

Foreword

The types of motorcycles increased day by day due to new structures and new technologies are adopted. For users and maintainers knowing well about the maintenance, adjustment and repair technologies of LX178MN engine, we made this maintenance manual for more convenience and better guidance for users and maintainers of Loncin.

All the data, diagrams, informations, performance targets are the latest when the manual is printing. Loncin motor co. ltd. reserves the right of revising the manual at any time without notification in advance. All rights reserved by Loncin motor co. ltd. for any parts of this manual, and no reprint is allowed before agreed by Loncin.

Directory

1 .Summary.....	3
2 .Lubrication system.....	7
3 .Checking and adjustment.....	10
4 .Fuel system.....	13
5 .Cooling system.....	16
6 .Cylinder and air valves.....	18
7 .Cylinder body and piston.....	28
8 .Clutch component.....	33
9 .Gearshift system.....	38
10 Magneto and electrical starting component.....	40
11.Crankshaft and transmission system.....	44
12.Fault diagnosis.....	50

1

Summary

Precaution in maintenance

Standard torque

Main technological parameters for performance

Periodic chart for maintenance

Precaution in maintenance

1. Spare parts, lubricant and other auxiliary material adopted should be agreed or recommended by Loncin. In case selected material failed to meet demands of Loncin specification and requirement, the motorcycle may damage.
2. Washer, seal parts and split pin need to be replaced when re-intallation after disassembly is needed.
3. Bolts and nuts should be fastened by the sequence of diagonal cross, and reached stipulated torque by turning 2~3 times.
4. Flammable cleaning fluid for parts' washing is not allowed. Spread lubricant on movable surface of parts before installation.
5. Inspect and confirm correct assembly after installation, check by means of turning, moving and operation.

Technological parameters for main performance

Items		Type
		YF300
Type		LX178MN
Style		Single cylinder, 4 stokes, standing type engine, water cooled, 4 air valves, double OHV
Main parameters for performance	Max. power and its rotation speed	(19.3±5%)kW/(8500±1.5%)rpm
	Max. torque and its rotation speed	(24.5±5%) N·m/ (7000±1.5%) rpm
	Min. fuel consumption	≤340 g/km·h
	Min. steady rotation speed of idling	(1500±150) rpm
Main parameter for structure	Cylinder bore	78mm
	Piston stroke	61.2mm
	Total displacement	292.4ml
	Compression ratio	11.0: 1
	Air intake	OHV
	Ignition	CDI
	Lubrication	Pressure and splash
	Cooling	Water
Transmission device	Type of clutch	Manual operation clutch, wet and plates
	Gearshift	International gearshift
	Primary ratio	2.864
	1 st gear	3
	2 nd gear	2
	3 rd gear	1.5
	4 th gear	1.25
	5 th gear	1.05
	6 th gear	0.905
Starting		Foot and electrical
Carburetor		Vacuum and diaphragm MV34-5A
Ignition advance angle curve or working-set point		1700±200r/min when 0° ± 1° 5000± 200r/min when 25° ± 1°
Spark plug		Resistive B8RC
Lockage angle for air intake valve	Open	BTDC 0° (Open is 1)
	Close	ABDC 40° (Close is 1)
Lockage angle for air exhaust valve	Open	BBDC 37° (Open is 1)
	Close	ATDC 2° (Close is 1)
Brand of lubricant		15W/40-SE
Capacity of lubricant (mL)		1500±100mL
Net weight of lubricant (kg)		34±1kg

Data of standard torque

Ref.No.	Parts name	Specification	Torque N·m
1	Spark plug	M10	15~20
2	Bolt on cylinder head cover	M6	8~12
3	Bolt for bracket of camshaft	M6	10~15
4	Fastening bolt of cylinder body	M6	10~15
5	Fastening bolt for cylinder head	M10	40~50 (Pre-fastening) 50~60 (Final-fastening)
6	Locking bolt for timing driven sprocket wheel	M6	10~15
7	Fastening bolt of tensioner	M6	10~15
8	Bolt for oil tube	M8	10~15
9	Fastening nut of primary driving gear	M12	90~100
10	Fastening nut of clutch	M12	70~80
11	Locking nut of impeller	M6	10~15
12	Controller valve comp. of oil	M12	10~15
13	Fastening bolt of guiding plate of ratchet	M6	8~12
14	Fastening bolt of rotor of magnetor	M12	100~120
15	Fastening bolt of gearshift drum plate	M6	10~15
16	Bolt of check plate	M6	10~15
17	Positioning bolt of gearshift arm	M10	25~30
18	Oil drainage plug	M12	32~40
19	Pin axis of chain adjustor	M8	25~30

Except the key torque data in table above, others follow the table below:

Ref.No.	Parts name and specification	Torque N·m
1	5mm Bolt and nut	5~7
2	6mm Bolt and nut	10~15
3	8mm Bolt and nut	15~20
4	10mm Bolt and nut	25~35
5	12mm Bolt and nut	30~40
6	5mm Screw	3.5~5
7	6mm Screw	8~12

Periodic chart of Maintenance

<div> <div>Times</div> <div>Items</div> </div>	Mileage chart km				
	500	2000	5000	10000	15000
Clutch-adjustment	√	√	√	√	√
Clutch friction plate-checking			√		√
Spark plug-Cleaning and clearance checking	√	√	√	√	√
Valve clearance-Checking					√
Air filter-cleaning	Each 1000km				
Air filter-replacement	When damage				
Carburetor-inspection, adjustment	√	√	√	√	√
Spark plug cap-Cleaning	Each 4000km				
Oil filter-Replacement	√		√		√
Oil-replacement	√		√		√
Sprocket wheel-checking			√		√
Coolant-replacement	Each 2 years				
Heat radiator-checking			√		√
Fuel system-cleaning	√	√	√	√	√
Bolt, nut, washer-checking	√		√		√
Lubricant system-checking	√	√	√	√	√

Maintenance of motorcycle should be conducted according to chart above

Items in chart above should be done by Loncin service maintainer, in case of self-maintenance, reference to chart above is also necessary.

2

Lubrication system

Notice of maintenance	Replacement of lubricant filter
Troubleshooting	Replacement of decompression valve
Lubrication system of engine	Assembly and disassembly of oil pump
Checking of lubricant	... Inspection of oil pump
Replacement of lubricant	Wash oil screen net

Notice of maintenance

This section introduce washing, inspection and replacement of lubrication system and its parts. This work could be done without disassembly of engine, but oil drainage is needed before that.

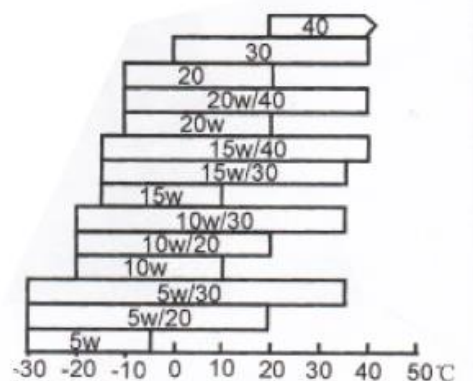
Troubleshooting

- | | |
|--|--|
| <p>A. Fast oil consumption</p> <ol style="list-style-type: none"> 1.Oil leakage of engine 2.Abrasion of piston ring .. 3.Abrasion of guiding rod of air intake and exhaust valve 4.Abrasion or damage of oil drip pan <p>C. Abnormality of lubricant</p> <ol style="list-style-type: none"> 1. Low level of oil 2. Blocked oil passage or filtering screen 3. Oil pump damage | <p>B. Dirt lubricant</p> <ol style="list-style-type: none"> 1. Replace oil without following chart above 2. Thread damage of oil filling port |
|--|--|

Lubrication system of engine

Lubricant is important to performance and working Life of engine, select according to stipulation, Substituted by common oil, gear oil, and plant Oil is not allowed.

This motorcycle use oil of 15W/40SE grade when It left factory, in case other lubricant is needed , its quality should reach grade of QE or SF, Thickness should be selected according to



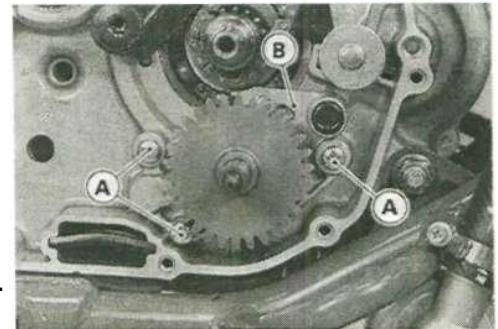
different region and temperature in right picture
Before oil replacement, drain off old oil in
Crankcase first, and then wash by washing kerosene.

Lubricant checking

In case engine just stopped running, waiting for minutes is needed which makes oil reach the bottom of crankcase. Lay engine vertically to ground and check through view window 3,, and the level should be within upper and lower scale line.

In case higher than upper line 1, drain out surplus oil

In case lower than low line 2, add more lubricant



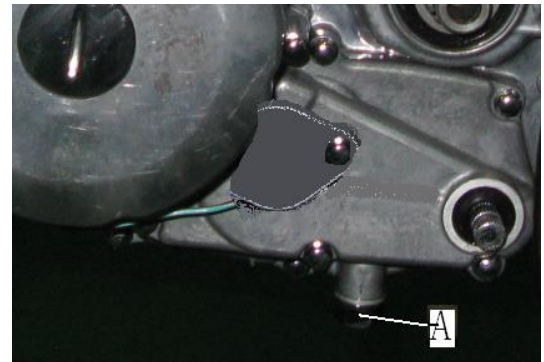
1. Upper scale line
2. Lower scale line
3. Oil view window

Replacement of lubricant

Replace lubricant before it cooled down, in this case, complete oil drainage in crankcase could be ensured. Lay one oil plate under engine, and screw off bolt A for releasing oil. Check seal washer, and replace if damage is found. Screw up bolt A and washer when old lubricant completely released

Fastening torque: $18\text{N} \cdot \text{m}$

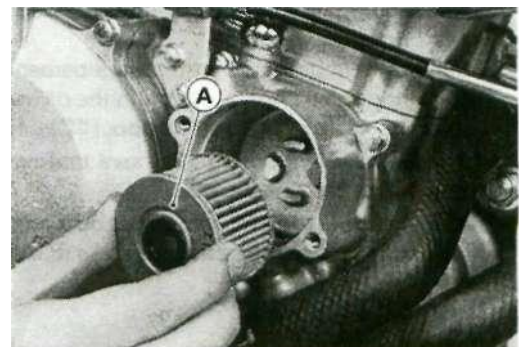
Fill new oil and check its level.



Requirement for newly added oil:
Fill oil by 1.5L when new engine left factory;
Fill oil by 1.3L when oil need replacing and without replace secondary oil filter.
Fill oil by 1.4L in case secondary oil filter also need replacement.

Replacement of secondary oil filter

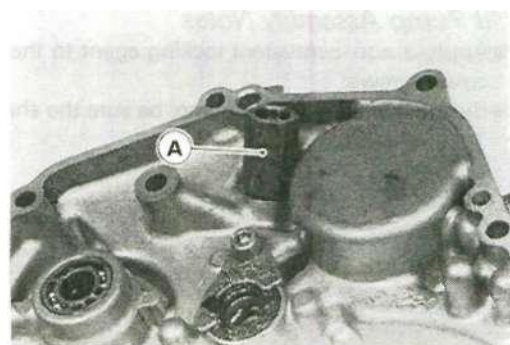
Remove the cap of secondary oil filter, and take out the old filter. Replace by new oil filter and install its cover.



Replacement of decompression valve

Remove right crankcase cover, and screw off decompression valve A, and then install new one and tightly screw up.

Torque for screwing up: $15\text{N} \cdot \text{m}$

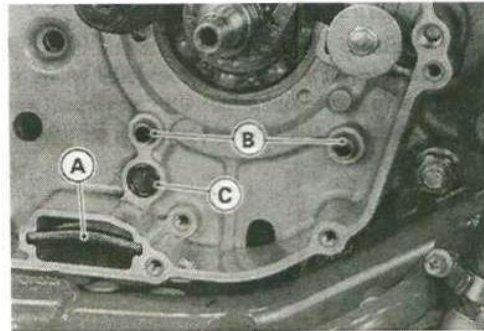


Disassembly of oil pump

Remove right crankcase cover first,
Remove screw A and oil pump B

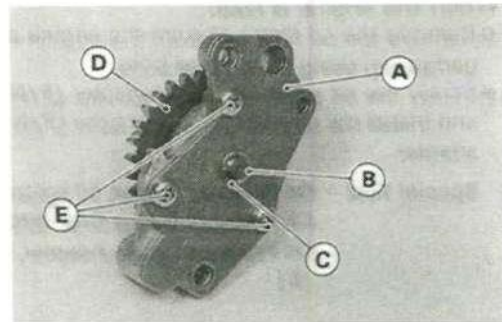
Assembly of oil pump

Clean up metal and dirt on screen A
Spray lubricant on oil pump needs installation.
Confirm positioning pin B and seal ring C and
filtering screen already installed.
Finally fill oil and fasten the screw.



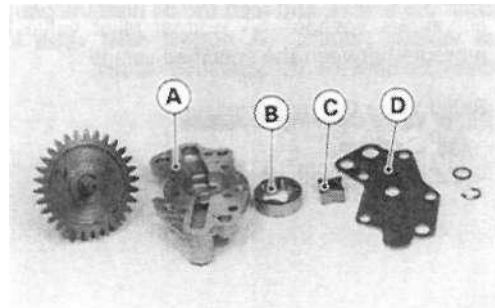
Disassembly of oil pump comp.

Remove washer C and elastic washer B,
and then remove axis of oil pump.
Screw off screw E of oil pump cover,
and remove cover A.
Remove rotors of inner and outer.



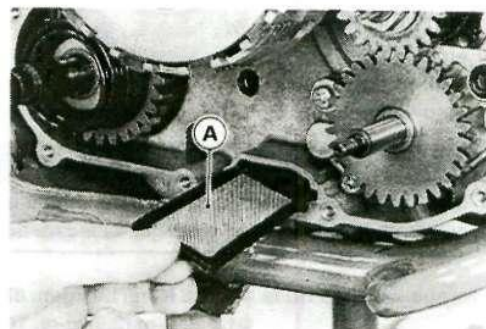
Inspection of oil pump

Open oil pump and then check pump body A,
outer rotor B, inner rotor C and cover D, change
each damaged part or complete oil pump in case
any damage is found.



Washing of oil screen

Remove right crankcase, and take out oil screen
and wash up. No gasoline washing is allowed.
Check damages, replace if damage is found.
Install oil screen back to crankcase and assemble
right crankcase.



3

Checking and adjustment

Notice in maintenance

Technological requirement

Carburetor idling

Test for cylinder pressure

Spark plug

Valve clearance

Timing ignition

Notice in maintenance

This section introduce checking and adjustment of YF300 engine and its each part, and also introduce technological requirement when it is in checking and adjusting.

Technological requirement

1. Engine

Recommended spark plug

B8RC

Clearance of spark plug

0.6~0.7

Clearance of valves

Air intake valve: 0.1~0.19

Air exhaust valve: 0.15~0.24

Lead angle for ignition

1700±200r/min when $0^\circ \pm 1^\circ$

5000± 200r/min when $25^\circ \pm 1^\circ$

Rotation speed in idling

1500±150r/min

Pressure of cylinder

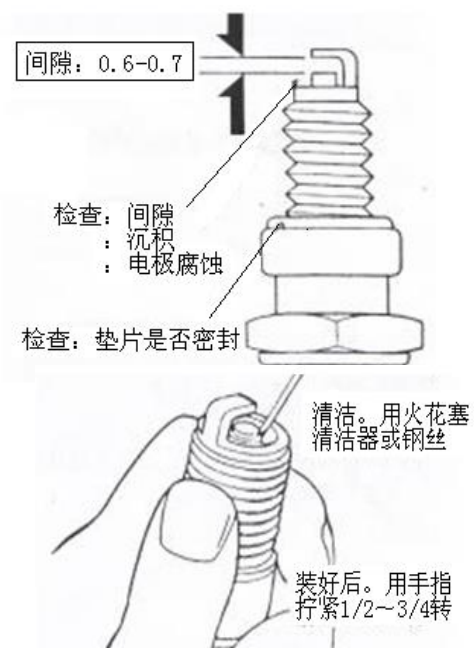
≥1200kPa

Spark plug

Remove spark plug by its sleeve, and visually check damages on insulator of spark plug, and also check ablation on electrode, and replace is needed in case damage is found.

Check clearance between electrodes by feeler gauge. Clearance between spark plug and electrode should be within 0.6~0.7mm.

Carefully adjust clearance. And then erase carbon



buildup and dirt by steel wire or spark plug washer.

Screw up spark plug by hand first and then by sleeve when it is assembling, and then screw up cap of spark plug.

Valve clearance

Caution: Engine should be under cold condition when valve clearance is in adjustment.

Remove cylinder head cover, view-hole cap and its decorative cover A.

Correctly align the timing mark.

Turn crankshaft anticlockwise, align timing mark (T shaped line) on rotor and groove on view-hole cap through viewing by view-hole on left front crankcase cover, and at this moment, the piston is at upper stopping point of compression stroke.

Timing scale line “—” on camshaft should be parallel with joint surface on cylinder head. (Note: Air intake cam corresponds scale line of “IN” while air exhaust cam of “EX”).

Checking of valve clearance

Insert feeler gauge between camshaft and tappet rod for checking valve Clearance.

Clearance of air intake valve: 0.1~0.19

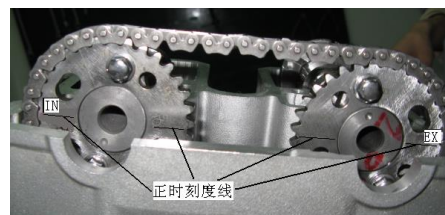
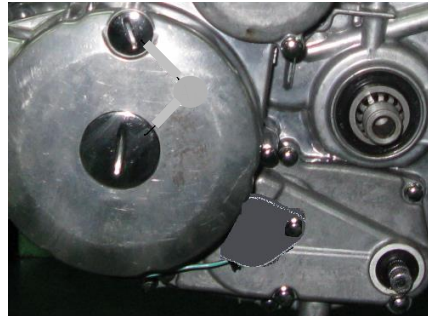
Clearance of air exhaust valve: 0.15~0.24

Adjustment is needed when clearance is incorrect.

Adjustment of valve clearance

Remove bracket of camshaft, and then camshaft A, tappet rod B, and finally remove adjustment washer C; Select a new adjustment washer according to valve clearance.

When installing adjustment washer, the side with mark face to tappet rod of valve; and then install tappet rod and camshaft, ensure position of timing; Measure valve clearance after adjusted; In case re-adjustment is needed, repeat adjustment according to steps above until it is correct;



Install bracket of cam and cylinder head cover.
Idling adjustment of carburetor

Note: Check and adjust idling speed of Carburetor after all other performance of engine reached stipulation range.

Engine should be under hot condition when it is in adjustment, and motorcycle should be supported by main stand, and turn adjustment screw on plug

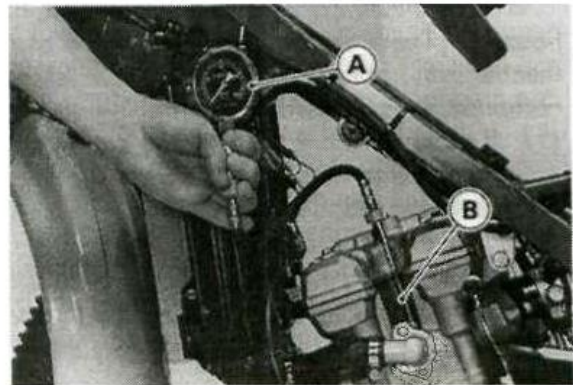
Idling speed: $1500 \pm 150 \text{ r/min}$.



Adjustment screw of idling speed

Pressure test of cylinder
Start engine for pre-heating, and then turn off engine and remove spark plug, and install pressure tube B on installation position of spark plug, and then install pressure meter A on pressure tube B, completely turn on choke and throttle, and finally turn on starting motor for 4~6 times.

Note: Check air leakage on each joint of pressure meter. Repeatedly start engine until rise of pressure meter stopped. Maximum data usually reached after 4~6 times starting.



Pressure of cylinder: $\geq 1200 \text{ kPa}$

4

Fuel system

Notice in maintenance	Adjustment for height of float
Trouble shooting	Installation of carburetor
Disassembly for carburetor	Adjustment for idling speed
Disassembly for float, float needle and injection nozzle	

Notice in maintenance

Summary

1. Be careful when gasoline is in using, keep good air ventilation in working place, and also keep far distance to spark and fire.
2. Pay attention to position of “O” ring when disassembling parts of fuel system, and replace by new “O” ring when re-assembly.
3. There is oil drainage screw at the bottom of float chamber, and this screw could be Loosened and drain off gasoline in float chamber

Troubleshooting

- | | |
|--|---|
| A. Engine could be ignited but unable to start | C. High concentration of mixing gas |
| 1. No fuel in fuel tank | .1. Too high the fuel level in caburetor |
| 2. No fuel entered carburetor | 2. Air nozzle of carburetor blocked |
| 3. Too much fuel in cylinder | 3. Float seized ot float needle failure |
| 4. Air filter blocked | 4. Dirty air cleaner |
| B. Low concentration of mixing gas | D. Unstable idling, stalling speed and bad rotation of engine |
| 1. Nozzle of carburetor blocked | 1. Incorrect idling adjustment |
| 2. Breathing hole on fuel tank cap blocked | .2. High concentration of mixing gas |
| 3. Fuel filter blocked | 3. Low concentration of mixing gas |
| 4. Bad fuel flow in fuel tube | 4. Low compression in cylinder |
| 5. Float needle failure | .5. Air filter blocked |
| 6. Low fuel level in carburetor | 6. Expired fuel |
| |7. Impurity in fuel |

Disassembly of carburetor

Close down fuel switch, and remove connection of fuel tube, and then remove covers both sides. Loosen fuel drainage screw, and drain off fuel in carburetor. Loosen screw connects clamp of air intake tube and carburetor.



Disassembly of float, float needle and nozzle

Remove cap of float chamber and its connective Screw. And then draw out pin of float arm. Remove float and its needle.



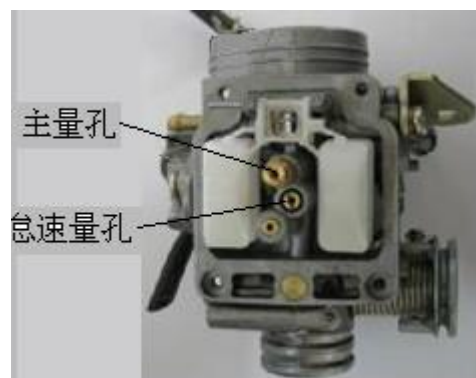
Check abrasion or damage on contact surface of float needle. Replace float needle in case it is necessary.



Remove main jet, foam tube, main nozzle and idling jet.

Caution: Keep in mind installation position of screw and its turning times, or trouble will be met in re-assembly.

Wash surface of carburetor, its holes and passage by cleaning fluid, and then clean up dirt in passage by compressed air, and then install idling jet, foam tube, main jet by sequence of disassembly.

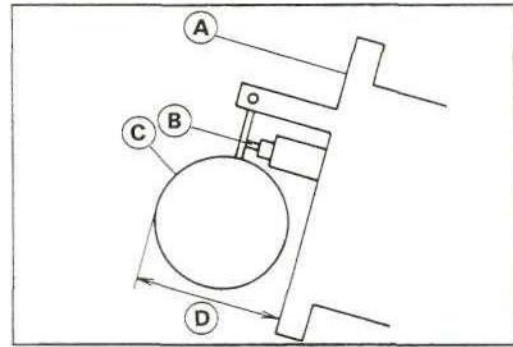


Insert pin of float arm after float and its needle installed.

Adjust the height of float
Measure the height of float by height gauge
first
Height of float D: $17 \pm 0.5 \text{ mm}$

A: Surface of end of float chamber
B: Needle of float
C: Float

Note: No pushing to needle is allowed when
Measure the float height.



When height adjustment is needed, slowly
change the angle of float arm, until end of
float arm precisely touched needle of float,
and float height could be also adjusted on
height gauge.

Installation of carburetor

After carburetor installed, adjust the
free moving distance of throttle lever
by adjustment device on throttle cable.
Free moving distance of throttle lever:
 $2 \sim 3 \text{ mm}$

Adjustment for idling speed

Start engine and raise
its temperature to working condition, and adjust
throttle screw for raising idling speed to $1500 \pm 150 \text{ r/min}$.
Repeatedly operate throttle lever for checking steady
acceleration and deceleration of engine.



Adjustment screw of idling speed

5

Cooling system

Notice in maintenance	Disassembly of cooling pump
Troubleshooting	Assembly of cooling pump

Notice in maintenance

Assembly and maintenance of cooling pump could be done only after its cover removed
No damage on two joint surfaces of cover of cooling pump is allowed.

Trouble shooting

In case there is failure in water cooling system, the engine may be overheated or undercooled which bad for its performance, in this case, periodic maintenance and troubleshooting for cooling system is necessary.

Coolant should be chosen according to different regions and temperature. The ice point of coolant should be lower than its local lowest temperature, running or hard water for substitution is not allowed due to water has cooling function only without functions of antiscaling, antifrost, and raising boiling point, in this case, engine usually uses running and hard water easily lead to rustiness on water pump shaft, scaling and bad heat radiation of water passage, and overheating of engine.

Check coolant in water tank when engine is cold, in case much reduction is found, it indicates there is coolant leakage, and further inspection for outside or inside leakage is needed. View the color of oil could know the inside leakage of water cooling engine, in case coolant entered oil, the oil may look milky white, under this situation, disassembly of engine and inspection on parts related to water passage is needed, such as cylinder head, cylinder body, gasket of cylinder head, and right crankcase.

Check outside leakage through viewing joints to cooling pump cover, heat radiator, auxiliary water tank, and water pipes.

Disassembly for cooling pump

Before disassembly of cooling pump, lay a box under engine first, and then screw off drainage bolt of engine and drain off coolant in engine.

Remove fastening bolt on cover of water pump, and then remove pump cover.

Remove impeller of cooling pump.

Check damage on impeller, abrasion and stretching scratch on static water seal ring and water rotating ring. In case damage is found, replacement is needed.

Check damage on end surface of cooling pump cover. In case damage is found, replacement is needed.



Installation of cooling pump

Press and install static water seal ring on right cover.

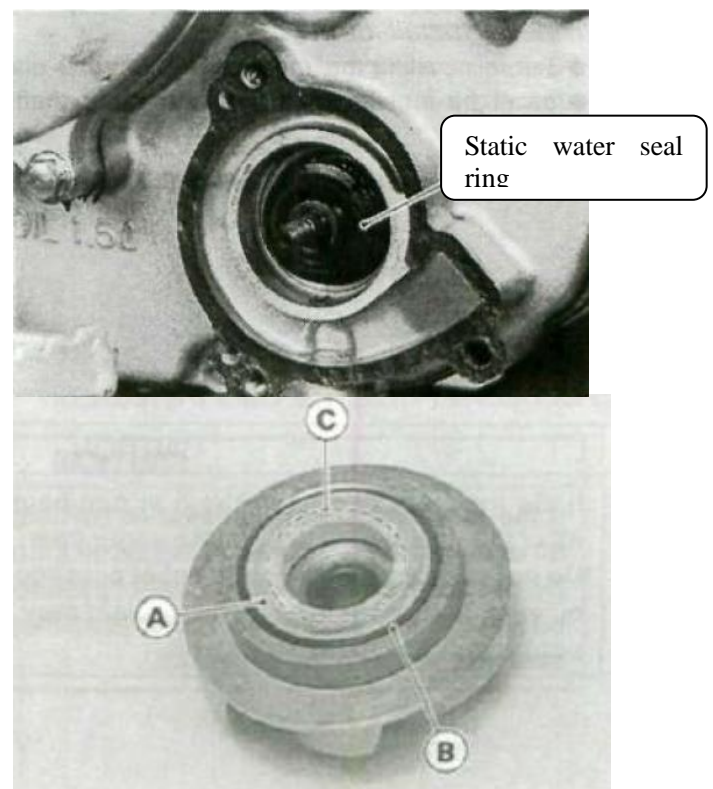
Press and install water rotating ring on impeller of water pump, whose surface matches static ring faces outwards.

Tightly lock impeller of cooling pump.

。

Locking torque of nut: 10N • m

Install cover of cooling pump (Note: Fasten two bolts on positioning pin for ensuring smooth and parallel joint)



Cylinder head and valves

Notice in maintenance	Disassembly of cylinder head	Inspection for valve seat
Troubleshooting	Break down cylinder head	Inspection for valves
Disassembly for cylinder head cover	Inspect valve and its guide tube	Repair valve seat
Remove bracket of cam	Inspect cylinder head	Assemble cylinder head
Remove camshaft	Inspect valve springs	Install cylinder head
Inspect camshaft	Replace guiding tube of valves	
Install camshaft		

Notice in maintenance

Summary

Engine must be disassembled when camshaft, cylinder head, and valve tappet rod is in maintenance, and spread lubricant on camshaft and tappet rod when assembly is needed for basic lubrication.

Size and specification for each part

Items		Standard data (mm)	Limits (mm)
Camshaft	Height of air intake cam	36.20~36.30	36.10
	Height of air exhaust cam	36.17~36.27	36.07
	Diameter of camshaft	22.967~22.980	22.94
	Diameter of hole of camshaft bracket	23.000~23.021	23.08
	Clearance between camshaft and bracket	0.020~0.054	0.15
Valves	Width of line of air intake valve	0.7	0.45
	Width of line of air exhaust valve	0.8	0.5
	Diameter of rod of air intake valve	4.475~4.49	4.460
	Diameter of rod of air exhaust valve	4.455~4.470	4.440
	Pore size of guiding tube of air intake valve	4.510~4.522	4.59
	Pore size of guiding tube of air exhaust valve	4.510~4.522	4.59
	Clearance between air intake valve and guide rod	0.02~0.047	0.07
	Clearance between air exhaust valve and guide rod	0.04~0.067	0.08
	Plate diameter of air intake valve	28.9~29.1	/
	Plate of diameter of air exhaust valve	24.9~25.1	/
Clearance of valves	Air intake valve	0.10~0.19	/
	Air exhaust valve	0.15~0.24	/
Valve springs	Height of inner spring under free condition	36.2	34.5
	Height of outer spring under free condition	41.1	39.4
Length of chain (20 links)		127.0~127.4	138.9

Troubleshooting

Low air pressure in cylinder: Blue smoke

- | | |
|---|--|
| 1. valves | 1. Abrasion of valves |
| Incorrect adjustment of valve clearance | 2. Damage or leakage of oil drip pan |
| Poor seal of valves | 3. Leakage of cylinder head gasket |
| Wrong timing of gas distribution | 4. Wide clearance between piston rings |
| Crack of valve spring | |

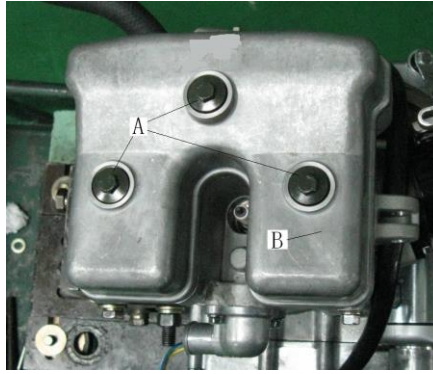
2. Cylinder head Noisy

- | | |
|--|--|
| Poor connection between cylinder head and spark plug | 1. Incorrect valve adjustment |
| Damage of leakage on cylinder head gasket | 2. Valve seized up or spring crack |
| Crack or sand hole on cylinder head | 3. Camshaft worn out |
| 3. Cylinder body, piston | 4. Long timing chain |
| Wide clearance between piston rings or crack | 5. Wrong timing of gas distribution |
| Piston with crack or damage | 6. Abrasion or damage on tensioner of timing chain |
| Big cylinder bore or with sand hole | 7. Abrasion of timing sprocket wheel |

Disassembly for cylinder head cover

Remove fastening bolt A on cylinder head cover.

Remove cylinder head cover B.

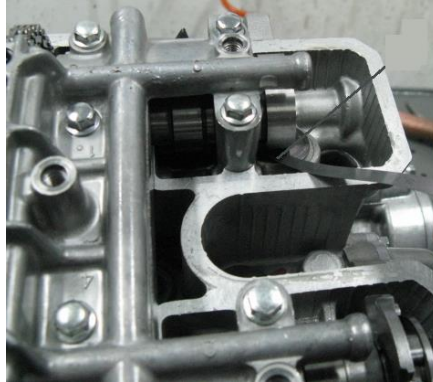


Remove cam bracket

Remove cylinder head cover

Remove bolt connects bracket

Remove cam bracket



Removal of camshaft

Remove cylinder head cover

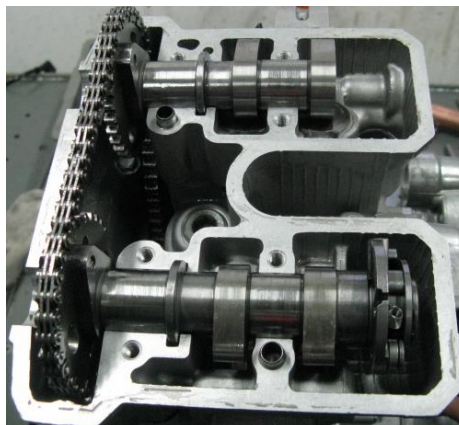
Remove tensioner comp. on cylinder head and bolt on cylinder body

Remove bolt connects bracket

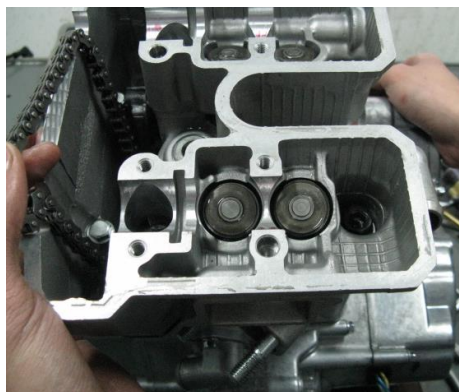
Remove cam bracket

Remove chain

Remove camshaft

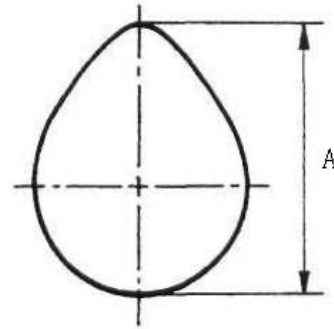


Note: No timing chain drop into crankcase is allowed.



Inspection for camshaft

Check rising distance of each cam.
Measure length A in right picture by micrometer
Check abrasion



Items	Standard date	Limits
Height of air intake cam	36.20~36.30	36.10
Height of air exhaust cam	36.17~36.27	36.07

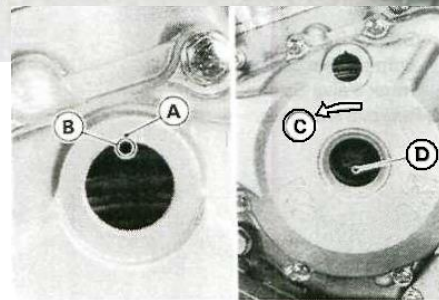
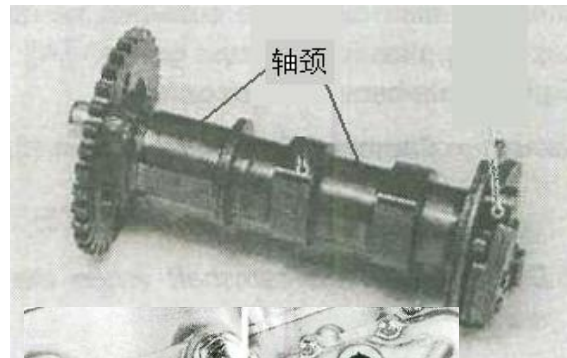
Check neck diameter of each camshaft for confirming abrasion

Air intake and exhaust cam
Standard data: 22.967~22.980
Limit data: 22.94

Installation of camshaft

Aline timing marks

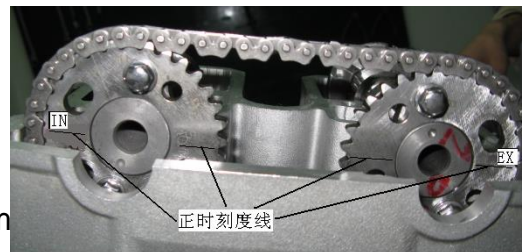
Turn crankshaft D anticlockwise and aline timing mark A on left front cover and mark B(T shaped scale line) on magnetor through viewing C on left front cover, and now the piston is at upper stopping point of compression stroke.



Timing scale line “—” should be parallel with joint surface of cylinder head when installing camshaft.

(Note: Air intake cam corresponds scale line of “IN” while air exhaust cam of “EX”)

Spread lubricant on neck of camshaft and cam



Disassembly of cylinder head

- Remove air intake tube
- Remove joint of water pipe
- Remove cylinder head cover
- Remove bracket of camshaft
- Remove camshaft
- Remove bolt connects cylinder body
- Finally remove cylinder head



Disassembly of cylinder head

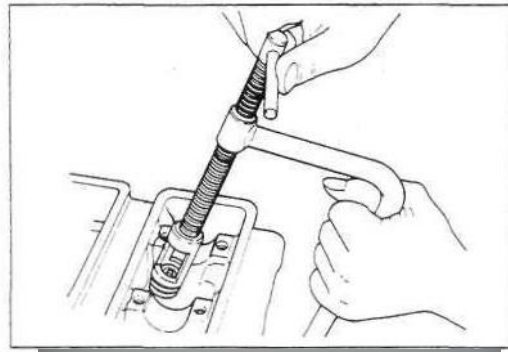
Press down valve spring by valve puller, remove lock clip of valve. Loosen valve puller, and remove seat of valve spring, spring, inner spring seat and valve.

Caution: For avoiding permanent distortion, excessively press spring is not allowed, only need to remove valve and lock clip.

All removed parts should make marks for ensuring its initial installation position when it is in re-assembling.

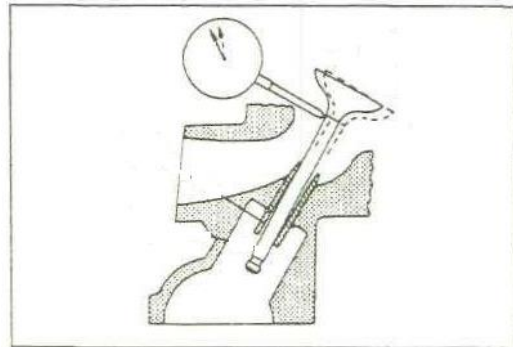
Check valve and its guiding tube

Check if there is bending on valve, abnormal abrasion or ablation on tappet rod of valve. Check movement of valve in its guiding tube and measure its outer diameter.



	Standard	Limit
Intake valve:	4.475~4.49	4.460
Exhaust valve:	4.455~4.470	4.440

Insert each valve into guiding tube and observe its movement



Measure inner diameter of each guiding tube of valve by internal micrometer, and finally calculate clearance between tappet rod and guiding tube.

	Standard	Limit
Guiding tube of intake valve:	4.510~4.522	4.59
Guiding tube of exhaust valve:	4.510~4.522	4.59
Clearance between intake valve and its guiding tube:	0.02~0.047	0.07
Clearance between exhaust valve and its guiding tube:	0.04~0.067	0.08

Caution: Clean up carbon buildup in guiding tube first, and then measure its internal diameter. In case replacement for guiding tube is needed, re-grinding for surface of valve seat is necessary



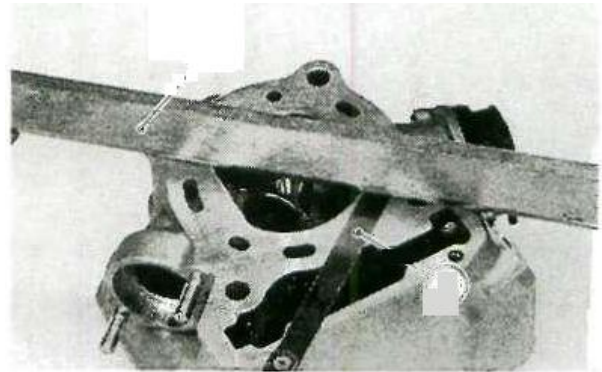
Completely clean up carbon buildup in combustion chamber. Eliminate remains on plane of cylinder head by scraper. No damage on plane of cylinder head is allowed.

Check cylinder head

Check crack on valve seat and hole of spark plug.

Check distortion on cylinder head, and inspect flatness of cylinder head by feeler gauge or knife straight gauge

Limit of maintenance: 0.05

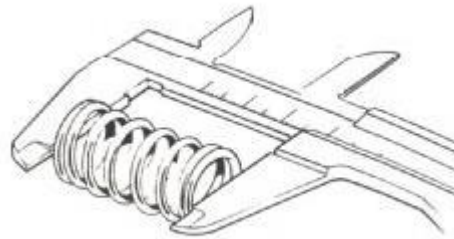


Check valve spring

Measure height of inner and outer spring under free condition.

Limit of maintenance: (Air intake and exhaust)

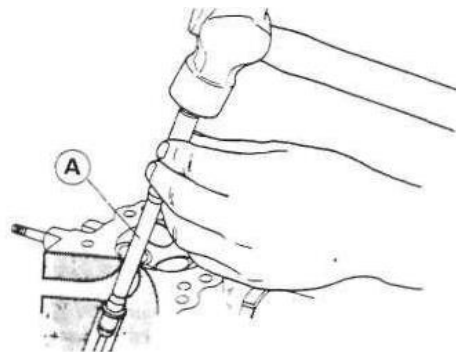
	Standard	Limit
Inner spring:	36.2	34.5
Outer spring:	41.1	39.4



Replace guiding tube

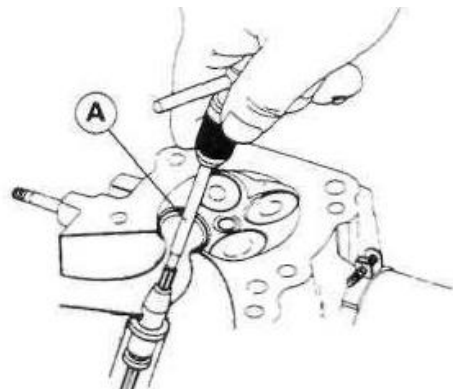
Fix cylinder head, and remove guiding tube from valve hole outwards by puller.

Caution: No damage to cylinder head is allowed when disassembling guiding tube of valve.



Press and install new guiding tube and o-ring on cylinder head, and make expansion for new guiding tube.

Caution: Spread cutting oil on reamer A when hole expansion is conducting. Turning is needed when install or remove reamer.



Finally, wash cylinder head by cleanser, and clean up metal chill from cutting by compressed air.

Check valve seat

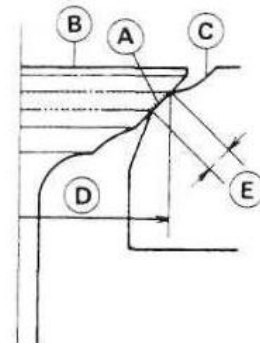
Measure door line diameter D of valve seat ring, and its width E.

Standard of door line diameter D: Intake: 28.3~28.5
Exhaust: 24.2~24.4

Standard of door line width D:

Intake valve, exhaust valve 1.0~1.2

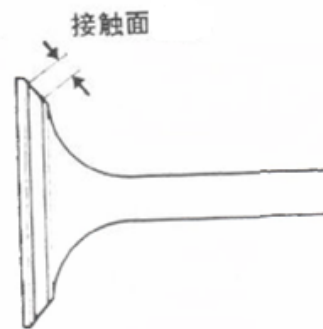
In case diameter or width of door line of seat ring is unqualified, repair seat ring until it meets the demand for correct sealing.



Check valve

Remove valve and check its contact surface

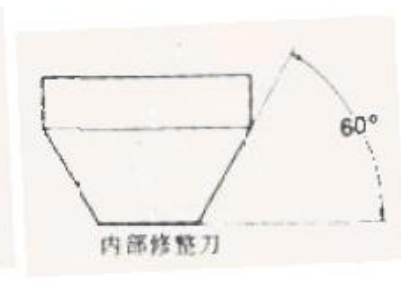
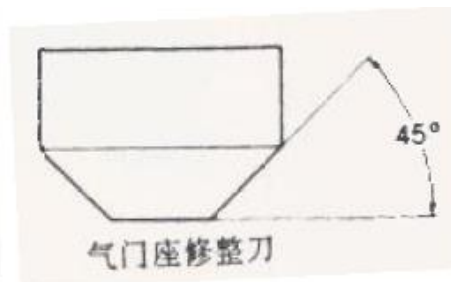
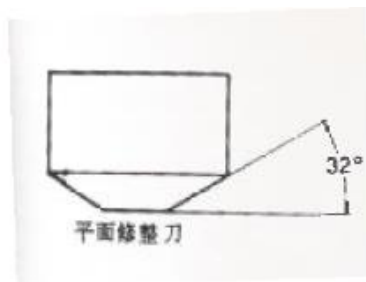
In case coarse, uneven abrasion of contact surface of valve is found, or contact to valve seat is abnormal, replacement for valve is needed.



Repair valve seat

Milling cutter of valve seat

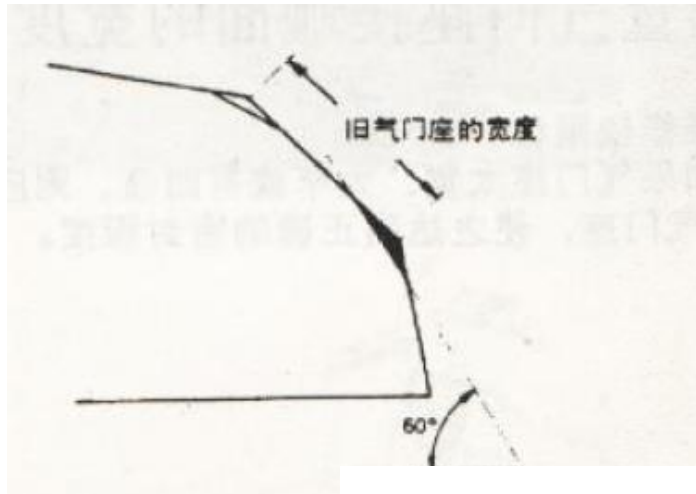
Milling cutter with three different angle



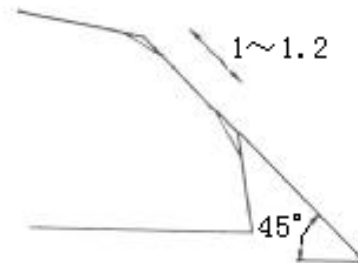
Mill upper ring belt area of valve seat by milling cutter of 32°



Mill bottom belt ring area of valve seat by milling cutter of 60°



Make fine machining on working surface of valve seat by milling cutter of 45° for its width reaching correct data
Standard data of width of working surface: 1.0~1.2。



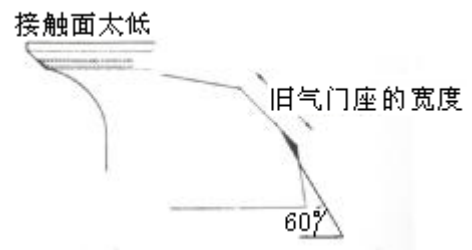
Spread stamp-pad ink on valve seat, and emboss valve and turn, and remove valve for observe its contact surface.

Caution; Good contact surface between valve and its seat is important for sealing performance of engine.



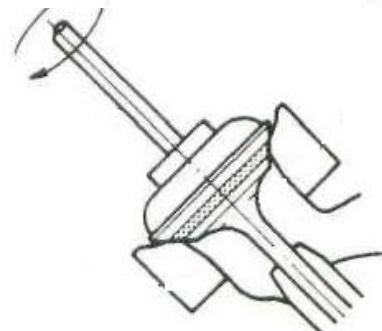
In case too high the contact surface, decrease its height by milling cutter of 32°.

In case too low the contact surface, rise its height by milling cutter of 60°.



Finally mill by milling cutter of 45° until the width of contact surface of valve seat reached stipulated data.

After valve seat finished machining, spread abradant on valve seat, and then install valve and grind by rubber tips with abradant. When grinding finished, wash and clean up abradant remain on cylinder head valve, valve seat and its guiding tube.



Assembly of cylinder head

Install oil drip pan onto valve guiding tube before installing valve.

Spread lubricant on rod of air intake and exhaust valves, and then install into guiding tube. Install valve spring and its seat.

Caution: Spring's end with small pitch face to cylinder head when it is installing.

Press down valve spring by valve puller, and then install clip into valve spring seat.

Caution: For avoiding permanent distortion, no excessive compressing on spring is allowed, only need it is enough to contain lock clip of valve.

Slightly knock the end of valve rod by plastic hammer for ensuring firm installation in groove.

Installation for cylinder head

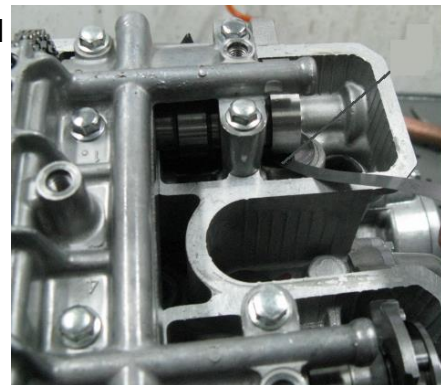
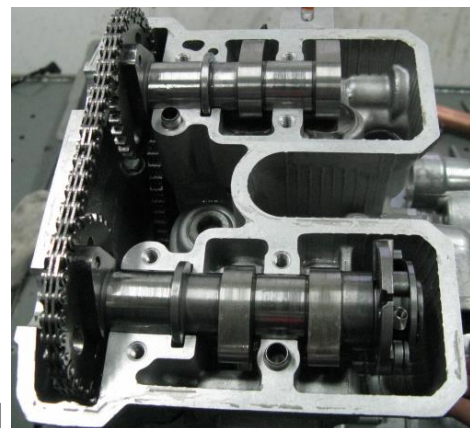
Clean up plane of cylinder after cylinder gasket removed, and then install new gasket and positioning pin.

Caution: No dust or impurity enter into cylinder is allowed.

1. Install new gasket and locating pin
2. Install bolt A, B, and washer on cylinder head.
3. Install bolts connect cylinder body.
4. Install adjustment washer and tappet rod of valve.
5. Install camshaft
6. Install positioning pin and bracket of cam.
7. Install tensioner.

Caution: Fasten bolt A and B first, and start from the position of positioning pin, and by the turns of diagonal cross; After smooth and flat plying-up, fasten bolt A and B by torque of $(45\sim45)\text{N} \cdot \text{m}$, and then fasten by torque of $(50\sim55)\text{N} \cdot \text{m}$, and finally fasten bolt for connective of M6.

Spread engine lubricant on tappet rod of valve, camshaft and neck of cam. Align the timing mark when installing camshaft.



Install new gasket in the groove on cylinder head cover.

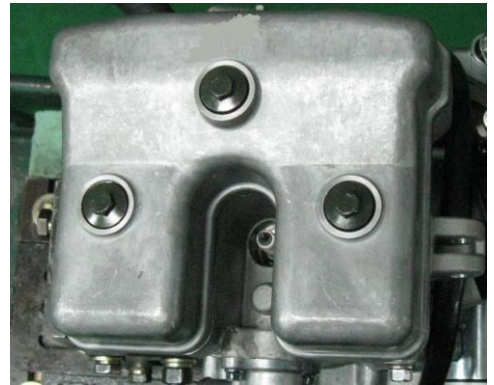
Install the cover on cylinder head.

Screw up fastening bolts on cylinder head cover.

Fastening torque for bolts should be: (8~10) N·m.

Note:

When seal ring of fastening bolt for cylinder head cover is in installing, the side of seal ring with metal lining faces upwards(This side matches flange face of bolt on cylinder head cover).



Cylinder body and piston

Notice in maintenance

Disassembly of piston

Troubleshooting

Assembly of piston

Disassembly of cylinder

Assembly of cylinder

Notice in maintenance

Summary

Well install new washer and positioning pin first before installing cylinder, no dust and impurity enter crankcase is allowed.

Specification of each part

Items		Standard (mm)	Limit (mm)
Cylinder body	Cylinder bore	78.00~78.01	78.07
Piston	Outer diameter of piston	77.950~77.97	77.805
	Inner diameter of hole of piston pin	17.002~17.008	17.04
	Width of groove of 1 st ring	1.01~1.03	1.11
	Width of groove of 2 nd ring	1.01~1.03	1.11
	Width of groove of 3 rd ring	2.01~2.03	2.11
Connective rod	Hole diameter of small end	17.013~17.025	17.05
Piston pin	Outer diameter	16.994.0~17.000	16.96
Clearance between piston and cylinder		0.03~0.06	0.12
Clearance btween piston pin and its hole		0.002~0.014	0.02
Clearance between piston pin and small end of connective rod		0.013~0.031	0.05
Thickness of piston rings	1 st ring	0.97~0.99	0.9
	2 nd ring	0.97~0.99	0.9
Clearance between piston rings and their groove	1 st ring	0.02~0.06	0.16
	2 nd ring	0.02~0.06	0.16
Closure clearance of piston rings	1 st ring	0.15~0.3	0.65
	2 nd ring	0.20~0.35	0.7
	Oil ring	0.2~ 0.7	1.0

Trouble shooting

Low or unstable compression

1. Abrasion on cylinder or piston ring or on piston

Smoky

1. Abrasion on cylinder, piston or its rings
2. Incorrect installation of piston rings
3. Scratch on cylinder inner wall or piston

Overheated

1. Carbon buildup in combustion chamber

Abnormal knock

1. Knocking or abnormal sound
2. Abrasion on cylinder or piston
3. Carbon buildup on piston

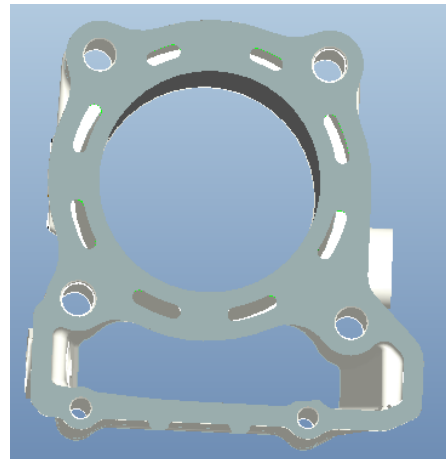
Disassembly of cylinder body

Remove cylinder head (Refer to section 6th)
Remove gasket and positioning pin
Remove cylinder body

Caution; No timing chain drop into crankcase is allowed.

Clean up remains on cylinder surface by scraper.

Caution: Immerse into gasoline may lead to easy work, while avoiding damage on contact surface of cylinder.



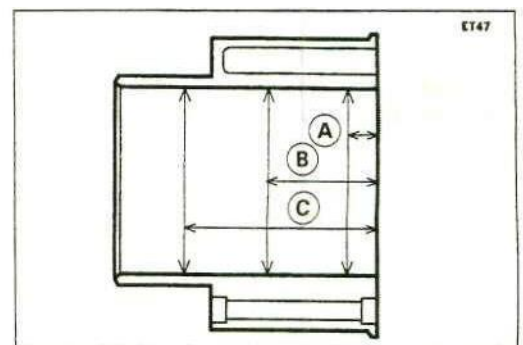
Check cylinder

Check abrasion and damage on cylinder
Measure inner diameter in three positions, which are A, B, and C points at top, middle and bottom of stroke of piston respectively, whose two directions are vertical to each other.

A=10 B=60 C=100

Standard data for cylinder bore is : 78.00~78.01

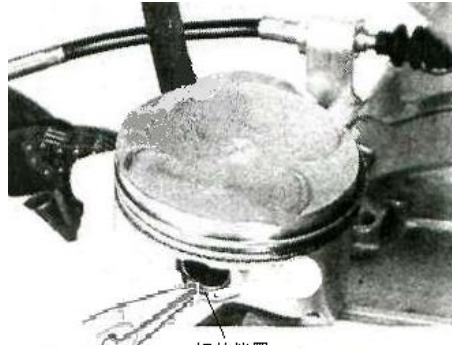
Limit datum for maintenance is: 78.1



Remove piston
Remove circlip of piston pin by pliers

Caution: No circlip drop into crankcase is allowed

Press piston pin out of piston, and then remove the piston.



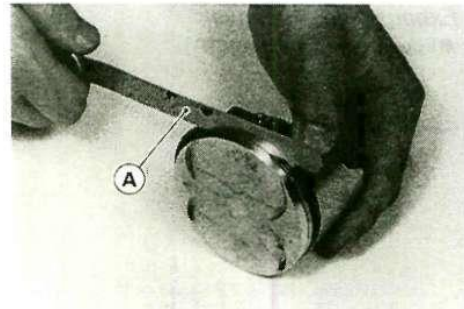
Piston/Piston rings' check

Measure clearance between piston rings and their grooves by thickness gauge A.

Standard data:

1st ring: 0.02~0.06

2nd ring: 0.02~0.06



Limit data:

1st , 2nd ring: 0.16

Remove piston ring

Caution: No damage to piston rings during disassembling is allowed



Insert each piston ring into cylinder and measure clearance.

Standard data:

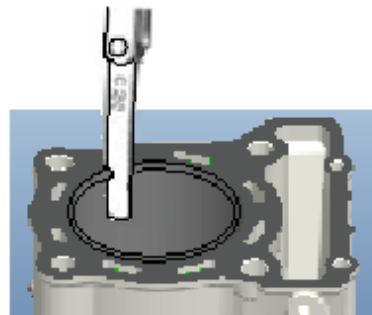
1st ring: 0.15~0.3

2nd ring: 0.20~0.35

Limit data in maintenance:

1st ring: 0.65

2nd ring: 0.7



Check abrasion or damage on piston and its grooves.

Measure outer diameter at position by 5mm above bottom of piston skirt.

Standard: 77.950~77.97

Limit: 77.805

Calculate clearance between cylinder and piston

Limit: 0.12

Measure diameter of hole of piston pin:

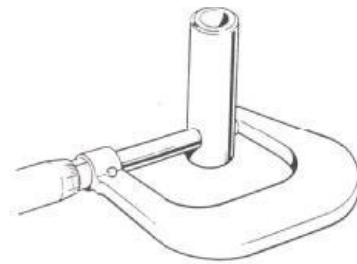
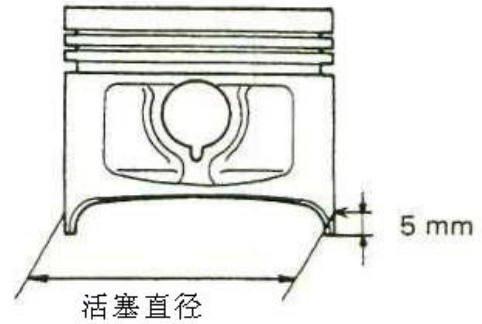
Standard: 17.002~17.008

Limit: 17.04

Measure outer diameter of piston pin:

Standard: 16.994.0~17.000

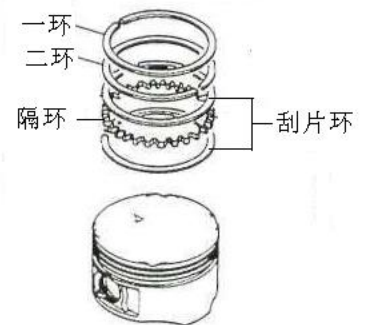
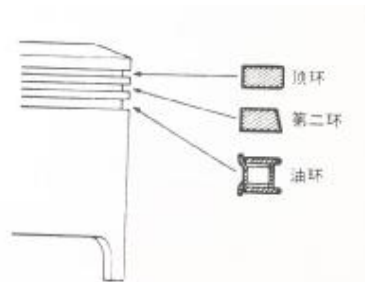
Limit: 16.96



Installation for piston rings

Completely wash and clean up grooves for piston ring, and then install rings.

Caution: No damage on piston and its rings during installation is allowed
The side with mark of rings face upwards.
Flexible turning of piston ring is needed after installed.
No opposite installation for top and 2nd ring is allowed



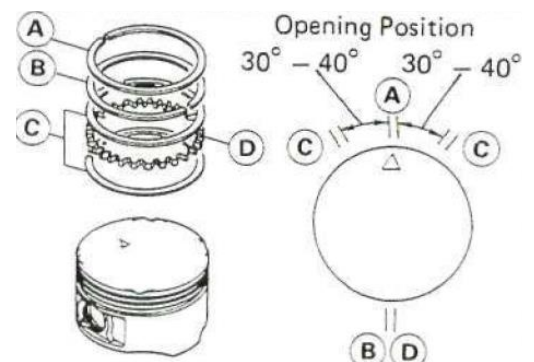
Issues need pay attention during installaion:

Opening on 1st ring face to direction of exhaust;

Opening on 2nd ring and oil ring face to air intake;

Interval between openings on 1st ring and 2 blade rings should be (30~40) degree.

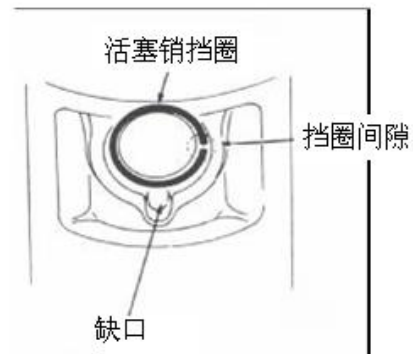
Oil ring made of three pieces, whose interval only need match to clearance of spacing ring.
install spacing ring first and then blade ring
when installing oil ring.



Install piston

Install piston, piston pin and new circlip of piston in together.

Caution: The side with mark“▲” face to exhaust valve when installing piston.
Clearance on end of circlip should interlace opening on piston. New circlip must be used when in re-installation. No circlip drop into crankcase is allowed.

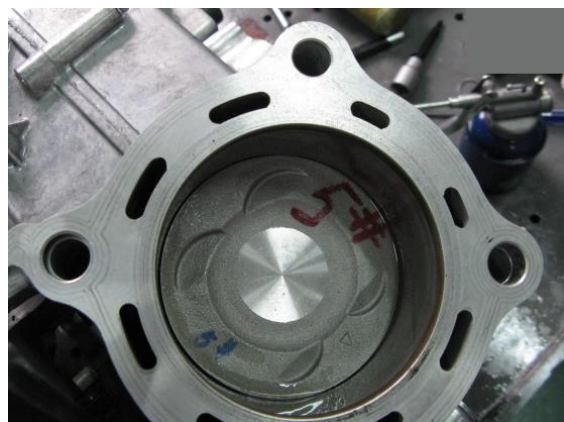


Install cylinder body

Install new gasket and positioning pin.

Spread oil on cylinder and piston rings.
Install cylinder.

Caution: No damage to piston
During installation is allowed. No
timing chain drop into crankcase
is allowed.



Install gasket and positioning pin.
Install cylinder head.

8

Clutch component

Notice in maintenance	Install right crankcase cover
Troubleshooting	Remove clutch and driving gear
Disassemble clutch cover	Disassemble clutch
Install clutch cover	Check clutch
Disassemble right crankcase cover	Assemble clutch and driving gear

Notice in maintenance

Maintenance work could be done after right crankcase cover removed, without taking down engine from motorcycle. No damage to right crankcase cover and joint surface of crankcase is allowed, no impurity enter engine is allowed.

Specification of each part

Items		Standard (mm)	Limit (mm)
Clutch	Free moving distance	2~3	/
	Thickness of driving plate	2.95~3.05	2.7
	Thickness of driven plate	Max.flatness0.1	0.2
	Length of spring under free conditon	35.5	34

Troubleshooting

Clutch skidding in acceleration

1. Insufficient free moving distance
2. Abrasion on friction plate

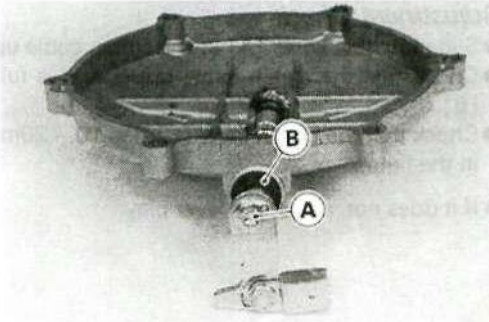
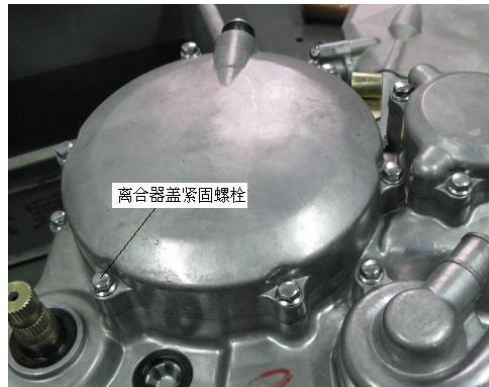
Remove clutch cover

Remove clutch cable

Loosen fastening bolts on clutch

Remove clutch cover

Caution: No taking out of operation rod A is allowed when removing clutch for avoiding damage oil seal B, in case took out, replace by new oil seal is needed.



Install clutch cover

Install positioning pin for clutch cover

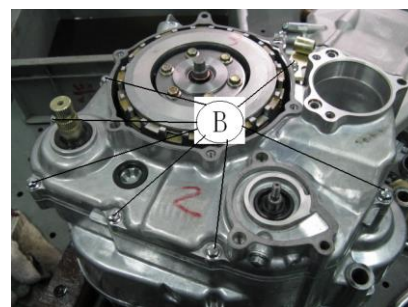
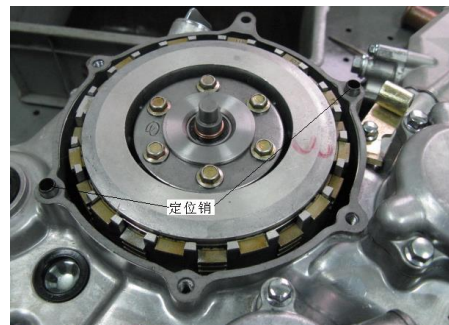
Turn downwards the operation rod

Replace new gasket for clutch cover

Install clutch cover

Fasten installation screw

Fastening torque: (8~10) N·m



Remove right crankcase cover

Drain off oil

Drain off coolant

Remove water pipe

Remove clutch cover

Remove cover of water pump

Remove impeller of water pump

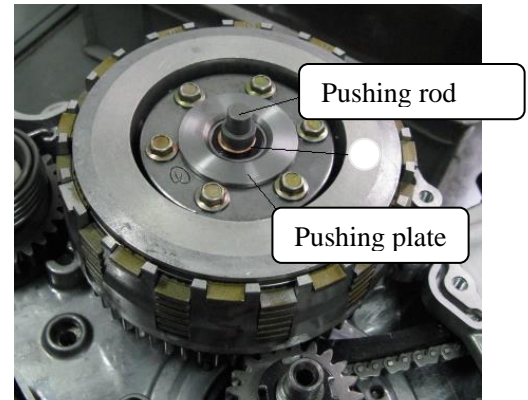
Loosen connective bolts of right crankcase cover

Remove right crankcase cover

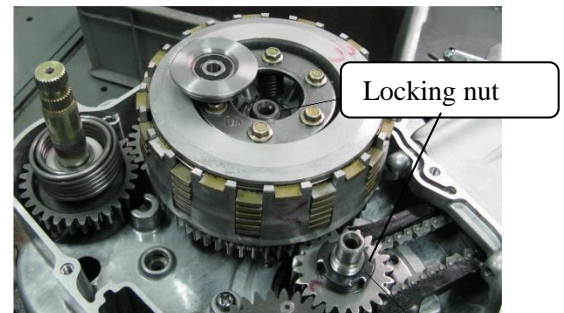


Remove clutch and driving gear

Remove pushing rod
Remove pushing plate



Loosen locking nut on clutch
Screw off locking nut on primary driving gear

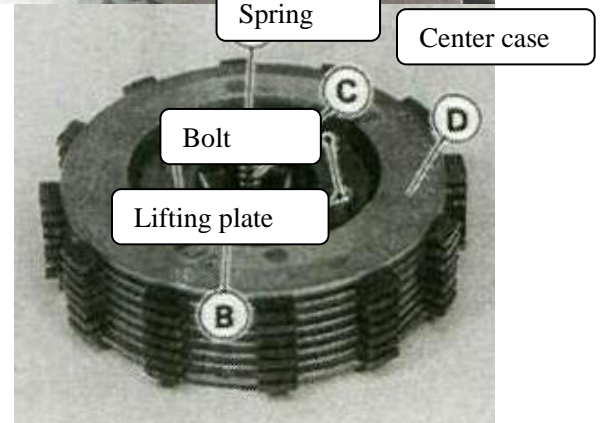


Remove clutch component
Remove collar and flat washer on clutch
Remove primary driving gear
Remove semi-round key



Disassemble clutch

Loosen spring bolt
Remove lifting plate, spring and center case
Remove driving plate (with friction material) and driven plate (steel plate)

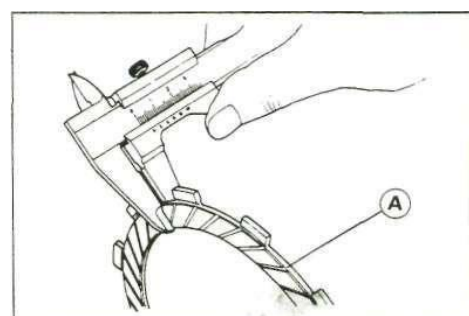


Check clutch

Check thickness of driving plate by vernier caliper:

Standard: 2.92~3.08

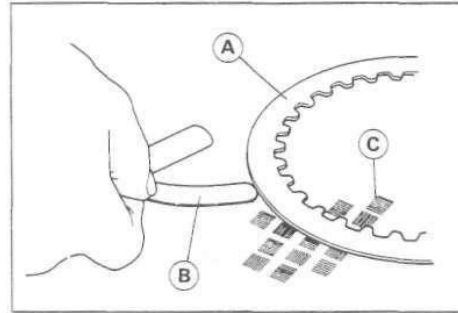
Limit: 2.7



Check flatness of driven plate by
thickness gauge

Standard: ≤ 0.1

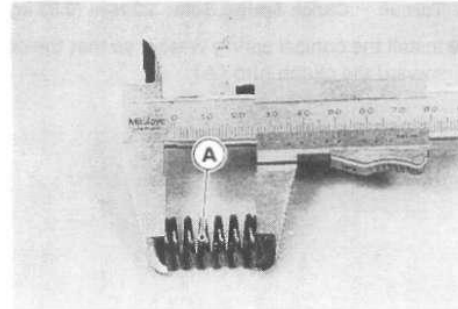
Limit: 0.2



Check spring length under free condition
by vernier caliper

Standard: 35.5

Limit: 34

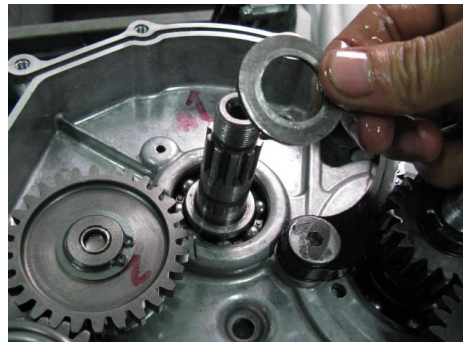


Install clutch and driving gear

Install woodruff key

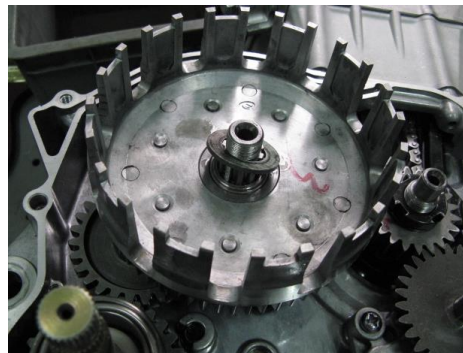
Install driving gear

Install flat washer and shaft sleeve
of clutch



Install outer case of clutch

Install washer of lower surface
of clutch center case

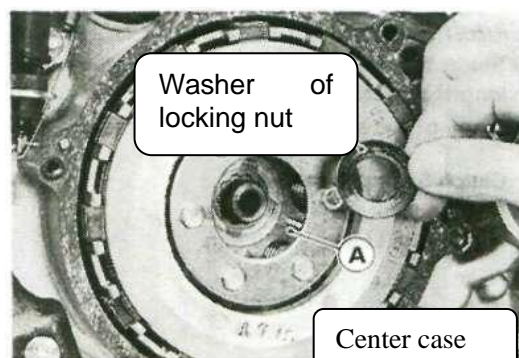


Install center case comp.

Install washer of locking nut of clutch

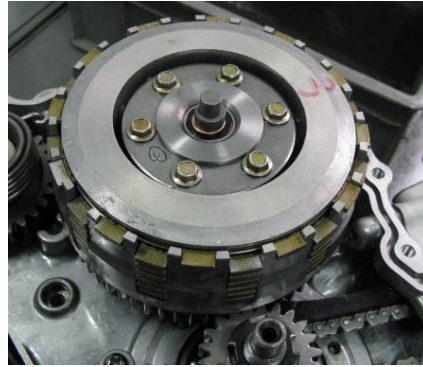
Install locking nut of clutch

Installation torque: (70~80) N·m

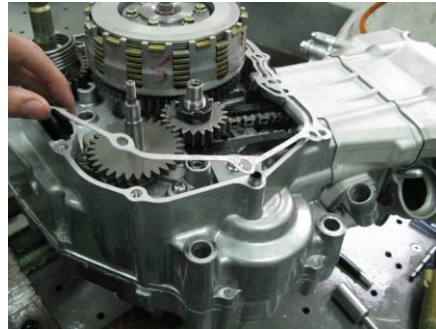


Install pushing plate of clutch
Install pushing rod and washer
Install washer of locking nut of driving gear
Install locking nut of driving gear

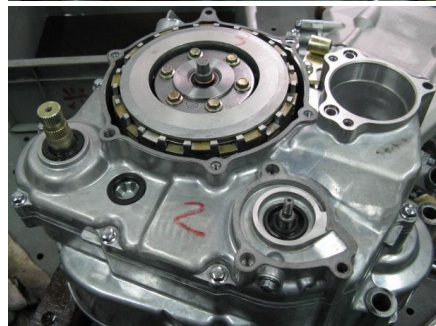
Caution: Concave side of washer face to clutch and driving gear when installing washer of locking nut of driving gear and clutch.



Install right crankcase cover
Install positioning pin and new gasket.



Install right crankcase cover
Install fastening screw, screw up bolt at hole of positioning pin.
Torque of installation: (8~12) N·m



Install clutch cover
Install secondary filter and its cover
Install impeller of water pump
Install cover of water pump



Gearshift system

Notice in maintenance

Remove gearshift device cover

Remove gearshift spindle

Check gearshift spindle

Install gearshift spindle

Remove check plate

Install check plate

Install gearshift device cover

Notice in maintenance

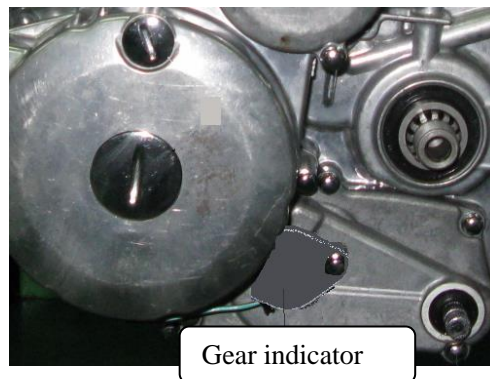
No damage to joint surface of cover and case of gearshift device is allowed when removing cover of gearshift device, no impurity drop into engine is allowed.

Remove cover of gearshift device

Remove gear indicator comp.

Remove installation bolt B of gearshift cover

Remove cover of gearshift device



Remove gearshift spindle

Remove installation screw of touching plate of gear indicator

Remove touching plate of gear indicator

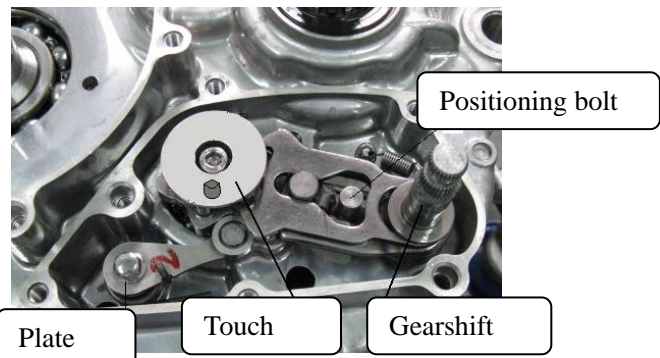
Remove gearshift spindle comp.

Loosen installation screw of check plate

Remove check plate comp.

Remove plate of gearshift drum

Remove positioning bolt of gearshift arm



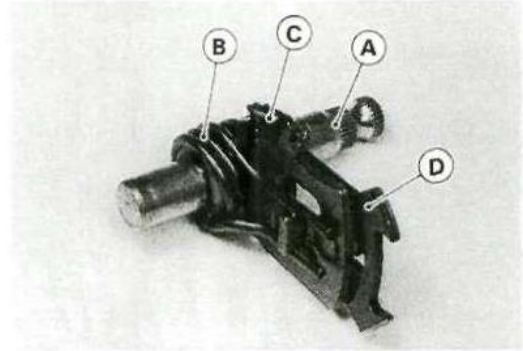
Check gearshift spindle

Check damage or distortion on gearshift spindle A, in case distortion is found, adjustment is needed, in case damaged, replace it.

Check damage or distortion on returning spring B, in case damage or distortion is found, replacement is needed.

Check damage on gearshift arm C, in case damage is found, replacement is needed.

Check damage on check plate D of gearshift, in case damage is found, replacement is needed.



Install check plate

Install positioning pin of gearshift drum plate

Install gearshift drum plate

Install touching plate

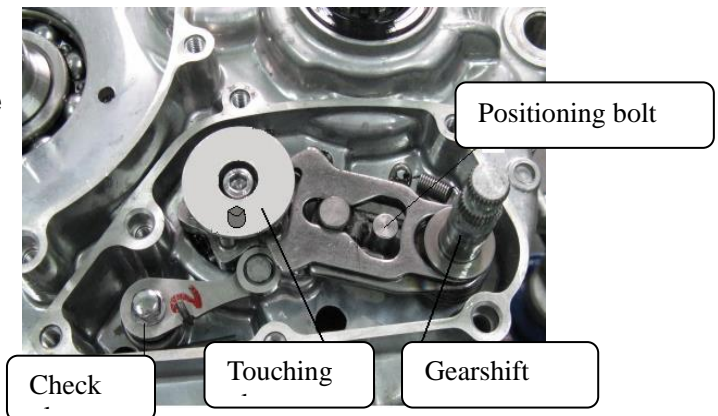
Install screw of touching plate

Screw fastening torque: $(8 \sim 12) \text{ N} \cdot \text{m}$.

Install check plate comp.

Install bolt of check plate

Installation torque of bolt of check plate : $(8 \sim 12) \text{ N} \cdot \text{m}$.



Install gearshift arm

Install positioning bolt F of gearshift arm

Installation torque of positioning bolt: $(25 \sim 30) \text{ N} \cdot \text{m}$.

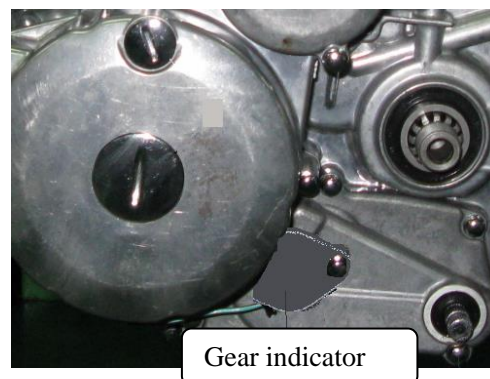
Install cover of gearshift device

Install positioning pin of gearshift device cover

Install new gasket

Install gearshift device cover

Install gear indicator comp.



Magneto and electrical starting component

Notice in maintenance

Remove starting motor

Remove left front cover

Remove magneto

Remove electrical starting gear

Install electrical starting gear

Install magneto

Install left front cover

Install magneto

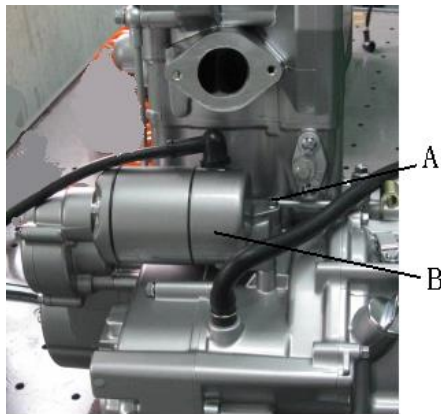
Notice in maintenance

This section introduce removal and installation of magneto, the work could be done without removing engine, only need remove left front cover.

Remove starting motor

Remove installation bolt A of starting motor

Remove starting motor B



Remove left front cover

Drain off lubricant in engine

Remove installation bolt of left front cover

Remove left front cover

No damage to joint surface of cover is allowed during removing left front cover



Remove magneto

Remove installation bolt A of stator

Remove installation screw C of wire pressing plate of stator.

Remove stator B of magneto



Remove washer and installation bolt of rotor

Remove rotor comp. of magneto



Remove electrical starting gear

Remove plate shaped gear A and collar below it

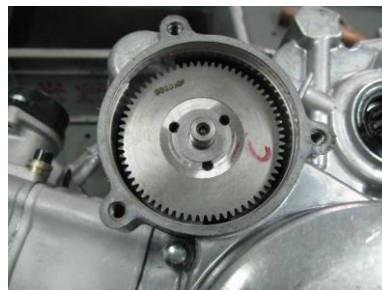
Remove small double gear and flat washer



Remove installation bolt of gear chamber cover on left front cover

Remove cover of gear chamber

Remove big double gear and flat washer



Check big and small double gear and plate shaped gear
In case damage and abrasion is found, replacement is needed

Install electrical starting gear

Install collar A of plate shaped gear

Install plate shaped gear

Install small double gear and flat washer



Install magneto

Install rotor comp. of magneto

Install fastening bolt of rotor

Bolt fastening torque: (100~120) N·m



Install stator comp. B of magneto

Install fastening bolt A of stator

Fastening torque: (5~7) N·m

Install wire pressing plate of stator

Fasten bolt of wire pressing plate

Fastening torque: (8~12) N·m



Install left front cover

Install positioning pin of left front cover

Install new gasket

Install left front cover

Fasten installation bolt of left front cover

Fastening torque: (8~12) N·m

Install starting motor

Install starting motor into left cover

Fasten installation bolt of starting motor

Fastening torque: (8~12) N·m



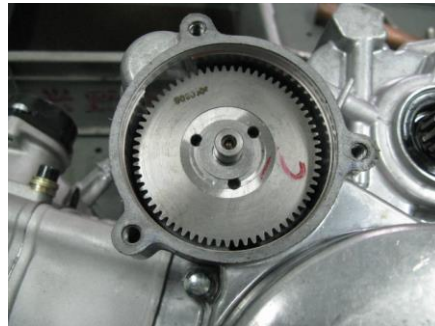
Install big double gear and flat washer, 1 pcs each at upper and lower position of gear chamber cover on left front cover

Install new gasket of gear chamber cover

Install gear chamber cover

Fasten bolt of gear chamber cover

Fastening torque: (8~12) N·m



Crankshaft and transmission device

Notice in maintenance	Check crankshaft
Troubleshooting	Check transmission device
Break down crankcase	Install crankshaft
Remove transmission system	Install transmission system
Remove crankshaft	Install crankcase

Notice in maintenance

This section introduce disassembly and assembly of crankshaft and transmission system, break apart crankcase before working above began. Disassembly for other parts of engine should be done before breaking apart crankcase.

Working before breaking apart crankcase

- Remove engine and lay it on a clean workbench
- Drain off lubricant
- Remove right crankcase cover
- Remove clutch comp.
- Remove oil pump comp.
- Remove starting spindle comp.
- Remove left front cover
- Remove magneto comp.
- Remove electrical starting gear and starting motor
- Remove cover of gearshift device
- Remove gearshift arm comp.
- Remove check plate comp. and gearshift drum plate
- Remove cylinder head comp.
- Remove cylinder body comp.
- Remove piston comp.
- Remove chain, chain adjustor, and tension plate of chain

Specification of each part

Items	标准值 (mm)	维修极限值 (mm)
Radial clearance of bigger end of connecting rod	0.008~0.023	0.07
Total clearance between bigger end of connecting rod and end of crankshaft	0.2~0.4	0.6
Thickness of fork and plate of gearshift drum	4.93~5.0	4.83
Diameter of pin of gearshift fork	5.9~5.95	5.8
Width of groove of gearshift fork	5.0~5.18	5.33
Width of groove of gearshift drum fork	6.05~6.15	6.2

Trouble shooting

Noisy

1. Abrasion of bearing on bigger end of connecting rod
2. Distortion of connecting rod
3. Abrasion of bearing on neck of crankshaft
4. Abrasion, seizing up or crushing of gear
5. Abrasion or damage on bearing

Oil leakage

1. Excessively oiled
2. Oil seal abrasion or damage
3. Crankcase damaged

Breaking down crankcase

Remove sleeve A and o-ring B of countershaft

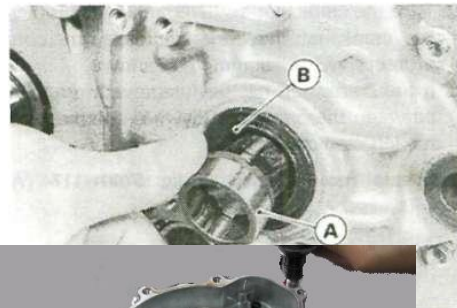
Loosen bolt connects crankcase

Remove right crankcase body

Remove positioning pin of case body

Clean up seal glue on end face, and no damage on end face of case body is allowed.

Caution: Break apart left and right crankcase by knocking by a soft hammer left and right by turns, no prying by screw driver is allowed.



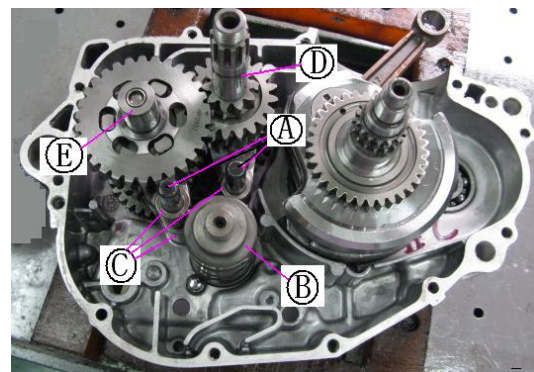
Remove transmission system

Remove fork shaft A

Remove fork C

Remove gearshift drum B

Remove main shaft D and countershaft E

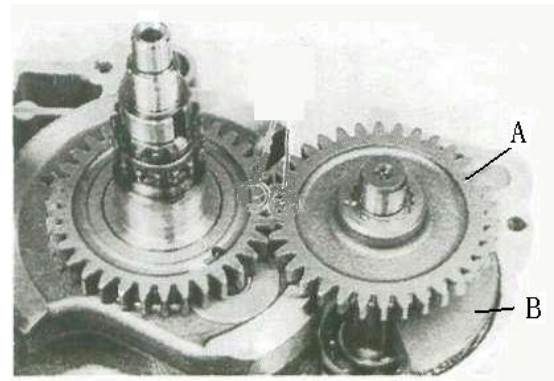


Remove crankshaft

Remove driven gear A of balancing shaft

Remove balancing shaft

Remove crankshaft

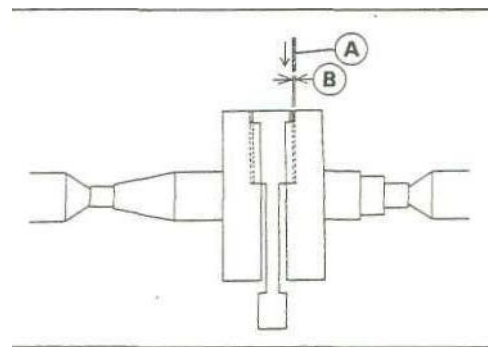


Check crankshaft

Measure total clearance B between end face of bigger end of connecting rod and crankshaft by thickness gauge A.

Standard: $0.2 \sim 0.4$

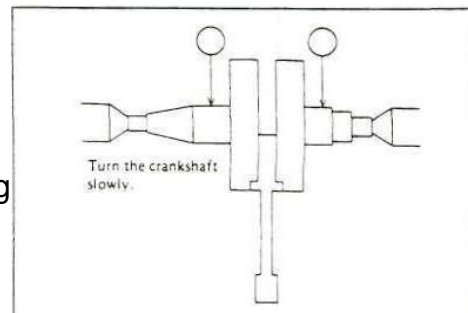
Limit: 0.6



Turn the crankshaft by hand and inspect its radial bounce by dial gauge:

Standard: ≤ 0.03

Limit: 0.05



In case damage or abrasion is found on bearing of crankshaft, replacement is needed.

Check transmission system

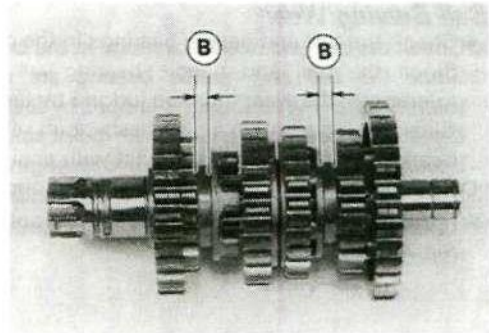
Check flexibility of turning or axial moving of main or counter shaft and their each gear.

Check abrasion or damage on each gear of main and counter shaft.

Check width B of fork groove

Standard: 5.0~5.18

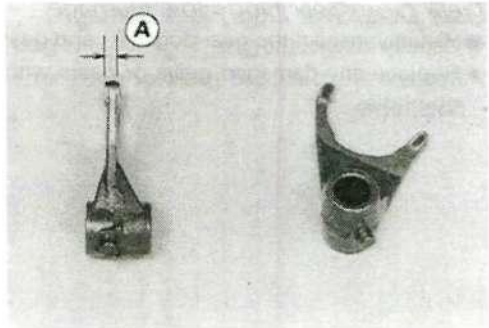
Limit: 5.33



Check thickness A of fork and its plate

Standard: 4.93~5.0

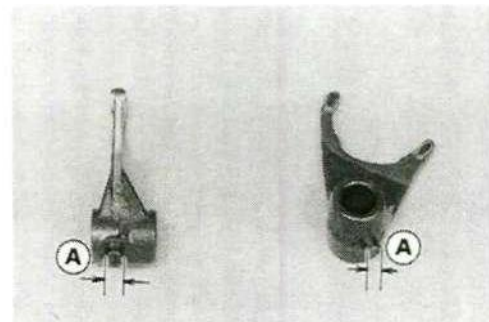
Limit: 4.83



Check diameter A of fork pin

Standard: 5.9~5.95

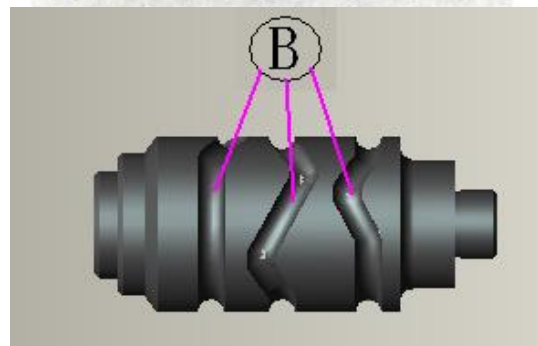
Limit: 5.8



Check groove width B for fork on gearshift drum

Standard: 6.05~6.15

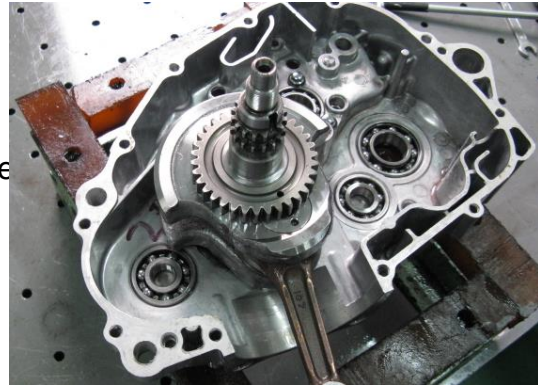
Limit: 6.2



Install crankshaft

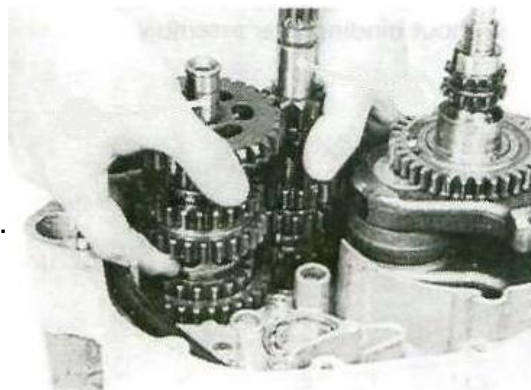
Inductively heat bearing hole of crankshaft on left crankcase to (130~150)°C, and then slightly press crankshaft into crankcase.

Turn and check flexibility of crankshaft. The right end of crankshaft face upwards, and sufficiently drop oil into oil hole at right end, and slowly turn the connecting rod until oil overflow from both sides of bigger end of connecting rod.



Install transmission system

Match up main and counter shaft first, and then install into crankcase together.



Install gearshift drum

Install forks, and insert forks into main and counter shaft, and put fork pin into line shaped groove of gearshift drum. Pay attention to mark on forks, and no wrong installation is allowed.

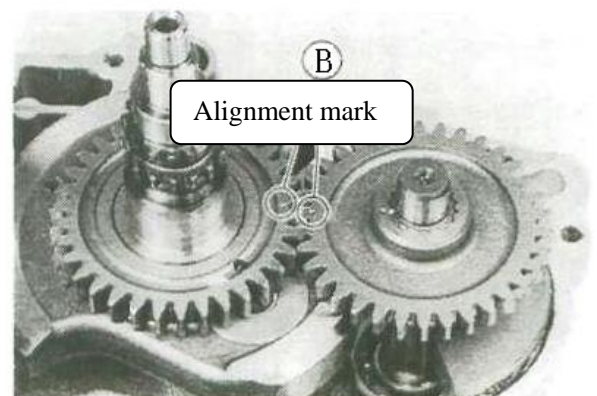
Aline holes on each fork, and insert axle of forks through the holes.

Turn and check flexibility of main and counter shaft, in case poor flexibility is found, re-installation and repeats of steps above is needed.



Install balancing shaft

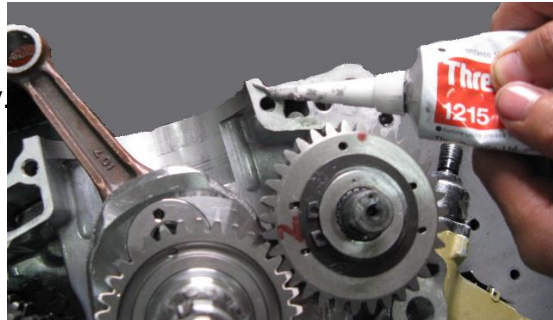
Aline guiding direction by key first, and press and install driven gear group on balancing shaft; And aline marks of matching up on driving and driven gears, and then install balancing shaft into crankcase.



Spread lubricant on each gear and turnable parts.

Spread sealant on end face of case body.

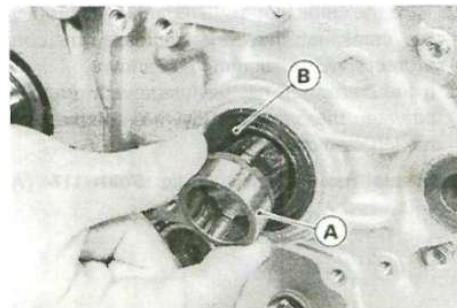
Match up left and right crankcase



Screw up installation bolt of crankcase
Installation torque of bolt: (8~12) N·m。



Install o-ring B and jacket A on countershaft.



Install chain, chain adjustment plate, and chain tensioning plate
Install piston comp.
Install cylinder body comp.
Install cylinder head comp.
Install check plate comp. and five star shaped plate
Install gearshift arm comp.
Install cover of gearshift device
Install electrical starting gear and starting motor
Install magneto comp.
Install left front cover
Install starting spindle comp.
Install oil pump comp.
Install clutch comp.
Install right crankcase cover
Fill lubricant

Failure diagnosis

Hard starting or starting failure of engine Bad performance when engine is in high speed
 Insufficient engine power Abnormal sound of engine
 Bad performance when engine is in low speed or idling

Hard starting or starting failure of engine

Diagnosis

Cause

1. Check if fuel entered carburetor→No fuel in carburetor→
 Already in carburetor
 1. No fuel in fuel tank
 2. Fuel switch blocked
 3. Fuel tube blocked
 4. Float needle of carburetor seized up
2. Remove and check spark plug→Weak or no spark→
 Normal spark
 1. Dirty or damaged spark plug
 2. Magneto failure
 3. Ignition switch failure
 4. Sensor failure
 5. Igniter failure
 6. Ignition coil failure
 7. High voltage wire failure
 8. Break or short circuit of power source
3. Check cylinder pressure→Low pressure→
 Normal pressure
 1. Starting device skidding and engine starting failure
 2. Narrow valve clearance or no clearance
 3. Distortion of guiding rod of valve
 4. Poor matching between cylinder seat and valve
 5. Abrasion on cylinder and piston ring
 6. Poor sealing performance of gasket of cylinder head
 7. Incorrect installation
 8. Wrong timing of gas distribution
4. Restart engine→Ignited but starting failed→
 Engine starting failed
 1. Excessively opened throttle gate
 2. Leakage of air intake tube
 3. Wrong timing of ignition
5. Remove spark plug→Wet spark plug→
 Dry spark plug
 1. Fuel rich in carburetor
 2. Excessively opened throttle
6. Turn off choke, and restart engine

Insufficient engine power

Diagnosis

Cause

1. Accelerate from idling to high speed→No speed change→
 Normal speed
 1. Clutch skidding
 2. Clutch abrasion

2、Gradual acceleration of engine rotation speed→No speed change→ Normal acceleration of engine rotation speed	1. Bad performance of fuel supplying 2. Air filter blocked 3. Ventilation hole on carburetor cover blocked 4. Muffler exhaust blocked
3、Check ignition timing→Wrong ignition switch→ Correct ignition timing	1、CDI damaged 2、Magneto failed 3、Pulse generator
4、Check valve clearance→Incorrect clearance→ Correct valve clearance	1、Incorrect adjustment for valve clearance 2、Valve seat abrasion
5、Check cylinder pressure→Low pressure→ Normal pressure	1、Narrow valve clearance 2、Valve distorted or seized up 3、Abrasion of valve seat 4、Abrasion of cylinder and piston rings 5、Damage on cylinder gasket 6、Incorrect timing of gas distribution 7、Incorrect installation of spark plug out of position
6、Check carburetor→Carburetor blocked→ Carburetor without blocking	1、Dirty fuel 2、Carburetor without periodic washing
7、Check spark plug→Carbon buildup and incorrect color→ Normal spark plug	1、No periodic maintenance was made 2、Incorrect heat value of spark plug 3、Too narrow the clearance between spark plug and electrode
8、Check oil through view window→Incorrect oil Quantity→ Normal oil quantity	1、Too high the oil level 2、Too low the oil level 3、Dirty oil
9、Remove cylinder head cover, check lubricant of valve→Abnormal valve lubrication→ Normal valve lubrication	1、Oil tube blocked 2、Abnormal working of oil pump
10、Check overheating of engine→Overheated→ Without overheating	1、Carbon buildup in combustion chamber 2、Used fuel without meeting demands 3、Clutch skidding 4、excessive rich of mixed gas 5、excessive amount of oil
11、Driving in high speed→Detonation of engine→ No detonation	1、Abrasion on cylinder and piston 2、Carbon in combustion chamber 3、Fuel failed meet specification 4、Too much advancing before ignition timing

Bad performance of engine under low speed or idling speed

Diagnosis	Cause
1、 Check ignition timing and valve clearance→Incorrect→ Correct	1、 CDI failure 2、 Magneto failure。 3、 Sensor failure 4、 Too narrow the valve clearance
2、 Check joint and leakage of carburetor→Leakage is found No leakage	1. Distortion of seal ring of carburetor 2. Loose and drop of carburetor joint 3、 Fracture of sealing ring
3、 Check sparkover of spark plug→Weak spark or sparkover of intermittent→ Normal spark	1、 Spark plug damaged 2、 Magneto failure 3、 Ignition coil failure 4、 CDI Failure 5、 Sensor failure 6、 Ignition switch failure 7、 Spark plug cap failure 8、 Wrong connection or short circuit in power source circuit

Bad performance when engine under high speed

Diagnosis	Cause
1、 Check valve clearance and ignition timing→Incorrect→ Correct	1、 Magneto failure 2、 CDI failure 3、 Sensor failure 4、 Incorrect valve clearance
2、 Open fuel tube of carburetor→Fuel flow was limited→ Fuel smoothly flow out	1、 Fuel in fuel tank used up 2、 Ventilation hole on fuel tank cap blocked 3、 Fuel tube from fuel tank to carburetor blocked 4、 Fuel switch blocked 5、 Gasoline filtering screen blocked 6、 Bad connection negative pressure tube of fuel tube
3、 Check carburetor→Carburetor blocked→ Carburetor unblocked	1、 Float needle blocked 2、 Low level of fuel float 3、 Main jet of carburetor blocked 4、 Float seized up
4、 Check gas distribution timing→Incorrect→ Correct	1. Incorrect installation for timing chain and sprocket wheel 2. Heavy abrasion of gear
5、 Check sparkover of spark plug under high speed→Abnormal→ Normal sparkover	1、 Magneto failure 2、 CDI failure

- 3、Sensor failure
- 4、Ignition switch failure
- 5、Ignition coil failure
- 6、Spark plug cap failure
- 7、Spark plug damaged
- 8、Short circuit is found in power resource circuit

Abnormal noise of engine

Diagnosis

Cause

- | | |
|--|--|
| 1、Abnormal noise of valve | <ol style="list-style-type: none"> 1、Wide valve clearance 2、Abrasion of valve |
| 2、Piston and cylinder knocking | <ol style="list-style-type: none"> 1、Abrasion on piston and cylinder body 2、Abrasion on piston pin and smaller end of crankshaft connecting rod 3、Abrasion on bigger end of crankshaft connecting rod |
| 3、Abnormal noise of bearing | <ol style="list-style-type: none"> 1、Bearing on crankshaft connecting rod damaged 2、Bearing of camshaft damaged |
| 4、Abnormal noise of chain of cam | <ol style="list-style-type: none"> 1、Lengthened chain 2、Teeth abrasion of timing sprocket wheel 3、Abrasion on guiding plate or tension plate 4、Incorrect adjustment for chain tensioner |
| 5、Abnormal noise of transmission and driven gear | <ol style="list-style-type: none"> 1、Insufficient machining precision of gears |