the duplicate gear cover with 3 small GB16674 M6×20 pan-head bolts.

曲轴箱、曲轴、变速传动、平衡轴
Crankcase, Crankshaft, Transmission, Balance Shaft

维修须知 **Maintenance instructions** 故障排除 **Troubleshooting** 曲轴箱的分解 **Disassembling of crankcase** 曲轴/平衡轴/主副轴的拆卸 **Removal of crankshaft/balance shaft/main and counter shafts** 曲轴的检查 **Inspection of crankshaft** 左、右箱体轴承的检查 **Inspection of left and right crankcase bearings**	换档拨叉/换档拨叉轴/变速鼓的检查 **Inspection of shift fork/shift fork shaft/gear shift drum** 主副轴组件的检查 **Inspection of main and counter shaft assembly** 机油滤网的检查 **Inspection of oil screen** 机油滤网的装配 **Assembling of oil screen** 变速器/曲轴/平衡轴的装配 **Assembling of transmission/crankshaft/balance shaft** 合箱 **Crankcase assembling**

维修须知
Maintenance Instructions

本节介绍变速器、曲轴、平衡机构的安装、检测，进行上述工作时，应将曲轴箱先进行分离，关于发动机的其他部件的拆卸应在曲轴箱分离之前进行。
This section describes the installation and detection of transmission, crankshaft and balance mechanism; for execution of such work, the crankcase shall be separated firstly; the removal of other engine components shall be carried out before separating the crankcase.

曲轴箱分离之前的工作
Work to be carried out before separating the crankcase

汽缸头的拆卸
Removal of cylinder head

汽缸/活塞的拆卸
Removal of cylinder/piston

离合器、油泵、换档机构、平衡齿的拆卸
Removal of clutch, oil pump, gearshift mechanism and balance gear

左曲轴箱前盖的拆卸
Removal of front cover of left crankcase

规格
Specifications

项　目 Items			标准值 mm Standard Value (mm)	维修极限值 mm Maintenance Limit Value (mm)
换档拨叉 Shift Fork	拨叉内径 Inner diameter of fork		φ12.00～φ1.018	φ12.020
	卡爪厚度 Thickness of pawl		4.925～5	4.8
换档拨叉轴 Shift Fork Shaft	拨叉轴外径 Outer diameter of fork shaft		φ11.966～φ11.984	φ11.95
	圆柱度 Cylindricity		0.010	----
曲轴 Crankshaft	连杆小头内径 Inner diameter of small end of connecting rod		φ16.021～φ16.028	φ16.04
	连杆大端侧间隙 Clearance on big end side of connecting rod	轴向 Axial	0.1～0.3	0.5
		径向 Radial	0.008～0.016	0.02
平衡轴 Balance shaft	轴径 Shaft diameter		φ19.98～φ19.993	φ19.96

故障排除
Troubleshooting

换档困难
Difficulty in gear shifting

1、 换档拨叉弯曲
Bending of shift fork

2、 换档拨叉轴弯曲
Bending of shift fork shaft

曲轴有噪音
Crankshaft having noise

1、 连杆大端轴承有磨损
Wear of big end bearing of connecting rod

2、 连杆弯曲
Bending of connecting rod

3、 曲轴轴承有磨损
Wear of crankshaft bearing

变速器跳档
Skipping of transmission

1、 换档齿轮棘爪有磨损
Wear of change gear pawl

2、 换档拨叉弯曲或磨损
Bending or wear of shift fork

3、 换档拨叉轴弯曲
Bending of shift fork shaft

换档齿轮有噪音
Change gear having noise

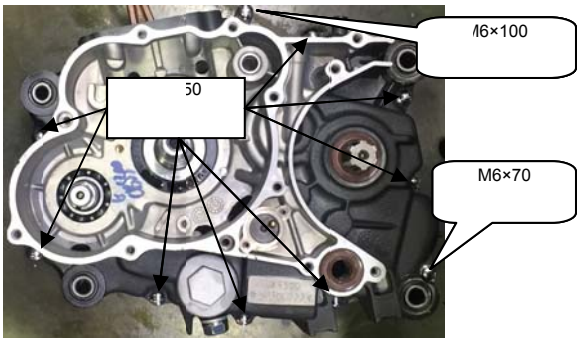
1、 换档齿轮有磨损
Wear of change gear

2、 花键轴有磨损
Wear of spline shaft

曲轴箱的分解
Disassembling of Crankcase

1、 将发动机左曲轴箱朝上放置。
Place upward the left crankcase of engine.

2、 拆下 8 颗 GB/T16674 小盘螺栓 M6×50、1 颗 GB/T16674 小盘螺栓 M6×70、1 颗 GB/T16674 小盘螺栓 M6×100 紧固螺钉。
Remove the 8 small GB/T16674 M6×50 pan-head bolts, 1 small GB/T16674 M6×70 pan-head bolt and 1 small GB/T16674 M6×100 pan-head fastening bolt.

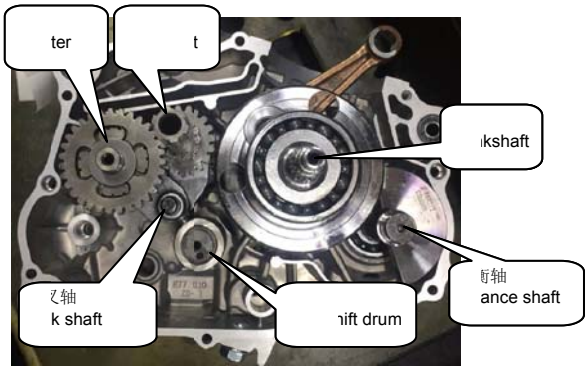


3、 将右曲轴箱朝上旋放置，取下右曲轴箱，取下密封纸垫，取下 2 颗定位销。
Hang upward and remove the right crankcase, and then remove the sealing paper gasket and the 2 dowel pins.

曲轴/平衡轴/主副轴的拆卸
Removal of Crankshaft/Balance Shaft/Main and Counter Shafts

1、 依次取出拨叉轴、变速鼓、拨叉、主副轴。
Take out the fork shaft, gear shift drum, fork, main and counter shafts in sequence.

2、 拆下曲轴组件。
Remove the crankshaft assembly.



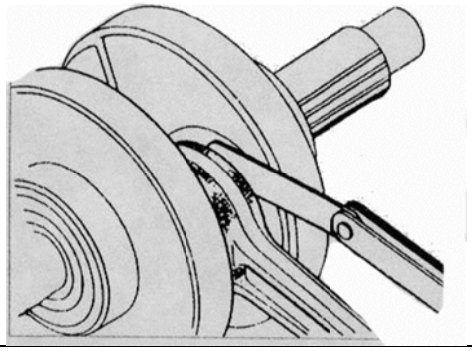
注意：
Note:
在取主副轴组件时要确保不能有零部件遗落。
Make sure no parts are left behind when taking out the main and counter shaft assembly.

曲轴的检查
Inspection of Crankcase

1、 将曲轴轴承放在 V 型铁上。
Place the crankshaft bearing onto the V-shaped iron.

2、 用百分表测量曲轴轴径的径向跳动。
Measure the radial run-out of crankshaft with a dial gauge.

用塞规测量连杆大头侧隙。
Measure the clearance on the big end side of connecting rod with a feeler gauge.
维修极限值：0.5 mm
Maintenance limit value: 0.5mm



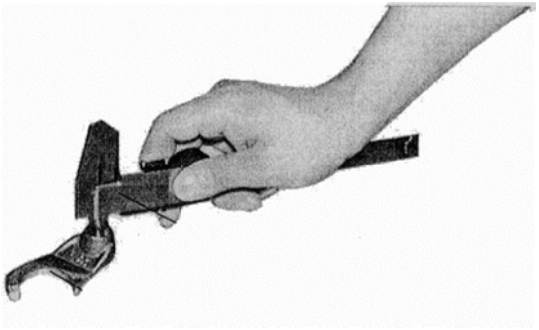
左、右箱体轴承、油封的检查
Inspection of Left and Right Crankcase Bearings as well as Oil Seal

1、 检查左、右箱体的所有轴承转动是否灵活；若转动不灵活或有发卡的现象则应更换相同型号的轴承。
Check all the bearings of left and right crankcases for flexible rotation; in case of inflexible rotation or seizure, the bearings shall be replaced with those ones of the same model.

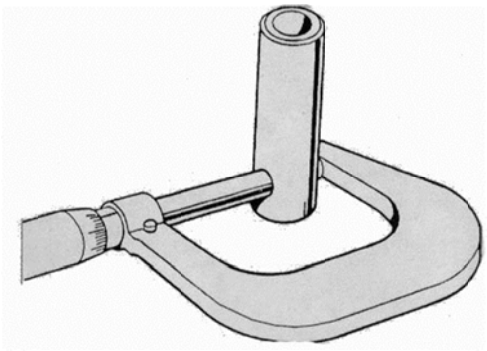
2、 检查左箱体上副轴、换档臂油封是否正常，若发生损坏则应更换相同型号的油封。
Check whether the oil seals of counter shaft and shift arm on left crankcase is intact; in case of damage, they shall be replaced with those ones of the same model.

换档拨叉/换档拨叉轴/变速鼓的检查
Inspection of Shift Fork/Shift Fork Shaft/Gear Shift Drum

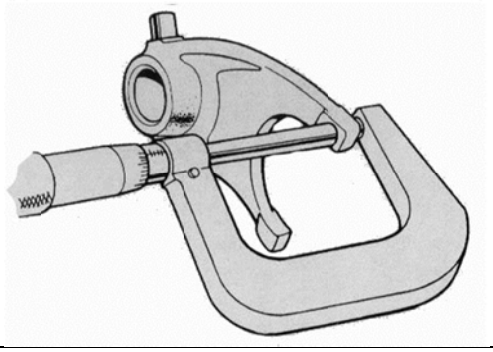
检查各换档拨叉是否有磨损、弯曲或其他任何故障，测量换档拨叉内径。
Check each shift fork for wear, bending or any other fault, and measure the inner diameter of shift fork.
拨叉维修极限值：φ12.020 mm
Maintenance limit value of fork: φ12.020 mm



检查拨叉轴是否有磨损、毁坏或弯曲，测量外径。
Check the fork shaft for wear, damage or bending, and measure its outer diameter.
拨叉轴维修极限值：φ11.95 mm
Maintenance limit value of fork shaft: φ11.95 mm



测量叉爪的厚度。
Measure the thickness of fork pawl.
维修极限值：4.8 mm
Maintenance limit value: 4.8 mm



检查变速鼓表面和槽是否有磨损或损坏
Check the gear shift drum surface and groove for wear or damage.

主副轴组件的检查
Inspection of main and counter shaft assembly

检查主副轴组件各齿轮是否有过量或不正常的磨损,检查齿轮之间的各卡圈是否有变形、脱落现象。
Check each gear of main and counter shaft assembly for excessive or abnormal wear, and check inter-gear clamps for deformation and insecurity.

机油滤网的检查
Inspection of Oil Screen

1. 检查机油滤网的清洁度；对清洁度差的机油滤网要用汽油冲洗干净。
   Check the cleanliness of oil screen; use gasoline to flush clean the dirty oil screen.
2. 检查机油滤网是否有损坏的现象；若有损坏的现象需更换新的机油滤网。
   Check the oil screen for damage; if any, replace it with a new one.

机油滤网的装配
Assembling of Oil Screen

1、 将机油滤网、弹簧依次安装到左体相应孔中。
   Mount the oil screen and spring in corresponding holes on the left case body.
2、 安装机油滤网盖。
   Mount the oil screen cover.

注意：
Note:
机油滤网盖扭紧力矩：（15～20）N•m。
Tightening torque of oil screen cover: (15～20) N•m

变速器/曲轴/平衡轴的装配
Assembling of Transmission/Crankshaft/Balance Shaft

1、 把曲轴装到右体相应的孔中。
   Mount the crankshaft in the corresponding hole on the right case body.
2、 把主副轴组件、变速鼓、拨叉、平衡轴装到左体相应的孔中，再将拨叉轴装配到相应的位置。
   Mount the main and counter shaft assembly, gear shift drum, shift fork and balance shaft in corresponding holes on the left case body, and then mount the fork shaft to the corresponding position.

注意：
Note:

2、 标记为--R 的拨叉装入副轴靠右体一侧；
Mount the fork marked with R in the counter shaft on right body side.
3、 标记为--L 的拨叉装入副轴靠左体一侧；
Mount the fork marked with L in the counter shaft on left body side.
4、 标记为--C 的拨叉装入主轴。
Mount the fork marked with C in the main shaft.

合箱
Crankcase Assembling

1、 将定位销装到左箱体相应的孔中，安装新的密封纸垫。
Mount the dowel pins in corresponding holes on the left case body, and mount a new sealing paper gasket.

2、 将左箱体合在右箱体上。
Connect the left case body onto the right case body.

注意
Note
左曲轴轴承与左曲轴孔为过盈配合，需以热装方式安装，即安装之前，需要将左曲轴孔烤热，再将左箱体合到右箱体上。
The left crankshaft bearing requires interference fit with the crankshaft hole and shall be mounted in a shrinkage-fitting way; namely, before installation, bake hot the left crankshaft hole, and then mount the left case body onto the right case body.

3、 将 8 颗 GB/T16674 小盘螺栓 M6×50、1 颗 GB/T16674 小盘螺栓 M6×70、1 颗 GB/T16674 小盘螺栓 M6×100 穿过左体相应的螺栓孔并将其紧固；
Put 8 small GB/T16674 M6×50 pan-head bolts, 1 small GB/T16674 M6×70 pan-head bolt and 1 small GB/T16674 M6×100 pan-head bolt through corresponding bolt holes on the left case body, and tighten them.

注意
Note
全箱螺栓紧固扭矩：11～13 N•m。
Tightening torque for bolts of the integrated case: 11～13 N•m