RIEJU

AVENTURA RALLY 307

ENGINE MAINTENANCE MANUAL

Preface

The descriptions and images in this publication are provided for illustrative purposes only and are not binding. Although the basic features described and illustrated in this brochure remain unchanged, Rieju, S.A. reserves the right, at any time and without prior notice, to make changes to components, parts or accessories that it deems necessary for improvement. Not all versions/models shown in this publication are available in all countries. The availability of each model must be verified with the official RIEJU sales network.

This workshop manual was produced by Rieju, S.A. for use by RIEJU dealership workshops and sub-agencies. Users of this publication for the maintenance and repair of Rieju vehicles are assumed to have a basic knowledge of the principles of mechanics and technical procedures for vehicle repair. Any significant changes to the characteristics of the vehicle or specific repair operations will be communicated through updates to this manual.

Note: Provides key information to make the procedure easier to understand and carry out. Caution: Refers to specific procedures that must be carried out to prevent damage to the vehicle.
Danger: Refers to specific procedures to be followed to prevent injury to the operator.

Personal safety: Failure to follow these instructions will result in a serious risk of personal injury.

Failure to follow these rules will result in serious damage to the vehicle and, in some cases, even loss of warranty.

Contents

I. Overview

Maintenance code

1. Please use spare parts, lubricating oil or other auxiliary materials produced by Chongqing Loncin General Dynamics Co., Ltd. or approved and recommended by Chongqing Loncin General Dynamics Co., Ltd.. Materials do not meet the specifications or requirements may cause damage to the motorcycle.

2. Non-metric tools must not be used to repair motorcycles. Metric gauge bolts, nuts, and screws are not interchangeable with imperial gauge fasteners.

3. Please replace the washer, O-ring, cotter pin and locking plate with new ones when reassembling after disassembly.

4. Please tighten the larger diameter bolts or inner bolts first when tightening bolts or nuts. Then gradually tighten each bolt in diagonal sequence to its specified torque value, unless a special sequence is specified.

5. Clean the removed parts with detergent. Before assembly, the sliding surface of parts shall be applied with lubricating oil.

6. After reassembly, check whether all parts are correctly installed and operated properly. Rotation, movement and operation shall be operated.

7. During the maintenance process, coolant, engine oil, discarded parts and other pollutants must be disposed of in accordance with national environmental protection requirements.

Specifications

General specifications

	Items	Data
Engine	Model	LX178MN
	Displacement	292.4ml
	Cylinder arrangement and included angle	Vertical single cylinder,
	Cylinder diameter × stroke	78×61.2mm
	Combustion chamber volume (cylinder head)	16.6±0.3ml
	Compression ratio	11.5：1
	Maximum power and corresponding rotation speed	22.5kW/9000rpm
	Max. torque and corresponding speed	25.5N·m/7500rpm
	Valve mechanism	Double overhead cam
	Lubrication system	Forced pressure lubrication + splash lubrication
	Cooling system	Water-cooled
	Engine net mass	34.9kg
Transmission system	Clutch	Multi-plate wet clutch
	Gearbox	International Sixth Gear
	Primary stage transmission ratio	2.8
	Last stage transmission ratio	3.286
	Gear ratio	First gear: 3 Second gear: 2
		Third gear: 1.5 Fourth gear: 1.25
		Fifth gear: 1.05 Sixth gear: 0.905
	Shift type	1-N-2-3-4-5-6
Electrical schematic diagram	Ignition system	CDI
	Starting system	Electric
	Lighting system	Battery
	Spark plug model	B8RC
	Spark plug gap	0.7-0.8mm
	Voltage regulating rectifier	Three-phase full-wave rectification

Cooling system specifications

Items		Specifications
Coolant capacity	Radiator and engine	1.0 L
	Water tank	0.10 L
Relief pressure of radiator cover		108-137kPa
Thermostat	The initial temperature when it was first opened	/
	The temperature when fully open	/
	Valve lift	/
Coolant recommended		Ethanol-containing silicate-free coolant
Standard coolant concentration		1:1 mixing with distilled water

Lubrication system specification Unit: mm

Items			Standard value	Maintenance threshold value
Oil capacity	After oil change only		1.3 L	—
	After changing the oil filter		1.4 L	—
	After engine overhaul		1.5 L	—
Recommended engine oil			It is recommended to use engine oil: SJ10W-40 API quality grade: SJ or higher (do not use oil marked as energy-saving on the circular API service label.)	—
Oil pump rotor		Tip clearance	0.15	0.25
		Intermediate clearance	0.15-0.21	0.27
		Clearance between the two sides	0.02-0.09	0.15

Cylinder head/valve specification Unit: mm

Items			Standard value	Maintenance threshold value
Electric starting cylinder pressure			800kPa	—
Valve clearance		Intake valve	0.10～0.19	—
		Exhaust valve	0.15～0.24	—
Tappet	Tappet outer diameter	Intake/exhaust	27.967～27.98	27.957
Camshaft	Cam protrusion height	Intake	36.9484～37.0784	36.8484
		Exhaust	36.6479～36.7779	36.5479
	Hop		0.02	0.04
Valve, valve guide	Valve stem diameter	Intake	4.475～4.490	4.465
		Exhaust	4.460～4.475	4.450
	Valve guide inner diameter	Intake/exhaust	4.51～4.522	4.542
	Clearance from valve stem to valve conduit	Intake	0.020～0.047	0.077
		Exhaust	0.035～0.062	0.092
	Valve line width	Intake/exhaust	1.10～1.30	1.60
Valve spring free length		Intake/exhaust (interior)	36.2	35.2
		Intake/Exhaust (external)	41	40
Cylinder head flatness		0.05		0.07

Clutch and shift mechanism specifications Unit: mm

Items		Standard value	Maintenance threshold value
Free stroke of clutch handle		10～20	—
Clutch	Spring free length	35.4	34.4
	Friction plate thickness	2.95～3.05	2.75
	Flatness of center sleeve and pressure plate	0.1	0.3
Clutch sleeve	Bore diameter	20.000～20.021	22.031
	Outer diameter	24.959～24.980	24.949

Outer diameter of main shaft at clutch sleeve	19.959～19.980	19.939

Magneto motor and starting clutch specification Unit: mm

Items	Standard value	Maintenance threshold value
Outer diameter of starting disc gear sleeve	45.66～45.67	45.46
Inner diameter of starting clutch housing	62.317～62.343	62.363

Specification of box and power train system Unit: mm

Items			Standard value	Maintenance threshold value
Transmission mechanism	Gear inner bore	M5	22.013～22.034	22.054
		C1	20.013～20.034	20.054
		C2	25.013～25.034	25.054
	Diameter of main shaft	M5	21.980～21.993	21.960
	Counter shaft diameter	C1	19.980～19.993	24.960
		C2	24.959～24.980	24.939
	Gear and shaft clearance	M5	0.020～0.054	0.094
		C1	0.020～0.054	0.094
		C2	0.023～0.075	0.115
Shift fork & shift fork shaft	Diameter of fork declutch shift shaft		11.966～11.984	11.946
	Shift fork inner diameter		12.000～12.018	12.038
	shifter fork tip thickness		4.93～5.00	4.73

Specification of crankshaft, piston, cylinder block, balance shaft Unit: mm

Items			Standard value	Maintenance threshold value
Crankshaft	The clearance on the large end of the connecting rod		0.2～0.45	0.5
	Clearance between connecting rod big end bearing and crank pin		0.008～0.023	0.025
	Clearance between left crankshaft journal and bearing inner ring		-0.002～-0.021	0.04
	Hop		0.03	0.05
Cylinder block	Cylinder diameter		78.00～78.01	78.04
	Cylindricity		0.006	0.01
	Flatness		0.03	0.05
Piston, piston pin, piston ring	Piston skirt diameter		77.965～77.980	77.915
	Pin bore hole		15.002～15.008	15.028
	Piston pin diameter		14.994～15.000	14.974
	Piston-to-piston pin clearance		0.002～0.014	0.04
	Piston ring closing clearance	1st ring	0.15～0.35	0.4
		2nd ring	0.20～0.40	0.45
		Oil ring	0.20～0.70	0.75
	Clearance between piston ring and piston ring groove	Clearance between the ring and the groove	0.020～0.050	0.07
		Clearance between the 2nd ring and groove	0.020～0.050	0.07
Cylinder clearance			0.020～0.045	0.08
Inner diameter of connecting rod small end			15.013～15.025	15.035

Torque value

Engine torque value

Items	Quantity	Thread diameter (mm)	Torque value (N.m)	Remark
Spark plug	1	10	10～15	
Inspection cover	1	14	3～5	
Left trim cover	1	30	3～5	
Engine drain bolt	1	12	26～30	

Cooling system

Items	Quantity	Thread diameter (mm)	Torque value (N.m)	Remark
Cooling pump cover bolts (including drain bolts)	4	6	8~12	
Cylinder head outlet pipe joint bolt	2	6	8~12	
Cylinder block water inlet pipe joint bolt	2	6	8~12	
Engine sensor (water temperature)	1	10	15～17	Thread coated with 1577 thread glue
Cooling pump impeller	1	7	8~12	

Lubrication system

Items	Quantity	Thread diameter (mm)	Torque value (N.m)	Remark
Oil fine filter cap bolt	3	6	8~12	
Oil pump bolt	v	6	8~12	Thread coated with 1262 thread glue
External tubing bolt	2	8	14~16	

Oil control valve	1	12	10～15	

Cylinder head and valve

Items	Quantity	Thread diameter (mm)	Torque value (N.m)	Remark
Cylinder head cover fastening bolt	4	6	8~12	
Cylinder head side bolt	1	6	8~12	
Timing driven sprocket bolt	4	6	8~12	Thread coated with 1262 thread glue
Cylinder head-to-block bolt	4	10	10 ~ 15 (first tightening) 40 ~ 45 (second fastening) 50 ~ 55 (third fastening)	Lubricate the threads and seat surfaces
Cylinder head-to-block bolt	2	6	8~12	
Intake pipe bolt	2	6	8～12	
Camshaft bracket bolts	8	6	8~12	
Tensioner seat mounting bolt	2	6	8~12	
Tensioner bolt	1	10	10~14	
Chain adjusting plate bolt	1	8	20～25	Thread coated with 1262 thread glue
Chain guide plate pressure plate bolt	1	6	8~12	

Clutch and shift mechanism

Items	Quantity	Thread diameter (mm)	Torque value (N.m)	Remark

Clutch center sleeve lock nut	1	16	70～80	Thread coated with 1262 thread glue
Primary drive gear lock nut	1	16	90～100	Thread coated with 1262 thread glue
Stop plate bolt	1	6	8~12	Thread coated with 1262 thread glue
Five-star paddle set bolt	1	6	8~12	Thread coated with 1262 thread glue
Rising plate bolt	v	6	10～15	
Shift arm set bolt	1	10	25～30	Thread coated with 1262 thread glue
Gear display bolt	2	6	8~12	
Clutch rib positioning plate bolt	2	6	8~12	
Transmission cover bolt				

Magneto and starting clutch

Items	**Quantity**	**Thread diameter (mm)**	**Torque value (N.m)**	**Remark**
Start the clutch fastening bolt	6	6	10～15	Thread coated with 1262 thread glue
Magneto rotor bolt	1	12	100～120	Thread coated with 1262 thread glue
Magneto rotor bolt	3	6	8~12	Thread coated with 1262 thread glue
Trigger fixing bolts	2	6	8~12	Thread coated with 1262 thread glue
Gear chamber cover bolt	3	6	8~12	
Starter motor bolt	2	6	8~12	

Box body, box cover, transmission

Items	Quantity	Thread diameter (mm)	Torque value (N.m)	Remark
Spindle/countershaft bearing baffle screw	4	6	8~12	Thread coated with 1262 thread glue
Transmission bearing limit bolt	2	6	8~12	
Crankcase bolt	10	6	8~12	
Left crankcase cover bolt	8	6	8~12	
Right crankcase cover bolt	10	6	8~12	
Countershaft driving sprocket nut	1	20	119～131	

Crankshaft, piston, cylinder block, balance shaft

Items	Quantity	Thread diameter (mm)	Torque value (N.m)	Remark
Tensioner bolt (on cylinder block)	1	20	17～22	
Crankshaft right oil seal baffle bolt	1	6	8~12	

Lubrication and sealing positions

Engine

Material		Position	Remark
Sealant	1596	Crankcase joint surface Left and right crankcase cylinder joint surface Magneto outlet Cylinder head cover gasket (at the junction of semicircle and straight line)	
Engine oil		Entire surface of the inner and outer rotors of the oil pump Entire surface of the oil pump Cylinder head camshaft bearing bore Cylinder head valve guide bore Entire surface of tappet Valve stem sliding surface and rod end Entire surface of timing chain Camshaft rolling surface Cylinder bore inner surface Piston outer surface, piston pin hole and piston ring groove Outer surface of piston pin Entire surface of piston ring Entire surface of clutch friction plate Sliding surface of clutch push rod Shift shaft portion and shift plate Entire surface of double gear shaft Entire surface of starting overrunning clutch Entire surface of fork shaft Outer surface of crankshaft bearing Small head bore of crankshaft connecting rod Gear teeth (primary drive, crankcase, starting reduction) Disc tooth sliding surface Rotational area of each bearing Each O-ring surface	
Multi-purpose grease		Starter motor seal ring Display seal ring	
Degreasing agent		Crankcase closing surface and paper pad installation surface	

	Crankshaft magneto rotor mounting taper Magnet rotor taper	

II. Maintenance

Maintenance information

Overview

- Place the motorcycle on a horizontal plane before the operation.

Maintenance specifications

Please check in accordance with the maintenance cycle in the maintenance form in the *Operation Manual*.

I: Inspection, cleaning, conditioning, lubrication or replacement is needed if necessary; C: Cleaning; R: Replacement; L: Lubrication.

Personnel who conduct the following maintenance items may have a good command of some certain mechanical knowledge. Some items (especially those marked with * and * * symbols) may require more technical information as well as tools.

Maintenance Schedule

NO.	Period / Items	X1000km	1	5	10	15	20	25	30
		Month	1	6	12	18	24	30	36
*1	Spark plug			I	I	R	I	I	R
*2	Engine oil		R	R	R	R	R	R	R
*3	Oil fine filter		R	R	R	R	R	R	R
*4	Valve clearance		I	I	I	I	I	I	I
*5	Coolant		I	I	I	I	R	I	I
*6	Cooling system			I	I	I	I	I	I
*7	Air filter cartridge			C	R	C	R	C	R
8	Right crankcase cover vent hose			C	C	C	C	C	C
9	Clutch system		I	I	I	I	I	I	I

Note:

1. Motorcycles that is used in a harsher environment such as abnormally wet and dusty environment

should be maintained more frequently.

2. * Marking items require special tools, data and professional skills, and must be carried out by **Rieju** dealers.

3. After the first warranty, the oil level needs to be checked every 2,000km; Add oil to the engraved line on the oil dipstick when the oil level position is below the engraved line under the oil dipstick.

4. The maintenance cycle refers to the data displayed on the odometer, and the earlier one shall prevail..

Crankcase vent hose

Note:

- Maintenance times should be increased in the rain or when driving at full speed, and after the motorcycle is washed or inverted. Check whether deposits are visible within the portion inside the vent discharge tube.

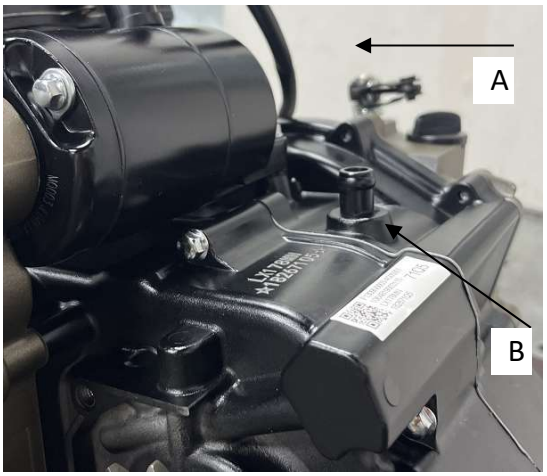
Remove air filter cleaning tube plug A and direct the sediment into a suitable container. Relocate tube plugs.

Remove the air filter.

Check the exhaust pipe B of the crankcase for cracks, aging, damage, or looseness.

Replace the exhaust pipe if necessary.

Install the air filter



Spark plug

Remove the tank.

Remove the ignition coil.

Remove spark plug A.

Note:

Blow around the spark plug base with an air gun before removing the spark plug, while making sure no dirt falls into the combustion chamber.

Check the insulator for cracks or damage and the electrode for damage, dirt, discoloration. Replace the spark plugs if necessary.

Check spark plug:

Clean the spark plug electrodes with iron wire or specialized spark plug cleaner.

Use a plug gauge to check the gap between the center electrode and side electrode.

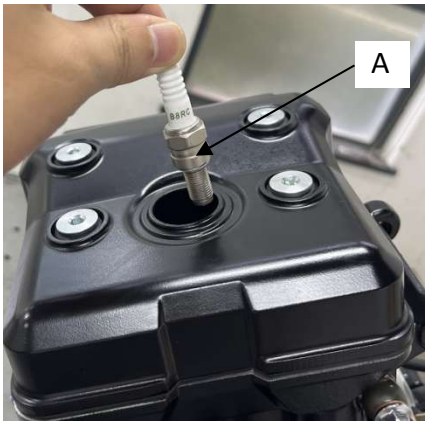
Spark plug gap: 0.70~0.80mm

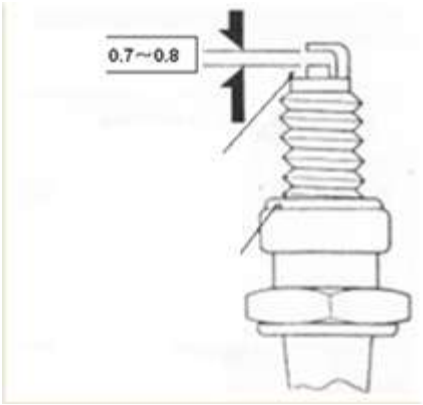
When necessary, bend the side electrodes carefully to adjust the gap.

Install and manually tighten the spark plug to the cylinder head, then tighten the spark plug to the specified torque value.

Torque value: 10 ~ 15 N · m

Installation of fuel tank





Valve clearance

Check

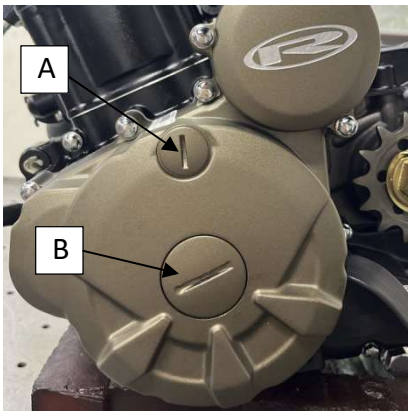
Caution:

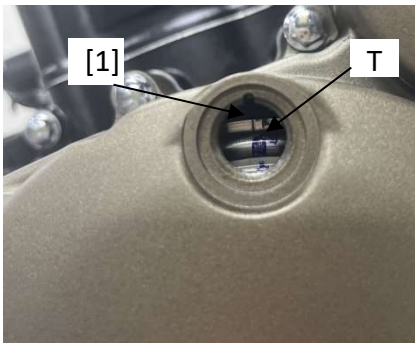
- Please check and adjust the valve clearance in the cold state (below 35 ℃).

Remove the following components:

- Cylinder head
- View hole cover A and left decorative cover B

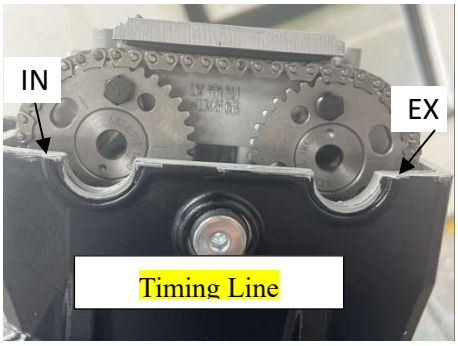
Check the valve clearance first; Turn the crankshaft counterclockwise with a 17mm socket wrench, so that the "**T**" engraved line of the magneto rotor is aligned with the notch of the left cover view hole cover [1].





Ensure that the inlet and row camshaft timing line "-" is parallel to the cylinder head engagement surface.

(Note: The intake cam corresponds to the "IN" engraved line, and the exhaust cam corresponds to the "EX" engraved line)



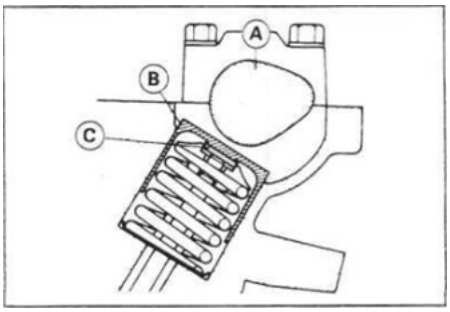
Insert a thickness gauge between camshaft A and valve tappet B. Check the valve clearance. And records shall be kept well.

Valve clearance:

Inlet valve clearance**: 0.10～0.19**

Exhaust valve clearance**: 0.15～0.24**

If the clearance is incorrect, it needs to be adjusted.



Adjustment

Remove block tensioner nut D and cylinder head tensioner E

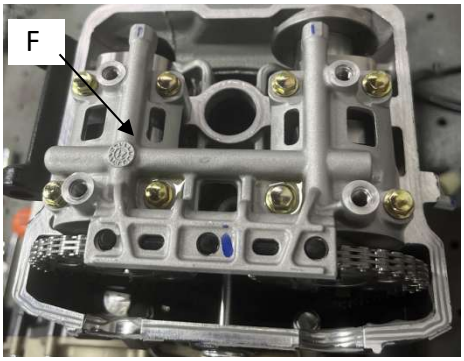
After the adjustment is completed, turn the crankshaft counterclockwise twice to check the air clearance. If the clearance is incorrect, it needs to be readjusted.

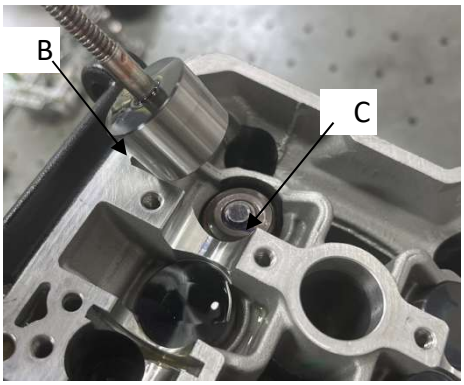
Remove camshaft bracket F, remove camshaft A, remove valve tappet B, and remove valve adjustment gasket C; Depending on the valve clearance requirements, select a new adjustment gasket.

When the valve adjustment gasket is installed, the marked side of the adjustment gasket shall face the valve tappet; Install the valve tappet, install the camshaft, and ensure the timing position; Measure the adjusted valve clearance;

If you need to re-debug, readjust according to the above steps until it's in a correct position;

Install the cam bracket and install the cylinder head cover.





Engine oil

Oil quantity check

Start the engine and idle for 3-5 minutes.

Turn off the engine and wait for 2-3 minutes.

Place the motorcycle in an upright position on a horizontal plane.

Let the engine be positioned vertically on the ground and observe through the oil observation window [3]. The oil level should be located between the upper and lower scales of the observation window.

If the oil level is higher than the upper scale mark [1], the excess oil should be drained.

If the oil level is below the lower scale mark [2], the lubricating oil should be replenished.

Specified motor oil:

SJ10W-40

API quality grade: SJ or higher (do not use oil marked as energy-saving on the circular API service label.)

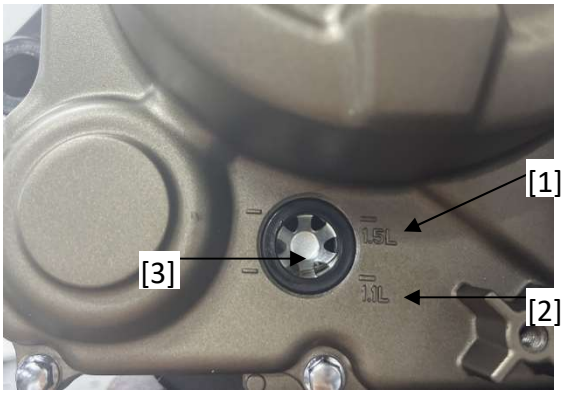
JASO T903 Standard: MA

Viscosity: SAE10W-40

Check whether the O-ring of oil plug A is in good condition. Replace it if necessary.

Apply oil to the surface of the O-ring.

Tighten the oil plug.



Replacement of engine oil

Heat the engine.

Remove oil drain bolt B and washer C and drain the oil.

Once the oil has been completely drained, install the oil drain bolts and replace the washers with new ones.

Tighten the drain bolt to the specified torque.

Torque: 26 - 30 N · m

Fill the crankcase with the designated oil.

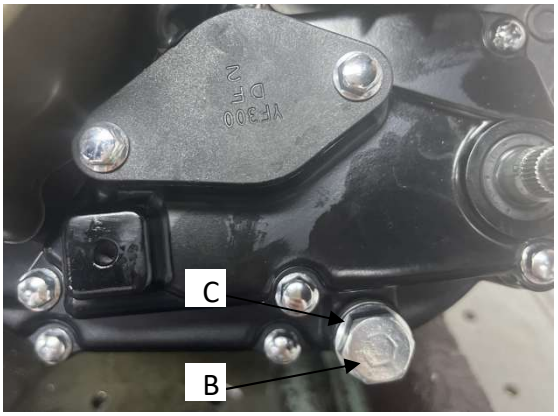
Filling quantity of oil：

After draining: 1.3 L

After oil fine filter replacement: 1.4 L

After decomposition: 1.5 L

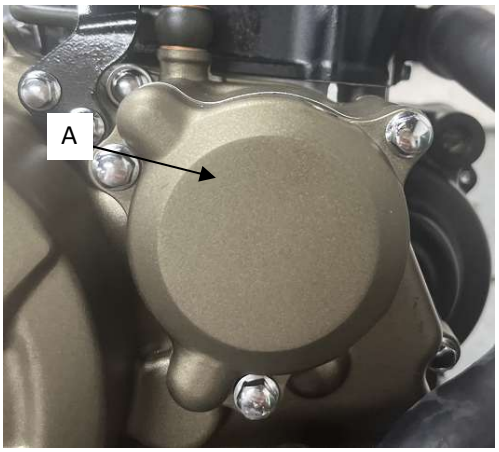
Check the oil level. Ensure there is no oil leakage and shut down the engine



Oil fine filter

Drain the oil.

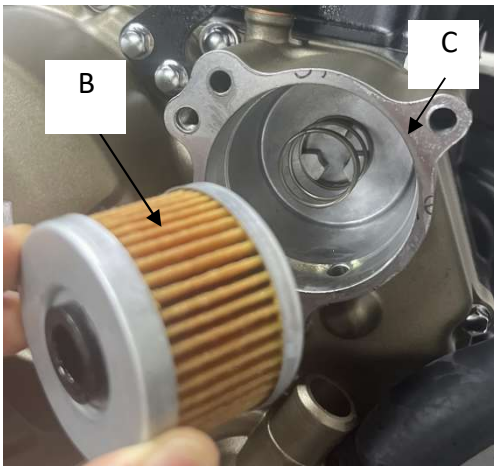
Remove the fastening bolts of the fine filter cover, fine filter cover A and oil fine filter B.



Use the new oil fine filter cover gasket C, install the oil fine filter cap and tighten it to the specified torque.

Torque: 8 -10 N · m

Add the designated engine oil.



Engine idle speed

Note:

- Check and adjust the idle speed after completing all maintenance items of the engine and confirming that it is within the specified range.
- Before checking the idle speed, please first check the following items:
  - No fault indicator flashing
  - Spark plug status
  - Air filter cartridge
  - Free travel of throttle switch and throttle handle
- The idle speed must be accurately checked and adjusted when the engine is hot.

Start the engine, heat it up to normal operating temperature, and make it be idle state.

And check idle speed.

Idle speed: 1500 ± 150

If idle speed is not within the service threshold, check the following components:

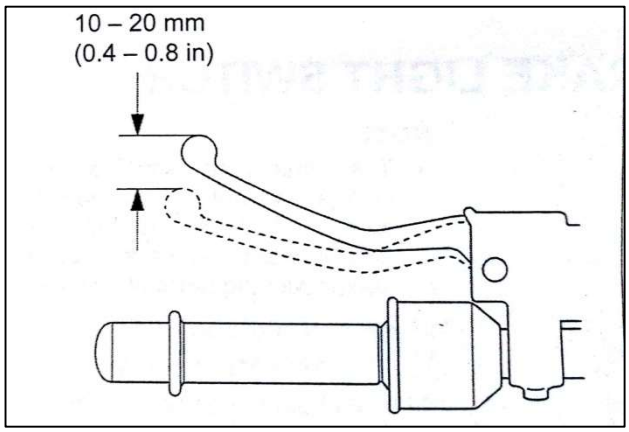
- Intake volume or engine tip
- Idle control valve

Clutch

Check whether the clutch cable is twisted or damaged, and lubricate the clutch cable if necessary.

Measure the clutch handle free travel at the clutch handle end.

Free stroke is: 10mm - 20mm

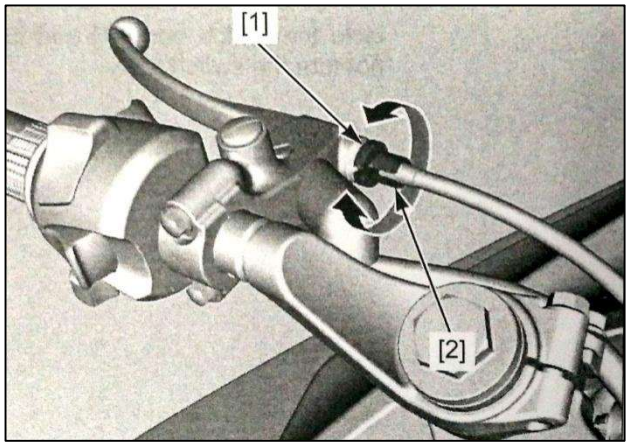


Directly adjust the adjuster on the clutch handle if it is small adjustment.

Loosen the locknut [1] and turn the adjuster as needed.

Hold the adjuster while tightening the locknut.

When the regulator thread is exceeded, an accurate free stroke cannot be obtained, and the main regulator needs to be adjusted at this time.



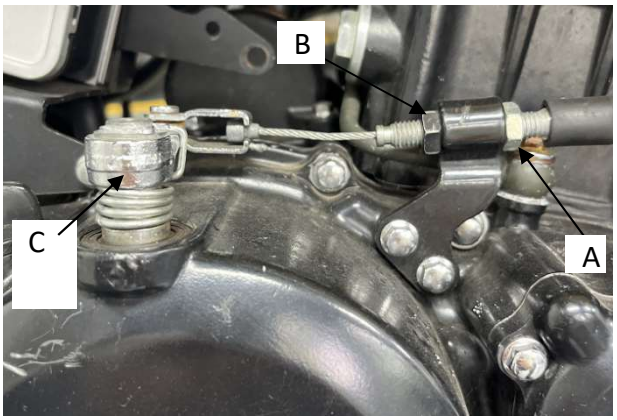
The main adjustment is performed by adjusting the adjuster nut A located on the clutch control arm.

Loosen locknut B and turn the regulator as needed.

Hold the adjuster while tightening the locknut.

The main adjustment is performed by turning the position of the clutch control arm C.

Disassemble and inspect the clutch if the correct clutch travel cannot be obtained, or if the clutch slips during a test ride.



III. Cooling system

Maintenance information

Overview

⚠ Warning
Do not remove the radiator cover until the engine and radiator are cooled to prevent coolant from splashing and burning people.

Caution

Using coolant with added silicate corrosion inhibitor may cause premature wear of water pump seals or clogged radiator channels.

Using tap water may cause engine damage.

- Add coolant to the auxiliary tank. Do not remove the radiator cap except to add or drain coolant.
- There is no need to remove the engine from the frame when servicing the cooling system.
- Avoid leakage of coolant onto painted surfaces.
- After system maintenance, use a cooling system tester to check for leakage.
- Coolant temperature indicator/water temperature sensor inspection.
- Fan control relay inspection.

Cooling system specifications

Items		Specifications
Coolant capacity	Radiator and engine	1.0 L
	Water tank	0.1 L
Relief pressure of radiator cover		108-137kPa
Thermostat	The initial	/

	temperature when it was first opened	
	The temperature when fully open	/
	Valve lift	/
Coolant recommended		Ethanol-containing silicate-free coolant
Standard coolant concentration		1:1 mixing with distilled water

Troubleshooting

Engine temperature is too high

- Coolant temperature indicator/water temperature sensor failure
- Radiator cover failure
- Insufficient coolant
- The radiator channel, hose and water pipe are blocked
- Recirculation system intake
- Cooling fan motor failure
- Fan control relay failure
- Water pump failure

Engine temperature is too low

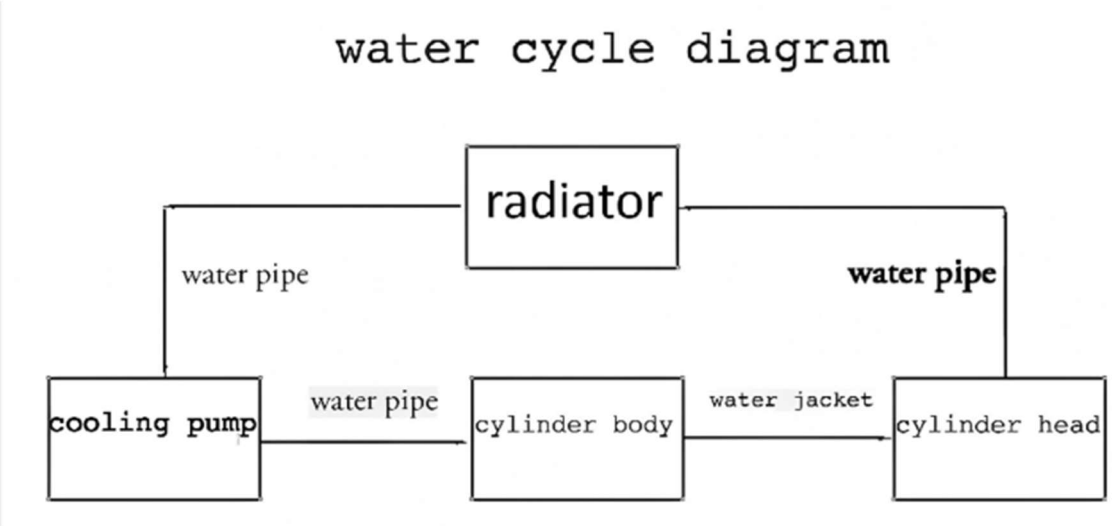
- Coolant temperature indicator/water temperature sensor failure
- Fan control relay failure

Coolant leakage

- Defects in mechanical mechanism of water pump
- Aging of sealing ring
- Radiator cover failure
- Cylinder head gasket damaged or aged
- Hose connection is loose or pipe clamp is not clamped

- Hoses is damaged or aged
- Radiator is damaged
- Cylinder head water outlet pipe joint, cylinder block water inlet pipe joint and water pump cover pipe joint are loose

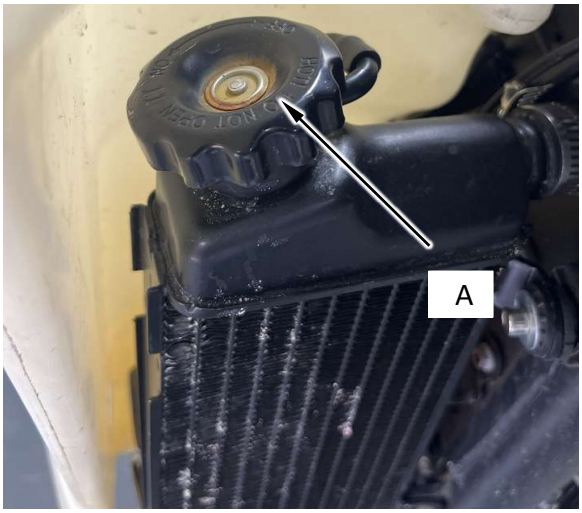
System process mode



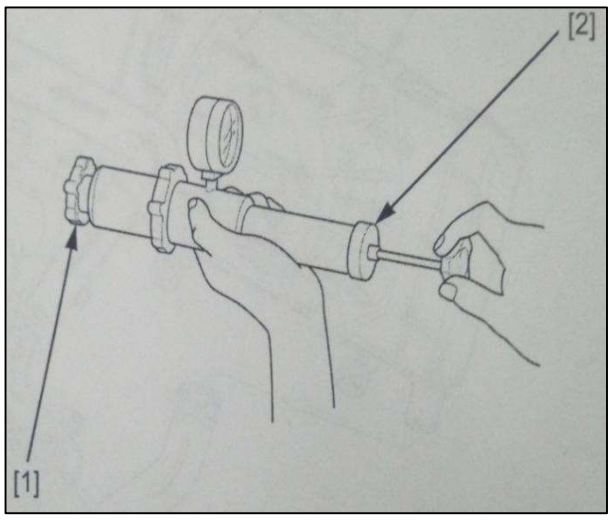
System testing

Radiator cap/system pressure test

Remove radiator cover A



Wet the radiator cover gasket and install the cover into the detector [2].



Pressurize the radiator cap with the detector.

If the radiator cap doesn't hold pressure or the pressure released is too high or too low, it needs to be replaced.

The radiator cover must withstand the specified pressure for at least 6S.

Radiator cap pressure:

(108-137) KPa

Connect the detector to the heat sink.

Pressurize the radiator, engine and hose with a detector to check their air tightness.

Caution

Excessive pressure may damage the cooling system components. The pressure should not exceed 137 KPa.

Repair or replace parts if the system cannot withstand the specified pressure for at least 6S.

Coolant replacement

Replace coolant/exhaust

Note: When adding coolant to the system or auxiliary water tank or checking the coolant dosage, the motorcycle should be placed on a level ground and should be in an upright position.

Remove water pump drain bolt A and flat washer B.

Remove the radiator cover C and drain the coolant.
Install the drain bolt after replacing the flat washer with a new one.
Tighten the drain bolt to the correct torque.

Torque:

Water pump drain bolt: (8 - 12) N . m

Fill the cooling system up to the neck with the recommended coolant through the water injection hole [1].

Recommended antifreeze:

Ethanol-containing silicate-free coolant

Coolant concentration standard:

1:1 mixing with distilled water

Remove air from the system as follows:

1. Shift the engine to neutral.
   Start the engine and let it idle for 2-3 minutes.
2. Open and close the throttle three to four times to exhaust the air in the system.
3. Turn off the engine and fill the coolant if necessary.
4. Install the radiator cover.

Fill the storage tank with recommended coolant.

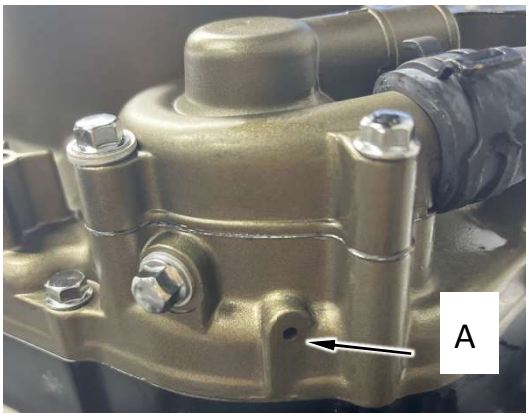
Water pump

End face seal inspection

Check the water pump overflow hole [1] for coolant leakage.

- It is normal to have a small amount of coolant flowing out.
- Ensure there is no continuous coolant leak when starting the engine.

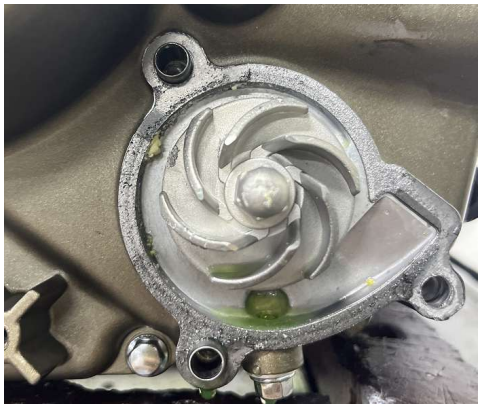
Replace the water pump if necessary.



Removal/Installation

Removal of cooling pump

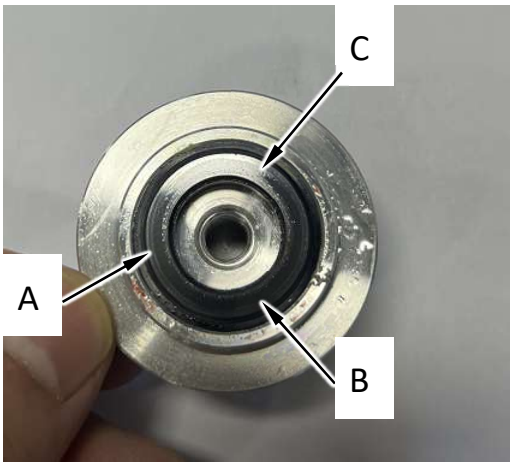
Before disassembling the cooling pump, place a box under the engine, unscrew the engine drain bolt, and discharge the coolant in the engine.
Remove the cooling pump cover by unscrewing the water pump cover fastening bolts
Remove the cooling pump impeller.
Check whether the impeller is damaged, and whether there is abnormal wear and strain on the sealing surfaces of the dynamic and static rings of the cooling water seal. In case of damage, make a replacement.
Check the end face of the cooling pump cover for damage. In case of damage, make a replacement.



Installation of cooling pump

Press-fit the cooling pump water seal static ring onto the right cover.

Press-fit the water seal moving ring A of the cooling pump on the impeller of the water pump (the outer surface of the rubber ring B outside the moving ring needs to be evenly coated with a proper amount of sealant C), and the sealing surface is outward in cooperation with the static ring.



Lock the cooling pump impeller tightly.

Locking torque: (8 - 12) N · m

Install the cooling pump cover (Note: two bolts at the locating pin need to be tightened first to ensure the cover surface is flush).

4. Lubrication system

Maintenance information

Overview

⚠ Warning

Repeated, long-term exposure of the skin to used engine oil may lead to skin cancer. This is rare unless you are exposed to used engine oil every day. However, it is recommended to wash your hands with soap box water as soon as possible after disposing of the used engine oil.

- There is no need to remove the engine from the frame when servicing the oil pump.
- The premise of each service step in this chapter is to drain the engine oil.
- Ensure there is no dirt and dirt in the engine when removing and installing the oil pump.
- If any oil pump component wears beyond the specified service threshold, replace the entire oil pump assembly.
- After installing the oil pump, check for oil leakage.
- Piston injection jet repair.

Lubrication system specifications

Unit: mm

Items		Standard value	Maintenance threshold value
Oil capacity	After oil change	1.3L	—
	After removing the oil filter	1.4L	—
	After removing the engine	1.5L	—
Recommended engine oil		Recommended engine oil: SJ10W-40 API quality grade: SJ or higher (do not use oil marked as energy-saving on the circular API service	—

		label.) JASO T903 Standard: MA Viscosity: SAE10W-40	
Oil pump rotor	Tip clearance	0.15	0.25
	Intermediate clearance	0.15-0.21	0.27
	Clearance between the two sides	0.02-0.09	0.15

Troubleshooting

Oil level is too low

- High oil consumption
- Oil leakage from external components
- Worn piston rings or poorly installed
- Cylinder block wear
- Mandrel seal wear
- Valve guide wear

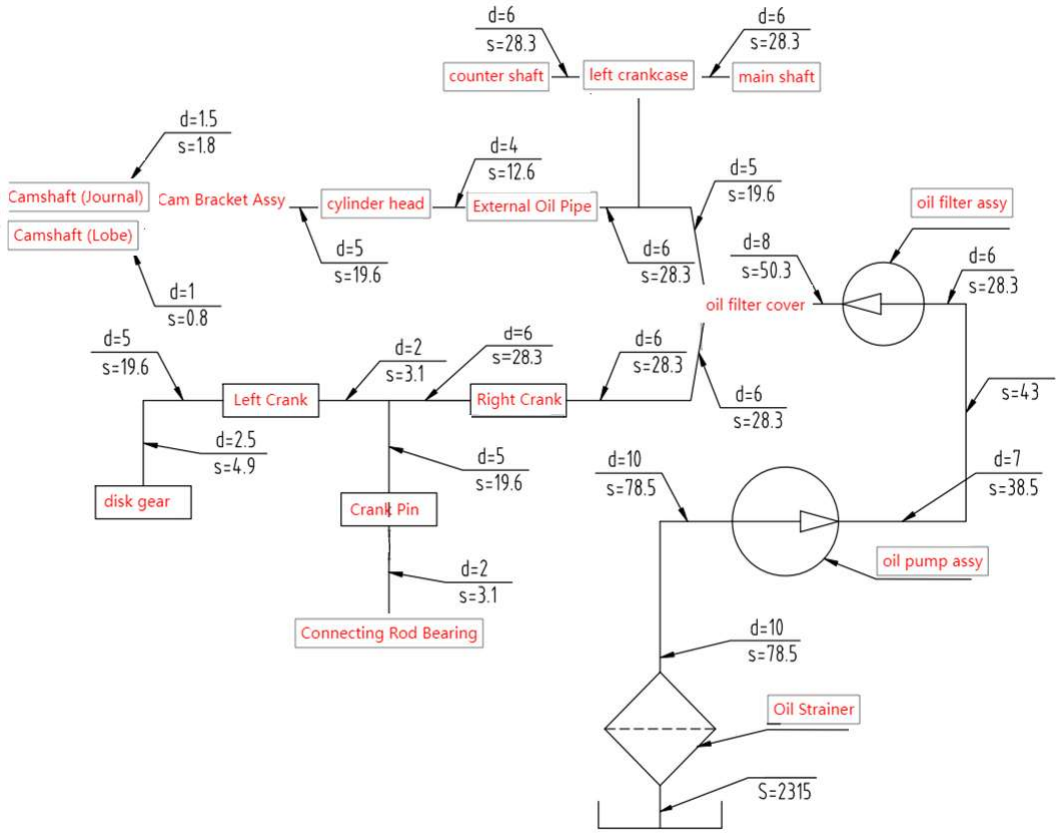
Oil is dirty

- No regular oil and filter changes
- Piston ring damage

Engine oil emulsification

- Cylinder head cover expansion cracking
- Coolant channel leakage
- The engine is flooded

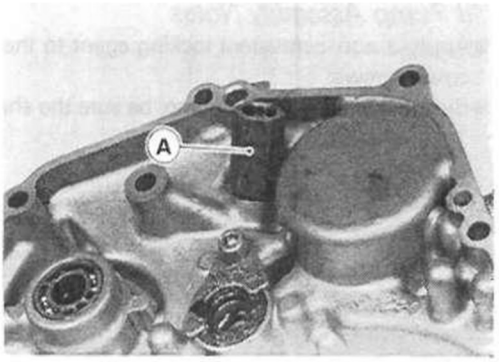
Lubrication system diagram



Oil pump

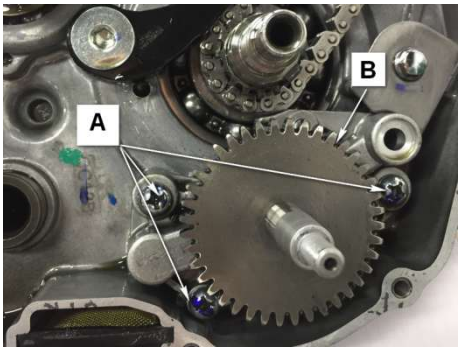
Replacement of pressure relief valve

Remove the right engine crankcase cover and unscrew pressure relief valve A.
When installing, replace the pressure relief valve with a new one and tighten it.
Tightening torque is: (10 - 15) N · m



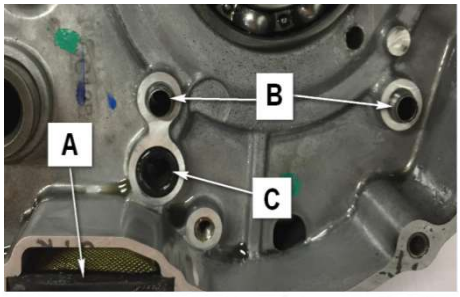
Disassembly of oil pump

Remove the right engine crankcase cover, and remove screw A and oil pump B.



Installation of oil pump

Clean the metal and dirt on oil filter A.
Spray the oil pump to be installed with lubricating oil. Check whether the locating pin B, the sealing ring C and the oil screen have been installed. The last step is to install the oil pump, and fasten the screws.

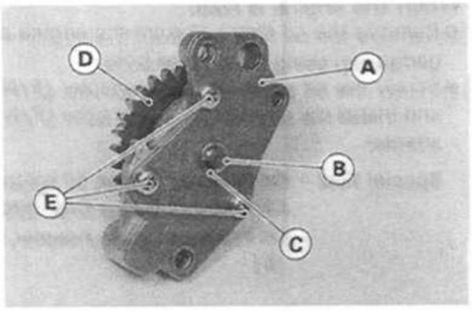


Removal of oil pump components

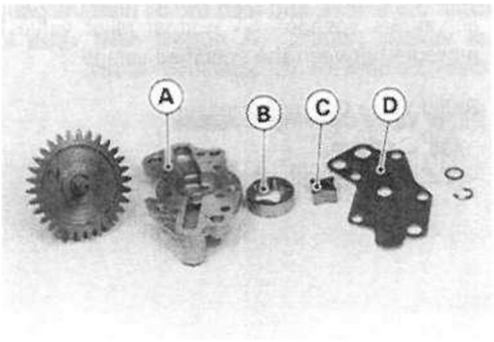
Remove elastic retaining ring B and gasket C, and remove the oil pump shaft.

Remove pump cap screw E, then remove pump cap A.

Take out the inner rotor and the outer rotor.



Inspection of oil pump



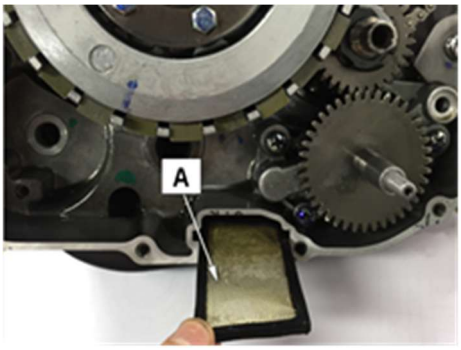
After disassembling the oil pump, check the oil pump body A, outer rotor B, inner rotor C, oil pump cover D, the corresponding parts or oil pump parts need to be replaced if any one of them is damaged.

Cleaning of oil filter

Remove the right crankcase cover, take out the oil filter and clean it.

Caution! Do not to clean with gasoline. And check whether there is damage, if there is damage, it needs to be replaced.

Install the filter screen back into the case and install the right crankcase cover.



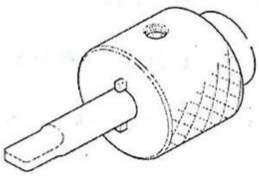
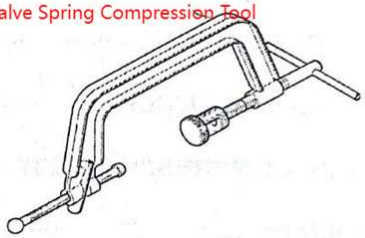
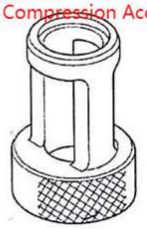
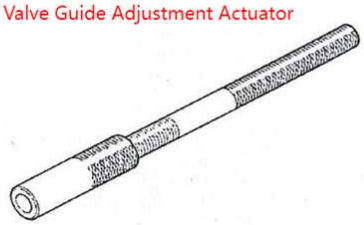
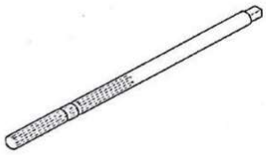
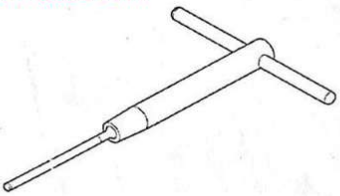
V. Cylinder head and valve

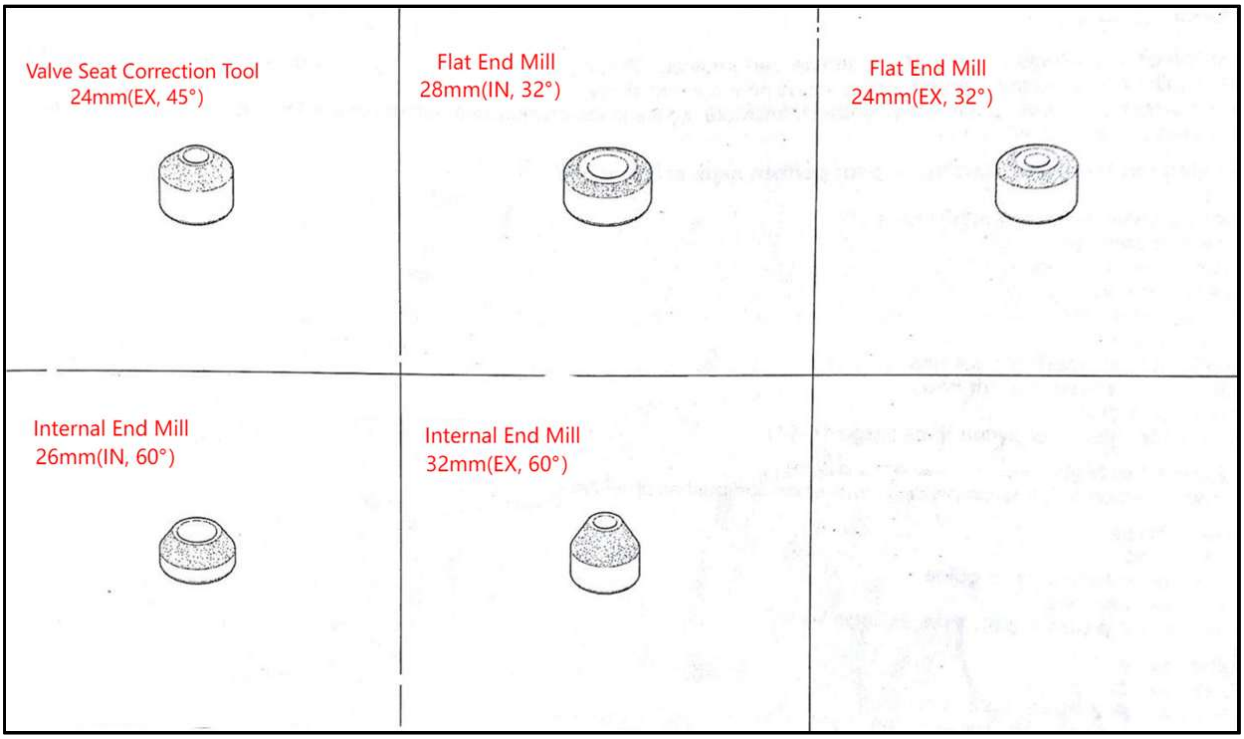
Maintenance information

Overview

- This chapter contains maintenance and inspection of cylinder heads, valves, camshafts, and rocker arms.
- There is no need to remove the engine from the frame when servicing the camshaft, rocker arm, tensioner adjustment screw, cylinder head.
- When disassembling, the disassembled parts shall be marked and put away to ensure that they are properly returned when reassembled.
- Before inspection, all removed parts should be cleaned with a detergent and they should be blown dry using compressed air.
- Camshaft lubricating oil is injected through the oil pipes in the cylinder head and head cover, so the oil pipes should be cleaned before assembling the cylinder head and head cover.
- Do not to damage the joint surface when removing the cylinder head and head cover.

Tools

Compression Gauge accessory 	Tensioner Clamp B 	Valve Spring Compression Tool 
Valve Spring Compression Accessory 	Valve Guide Drive Device, 4mm 	Valve Guide Adjustment Actuator 
Valve Guide Reamer, 4mm 	Tool Holder, 4mm 	Valve Seat Correction Tool, 27.5mm (IN, 45°) 



Cylinder head/valve specification

Unit: mm

Items			Standard value	Maintenance threshold value
Electric starting cylinder pressure			800kPa	—
Valve clearance		Intake valve	0.10～0.19	—
		Exhaust valve	0.15～0.24	—
Tappet	Tappet outer diameter	Intake/exhaust	27.967～27.98	27.957
Camshaft	Cam protrusion height	Intake	36.9484～37.0784	36.8484
		Exhaust	36.6479～36.7779	36.5479
	Hop		0.02	0.04
Valve, valve guide	Valve stem diameter	Intake	4.475～4.490	4.465
		Exhaust	4.460～4.475	4.450
	Valve guide inner diameter	Intake/exhaust	4.51～4.522	4.542
	Clearance from valve stem to valve conduit	Intake	0.020～0.047	0.077
		Exhaust	0.035～0.062	0.092
	Valve line width	Intake/exhaust	1.10～1.30	1.60

Valve spring free length	Intake/exhaust (interior)	36.2	35.2
	Intake/Exhaust (external)	41	40
Cylinder head flatness	0.05		0.07

Troubleshooting

- Top-end failure of the engine may affects engine performance. These faults can be diagnosed by compression testing, or the source of engine noise can be traced up to the top by using a probe rod or stethoscope.
- Check the crankcase breather pipe for white smoke if the engine is not performing well at low speeds. Check the piston ring for jamming if the hose is smoking.

When the engine is running at low speeds, the compression pressure is too low, it is difficult to start, or performs poorly

- Valve
  - Improper valve clearance adjustment
  - Valve cauterization or bending
  - Improper valve timing
  - Broken valve spring
- Cylinder head
  - Leaky or damaged cylinder head gasket
  - Warp or rupture of cylinder head
  - Spark plug loose
- Cylinder, piston, piston ring wear

Excessive compression pressure, overheating or knocking sound

- Excessive carbon deposition in piston head or combustion chamber

Excessive smoke

- Cylinder head
  - Valve stem or valve guide wear
  - Valve stem seal is damaged
- Cylinder, piston, piston ring wear

Excessive noise

- Cylinder head
  - Improper valve clearance adjustment
  - Stuck valve or broken valve spring
  - Worn or damaged camshaft
  - Rocker arm or rocker arm shaft wear
  - Rocker arm and valve stem end wear

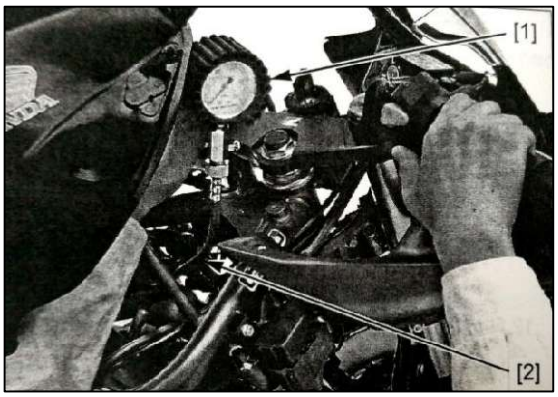
- Loose or worn cam chain
- Timing chain wear
- Cam sprocket tooth wear

- Cylinder, piston, piston ring wear

Poor idle speed

- Cylinder compression pressure is too low

Cylinder compression test

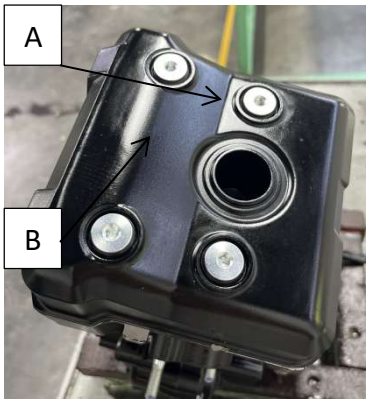


Heat the engine to normal operating temperature.
Stop the engine and remove the spark plugs.
Temporarily install the harness connection 33 (black) connector of ECM.
Install the threaded end of cylinder pressure gauge [1] into the spark plug hole.
Tools:
[2] Compression meter accessories

Turn the ignition switch to "ON" and turn the engine switch to " ".
Adjust it to gear "Neutral".
Keep the maximum throttle open and start the engine until the pressure gauge readings no longer rise.
Maximum readings typically last 4-7 seconds.
Compression pressure:
800kPa at 450rpm
Cause analysis of low pressure:
- Cylinder head seal washer leakage
- Improper valve clearance adjustment
- Valve leakage
- The piston ring or cylinder is worn

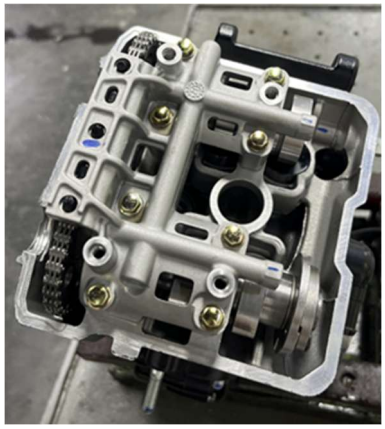
Cause analysis of high pressure:
- There is carbon deposit on the top of combustor or piston

Removal/Installation



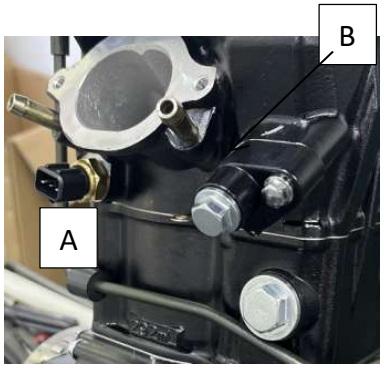
Cylinder head cover removal

Remove head cover fastening bolts A.
Remove cylinder head cover B.



Cam bracket removal

Remove cylinder head cover
Remove the bracket connecting bolts
Remove cam bracket

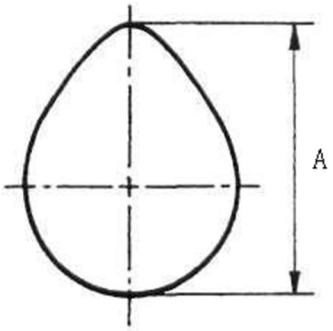


Removal of camshaft

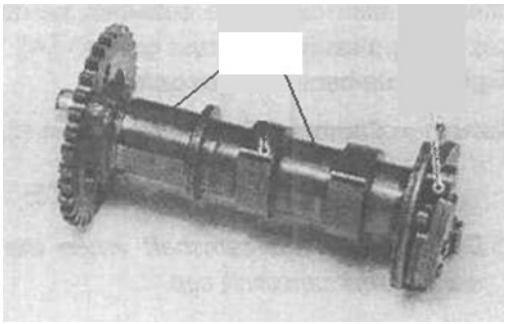
Remove cylinder head cover
Remove tensioner bolts A on the cylinder block and tensioner set B on the cylinder head.
Remove the bracket connecting bolts
Remove cam bracket
Remove the chain
Take out the camshaft

Caution: Do not allow the timing chain to fall into the crankcase

Inspection of camshaft



Check the lift distance of each cam.
Measure the length a of the convex part of the cam with a micrometer to check whether there is wear.



Test item Standard value Maintenance limit

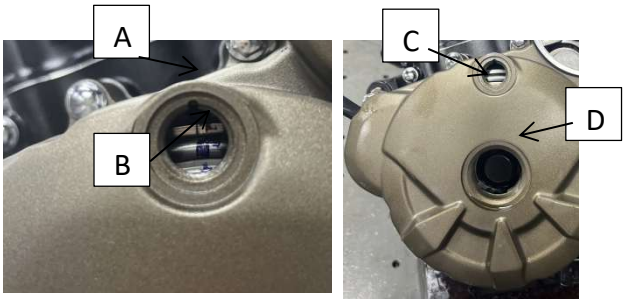
Intake cam height	36.9484～37.0784	36.8484
Exhaust cam height	36.6479～36.7779	36.5479

Check the journal diameter of each cam for wear

Intake and exhaust cam Standard value : 36.9484 ~ 37.0784

Maintenance limit value: 36.8484

Installation of camshaft



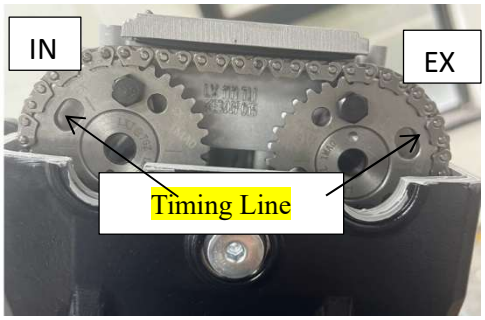
Mark the timing

Rotate the crankshaft D counterclockwise, and observe through the left front cover C to make the timing mark point A on the left front cover align with the timing mark B(T-score line) on the magnetoelectric machine, and the piston is at the top dead center of the compression stroke at this time.

When installing the camshaft, the timing line of the camshaft is parallel to the joint surface of the cylinder head.

(Note: The intake cam corresponds to the "IN" engraved line, and the exhaust cam corresponds to the "EX" engraved line)

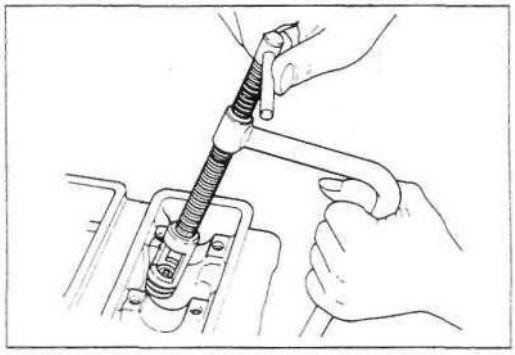
Apply lubricating oil to camshaft journals and cams.



Removal of cylinder head

Remove the intake pipe.
Remove water pipe joints
Remove cylinder head cover
Remove the camshaft support.
Remove the camshaft.
Remove the block connecting bolts and the cylinder head side bolts.
Remove the cylinder head lastly.

Disassembly of cylinder heads



Press down the valve spring with the valve remover,
and remove the valve lock clip. Then relax the valve remover,and remove the valve spring seat, the valve spring and the valve inner spring retainer and valve.

Note: In order to prevent permanent deformation of the valve spring, the valve spring should not be excessively compressed, and only the valve and locking clip can be removed.

All removed parts shall be marked to ensure that they reach the original assembly position during assembly.

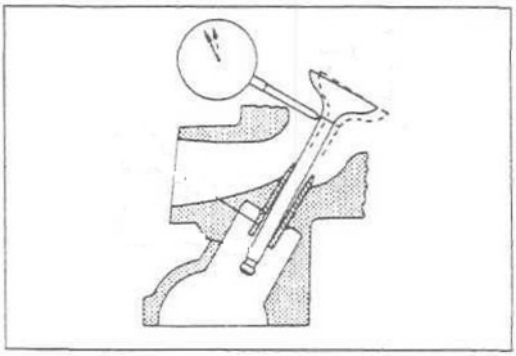
Inspection of valves and valve guides

Check whether each valve is bent, burned or the valve stem is abnormally worn.

Check the movement of the valve in the valve guide and measure its outer diameter.

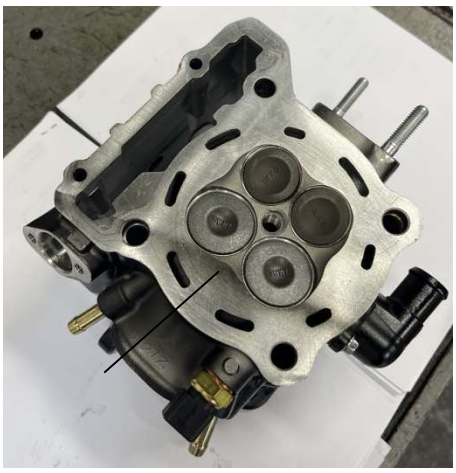
	Standard value	Maintenance limit value
Intake valve:	4.475 ~ 4.490	4.460
Exhaust valve:	4.460～4.475	4.450

And insert each valve into the conduit and observe its movement.



Measure the inside diameter of each valve guide with an inside micrometer or special measuring tool. Calculate the clearance between the valve stem and the valve guide.

	Standard value	Maintenance limit value
Intake valve guide:	4.510 ~ 4.522	4.542
Exhaust valve guide:	4.510 ~ 4.522	4.542
Clearance between intake valve and conduit:	0.02 ~ 0.047	0.077
Clearance between intake valve and conduit:	0.035 ~ 0.062	0.092



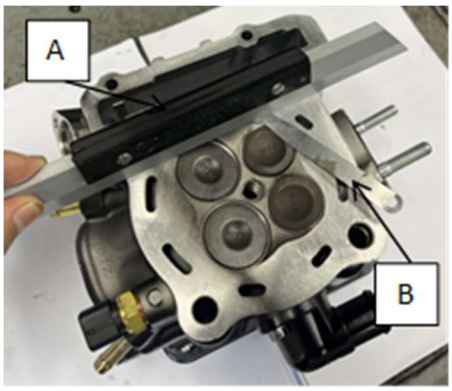
Combustion chamber

Note: Before measuring the inner diameter of the valve guide, the carbon deposit in the guide should be completely removed.
The valve seat should be ground again if the valve guide needs to be replaced.

Completely remove carbon deposits in the combustion chamber.
Remove the residue from the flat surface of the cylinder head with a spatula blade.

The cylinder head plane cannot be damaged.

Cylinder head inspection



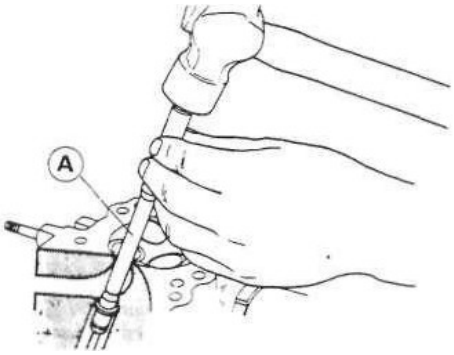
Check the spark plug hole and valve seat for cracks.
Check the cylinder head for deformation and use flat block A and feeler gauge B
Check the flatness of the cylinder head.
Maintenance limit 0.05

Inspection of valve springs

Measure the free length of the inner and outer springs of the valve.
Service limit value: (intake and exhaust)

	Standard value	Maintenance limit value
Inner valve spring:	36.2	35.2
Outer valve spring:	41	40.0

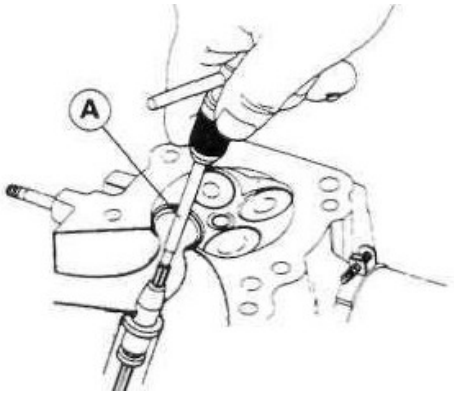
Replacement of valve guide



Fix the cylinder head, and use valve guide remover A to remove the valve guide outward from the valve hole.

Note: Do not damage the cylinder head when removing the valve guide

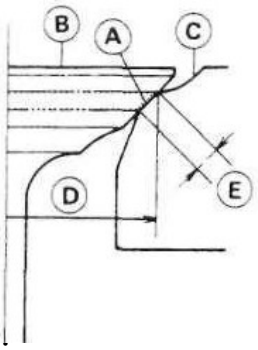
On the cylinder head, press-fit the new valve guide and "O" ring. The newly installed valve guide



Note: When reaming, reamer A must be coated with cutting oil. When loading or removing the reamer, it should be rotated.

Lastly, clean the cylinder head with cleaning agent, and remove all metal chips accumulated on the cylinder head with compressed air.

Inspection of valve seat



Measure the valve seat line diameter D and the line width

The standard value of door line diameter D is:

Intake valve: 31.1 ~ 31.3

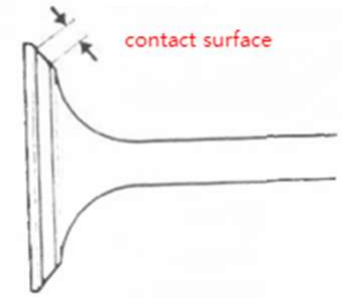
Exhaust valve: 25.9 ~ 26.1

The standard value of door line width E is: Intake valve/exhaust valve:

1.1 ~ 1.3

Repair the seat ring if the valve seat wire diameter or wire width is unqualified. Make it to the correct degree of sealing.

Valve inspection



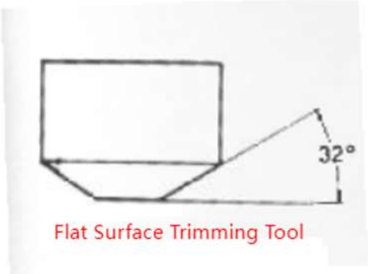
Remove the valve and check the valve contact surfaces.

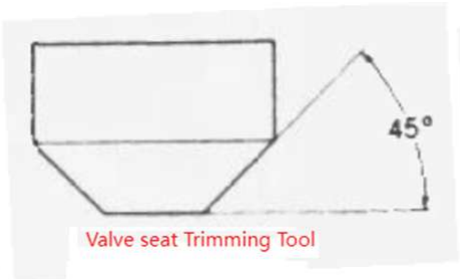
If the contact surface of the valve is rough, uneven in wear or not in normal contact with the valve seat, the valve should be replaced.

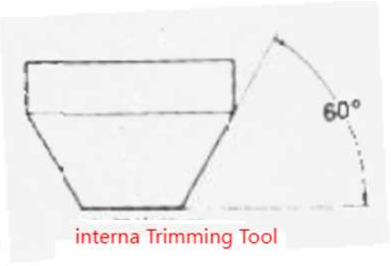
Valve seat repair

Valve seat milling cutter

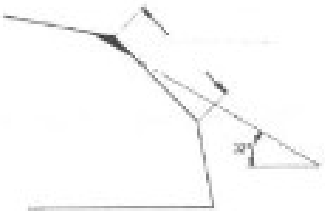
Milling cutters at three different angles



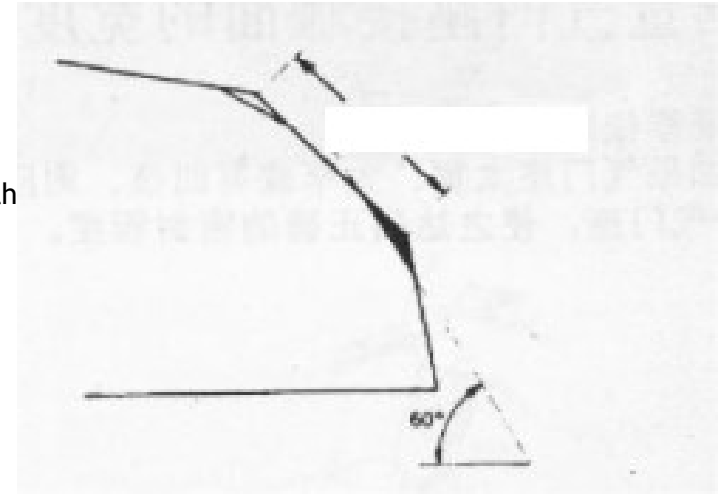




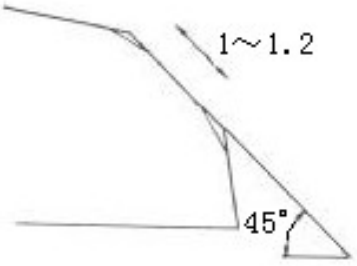
Mill the valve seat upper ring belt with a 32 ° milling cutter



Mill the valve seat bottom ring band with a 60 ° milling cutter

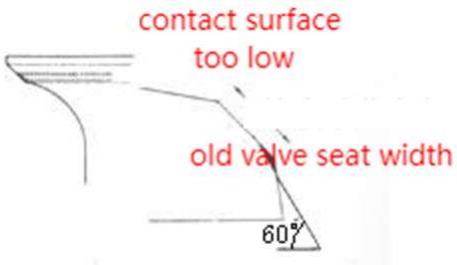


Then use a 45 ° milling cutter to finely machine the working surface of the valve seat to make it reach the correct width.
Standard value of working face width: 1.1 ~ 1.3.



Apply ink to the valve seat, insert the valve to rotate, then take out the valve, and observe whether the contact surface is correct and in good condition.

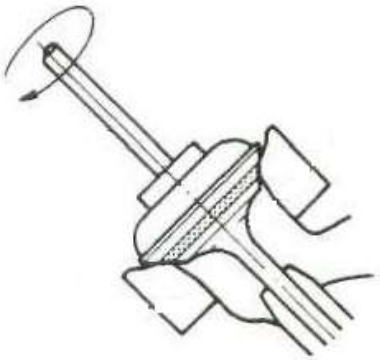
Note: Whether the contact surface between the valve and the valve seat is good or not will be a key factor for the sealing performance of the engine.



If the valve contact surface is too high, it can be milled with a 32° milling cutter to lower the contact surface.

If the valve contact surface is too low, use a 60° millir cutter to raise the contact surface.

Lastly, use a 45 ° milling cutter for machining and mil to machine the valve seat contact surface to the specified



After the valve seat is processed, the valve seat shoul coated a layer of abrasive. Then, install the valve and con all the abrasives remaining on the cylinder head, valve seat and valve guide.

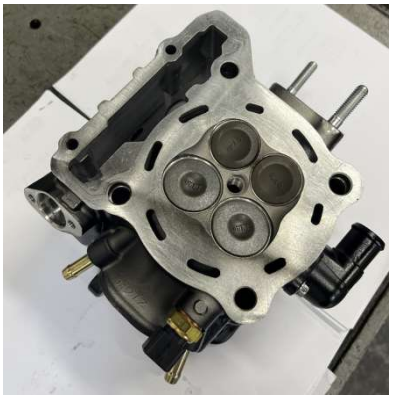
Assembly of cylinder heads

Before assembling the valve, the oil shield should be installed on the valve guide.

Then, coat the intake and exhaust valve rods with lubricating
oil and install them into the valve guide.

Install the valve spring and valve spring seat.

Note: When installing the valve spring, make the end of the spring with dense pitch face the cylinder head.



Use the valve remover to depress the valve spring, and then install the valve lock clip into the valve spring retainer.

Note: To prevent permanent deformation of the valve spring, do not excessively compress the spring so that the valve lock clamp can be fitted.

Then tap the end of the valve stem with a plastic hammer to make the lock clip firmly fall into the ring groove.

Installation of cylinder head

After removing the head gasket, clean the flat surface of the cylinder. Then, install a new gasket and dowel.

Caution: Do not allow dust and impurities to enter the cylinder.

1. Install the dowel and new cylinder head gasket.
2. Install the cylinder head, connecting bolts and washers.
3. Install the cylinder block side bolts.
4. Install the valve adjustment gasket and valve tappet.
5. Install the camshaft.
6. Install the dowel and cam bracket.
7. Install the tensioner.

Note: First tighten the connecting bolts, and start from the locating pins. Fasten the connecting bolt first, and start from the locating pin, and proceed diagonally; After ensuring that the cover is completely flat, tighten the connecting torque to (40 ~ 45) N·m in turn, and then tighten the connecting bolt to (50 ~ 55) N·m; Then tighten the side bolts of M6 to (8 ~ 12) N·m.

Apply clean engine oil to the cam, journal and valve tappet of
camshaft. When installing the camshaft, align the timing marks. When installing the camshaft, align the timing marks.

Install a new cylinder head gasket into the groove on the
cylinder head cover.

Then install the cylinder head cover on the cylinder head.

Tighten the cylinder head cover fastening bolts.

The bolt tightening torque is: (8 - 12) N · m.

Note:
When assembling the sealing ring of the cylinder head cover fastening bolt, the side of the sealing ring with the metal lining plate faces upwards (that is, this side is matched with the flange surface of the cylinder head cover bolt).

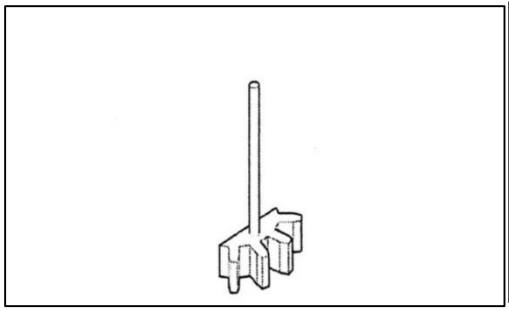
VI. Clutch and shift mechanism

Maintenance information

Overview

- This chapter is mainly about the maintenance of clutch and shift mechanism. The engine does not need to be removed from the frame for all operations.
- Oil viscosity and oil level can affect clutch disengagement. When the clutch is not disengaged or the motorcycle is still moving at a slow speed when it is disengaged, the oil level should be checked before overhauling the clutch system.

Tools



Clutch and shift mechanism specifications

Unit: mm

Items		Standard value	Maintenance threshold value
Free stroke of clutch handle		10～20	—
Clutch	Spring free length	35.4	34.4
	Friction plate thickness	2.95～3.05	2.75
	Flatness of center sleeve and pressure plate	0.1	0.3
Clutch sleeve	Bore diameter	20.000～20.021	22.031
	Outer diameter	24.959～24.980	24.949

Outer diameter of main shaft at clutch sleeve	19.959～19.980	19.939

Troubleshooting

Hard to grasp clutch handle
- Clutch cable is damaged, tangled or too dirty
- Improper wiring of clutch cable
- Clutch thrust mechanism damage
- Clutch push rod bearing failure
- Improper clutch lever installation

Clutch slip during acceleration
- Clutch push rod stuck
- Wear of active friction plate
- Insufficient elasticity of clutch spring
- No free stroke of clutch handle
- There is molybdenum disulfide or graphite additive in the engine oil

The motorcycle is still moving slowly forward even though the clutch is not disengaged or the clutch is disengaged
- Excessive free stroke of clutch handle
- Clutch friction disc warpage
- The oil level is too high, the oil viscosity is improperly used or the oil additive is used
- Clutch center sleeve lock nut loose
- Clutch thrust mechanism damage
- Improper clutch lever installation
- Clutch housing slot and clutch gear slot wear
- Improper clutch operation

Difficulty in shifting gears
- Improper adjustment of clutch cable
- Improper clutch operation
- Improper use of oil viscosity
- Damaged or bent fork
- Fork shaft bending
- Bending of fork claw
- Five-star paddle bolt is loose
- Five-star dial plate is damaged
- Transmission drum guide groove is damaged
- Five-star dial plates are worn or damaged

Drive train jump
- Stop plate wear
- Insufficient elasticity or damage of return spring of stop plate

- Five-star paddle bolt is loose
- Five-star dial plate is damaged
- Fork shaft bending
- Damaged or bent fork
- Damage to gear meshing surface or cogging

Shift pedal not returning

- Shift shaft return spring has insufficient elasticity or is broken
- Bent or damaged shift shaft

Clutch

Removal/Installation

Removal of right crankcase cover

Drain oil

Drain coolant

Remove water pipe

Remove the water pump cover

Remove the water pump impeller

Remove the clutch control arm

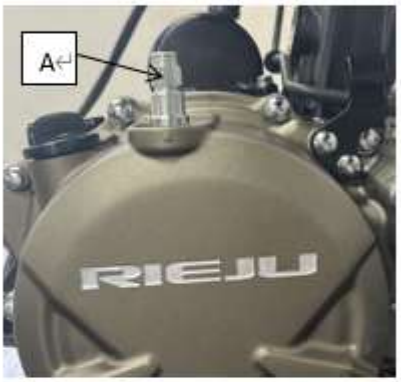
Remove the tubing bolt

Loosen the connecting bolts of the right crankcase cover.

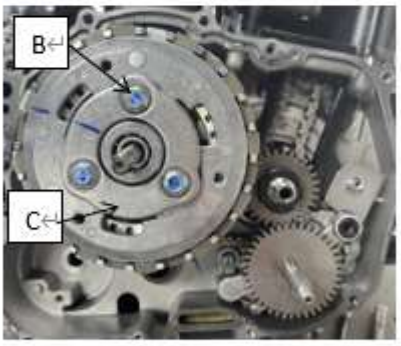
Remove the right crankcase cover

Loosen the right crankcase cover connecting bolt

Remove the right crankcase cover



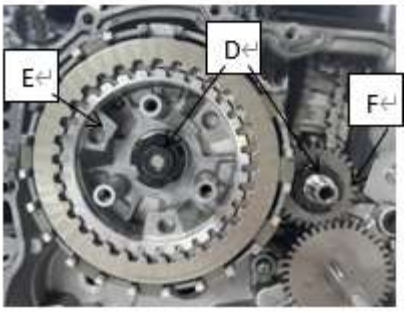
Note: When removing the right crankcase cover, do not move out
the clutch lever A to avoid damaging the oil seal. If removed, a
new oil seal needs to be replaced.



Removal of clutch and drive gear

Remove the clutch pressure plate bolt B

Remove clutch pressure plate C



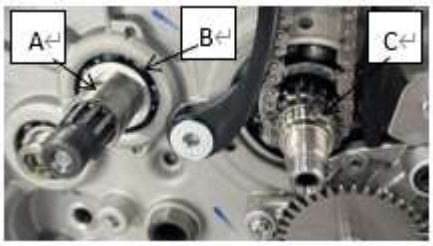
Loosen the clutch lock nut D

Loosen the lock nut D of the primary drive gear

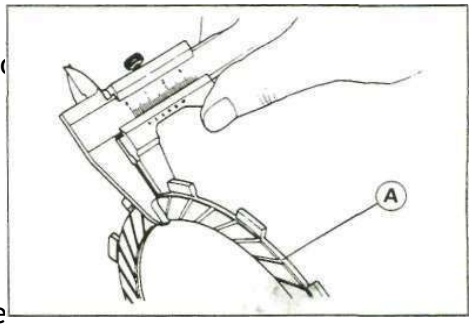
Remove clutch assembly E

Remove the primary drive gear F

Remove clutch bushing and flat washer B
Remove the drive gear and install the semi-circular key C



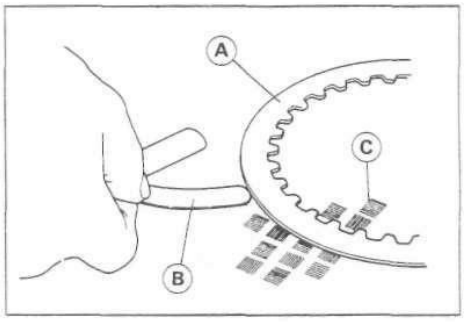
Clutch inspection



Use a vernier caliper to check the thickness of active friction plate:

Standard value: 2.95 - 3.05

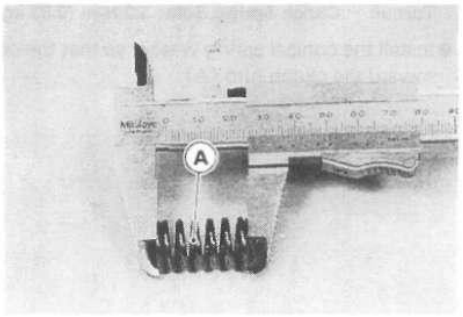
Service limit: 2.7



Thickness gauge checks the flatness of driven friction plate

Standard value: ≤ 0. 1

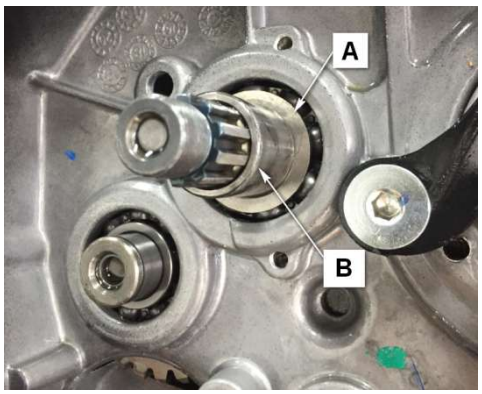
Maintenance limit: 0.2 mm



Vernier caliper checks clutch spring free height

Standard value: 35.4

Service limit: 34.4



Installation of clutch and drive gear

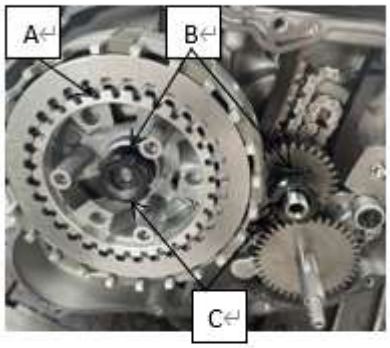
Install drive gear semi-circular key

Install the driving gear

Install clutch flat washer A and sleeve B

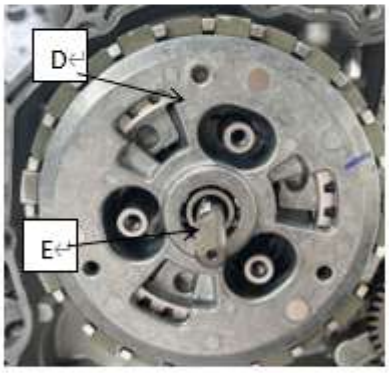
Install clutch cover
Install the underwasher of the center sleeve

Install the center sleeve combination A
Install the clutch lock nut washer B (concave side down)
Install the clutch lock nut (chamfered side down)
The installation torque is: (70 - 80) N · m

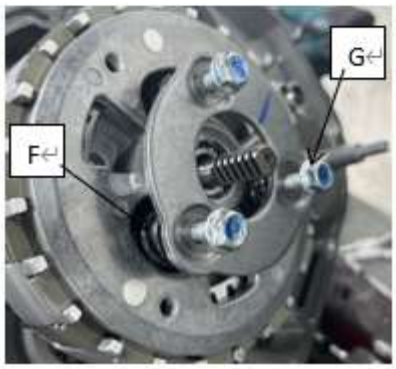


Note: When installing locknut spacers for clutch and drive gear
The concave surface of the gasket should face the clutch and drive gear.

Install the clutch lifter D and the push rod E

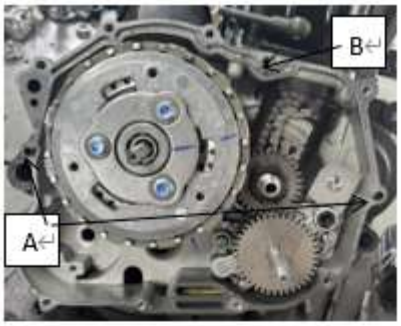


Install the compression spring F and the bolt G
The installation torque is: (10 - 15) N m



Installation of right crankcase cover

Install dowel A and new sealing paper pad B



Install right crankcase cover

Install the fastening screws, first tighten the bolts at the positioning pin holes, and then cross-tighten the remaining bolts.

The installation torque is: (8 - 12) N · m

Install fine filter and fine filter cover
Installation of water pump impeller
Install the water pump cover
Install the clutch control arm
Install the oil pipe bolt

Note: When installing the right crankcase cover, the fine filter cover and the water pump cover, a new paper pad should be replaced.

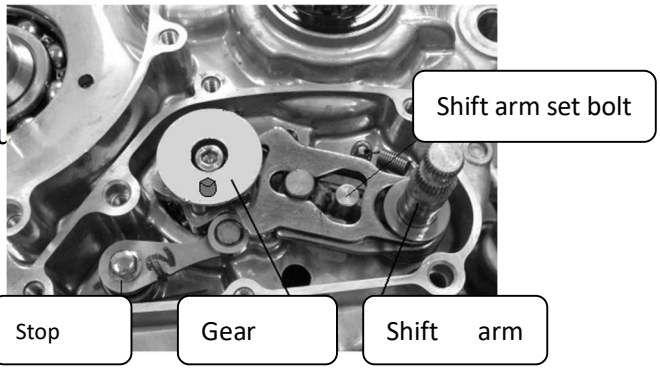
Shift system

Removal

Removal of transmission cover

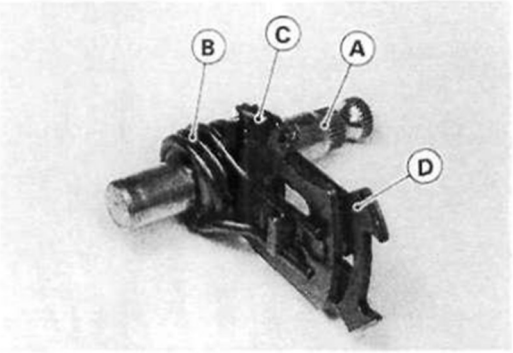
Remove gear display switch part A
Remove transmission cover mounting bolt B
Remove transmission cover C

Removal of shift shaft



Remove the mounting screw of the gear tou
plate
Remove the gear touch pad
Remove the shift arm component
Loosen the stop plate mounting screw
Remove the stop plate assembly
Remove the five-star dial
Remove the shift arm locating bolt

Inspection of shift shaft



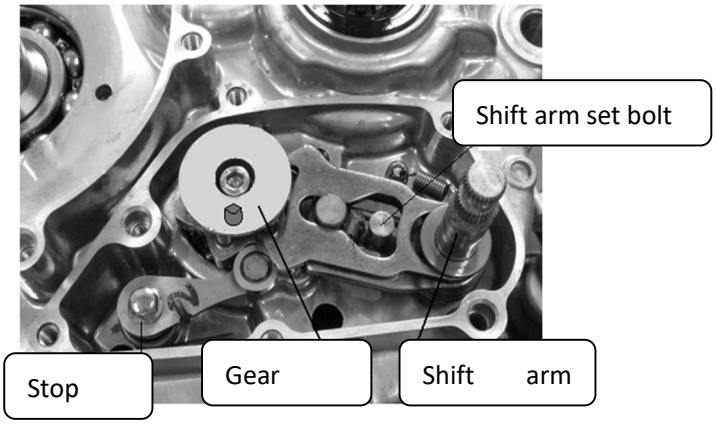
Check whether the shift shaft A is bent or damaged. If it bent, it needs to be corrected; if it is damaged, it needs replaced.

Check whether the return spring B is deformed or damag
If it is deformed or damaged, it needs to be replaced.

Inspect shift arm C for damage and replace if it is damaged.

Inspect shift plate D for damage and replace it if it is damaged.

Installation of stop plate



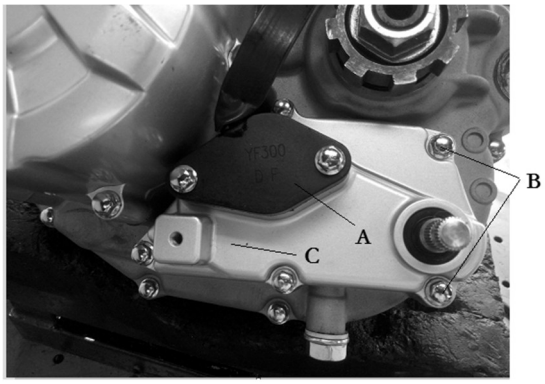
Install the five-star dial positioning pin
Install the five-star dial
Install gear touch plate locating pin
Install gear touch panel
Install gear touch plate screws
Screw tightening torque: (8 - 12) N · m.

Installation stop plate assembly
Install stop plate bolts
Installation torque of stop plate bolts: (8 - 12) N · m.

Installation of shift arm

Install shift arm positioning bolt F
Installation torque of shift arm positioning bolt: (25 - 30) N · m.

Installation of transmission cover



Install transmission cover dowel
Install new sealing paper pad
Install transmission cover
Installing file display component

VII. Magneto and starting clutch

Maintenance information

Overview

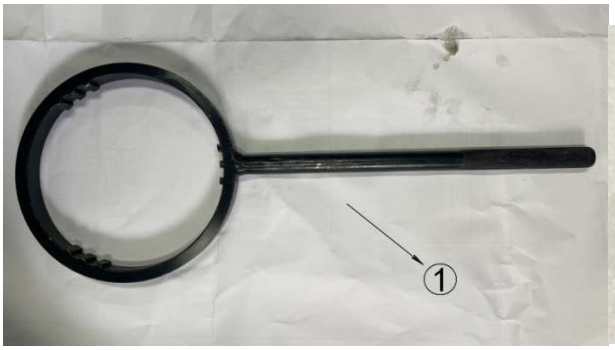
- This chapter is mainly about the maintenance of magneto stator and rotor. The engine does not need to be removed from the frame for all operations.
- Inspection regarding alternator charging coil.
- Inspection about triggers.
- Maintenance related to the starter motor.

Magneto and starting clutch specifications

Unit: mm

Items	Standard value	Maintenance threshold value
Outer diameter of starting disc gear sleeve	45.66～45.67	45.46
Inner diameter of starting clutch housing	62.317～62.343	62.363

Tools



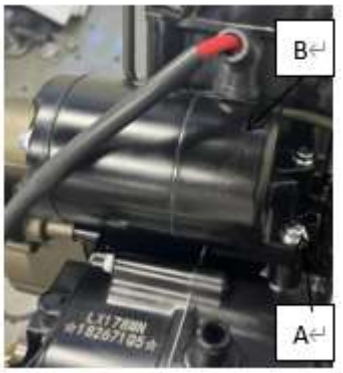
Troubleshooting

Starter motor rotates, engine does not start

- Starting clutch failure
- Starter motor duplex gear or shaft failure
- Starter motor pinion failure or wear
- Starter drive gear failure

Starting mechanism/left front cover/magneto

Removal of starter motor

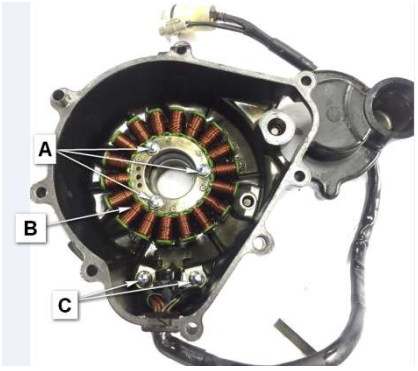


Remove motor mounting bolt A
Remove starter motor B

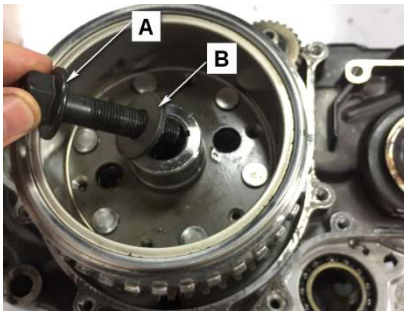
Removal of left front cover

Drain all engine lubricating oil.
Remove the gear chamber cover mounting bolt on the left front co
Remove the gear chamber cover.
Remove the mounting bolts of the left front cover.
Remove the left front cover.
Do not bruise the cover joint surface when removing the left front cover.

Removal of magneto

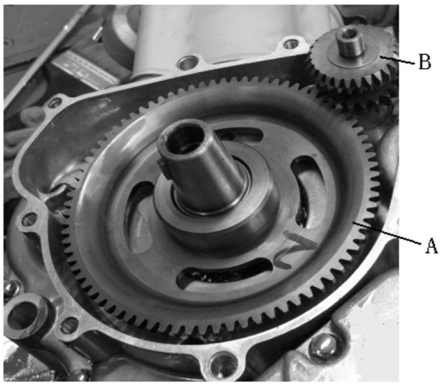


Remove spindle mounting bolt A
Remove spindle crimping plate mounting screw C
Remove magneto spindle B

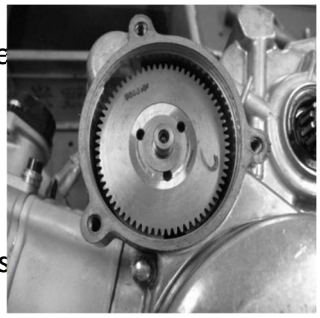


Remove rotor mounting bolt A and spacer B
Remove magneto rotor components

Removal of electric starting gear



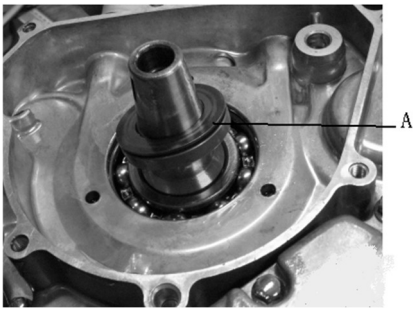
Remove disc gear A and the lower bushing of the disc tooth
Remove small double gear B and flat washer



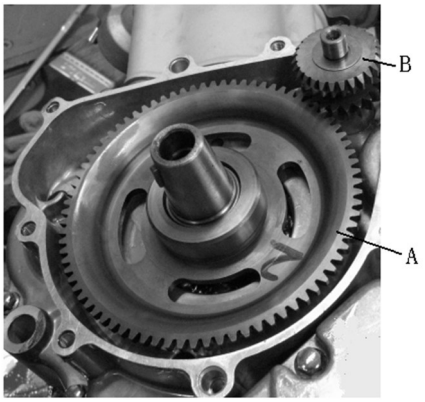
Remove the gear chamber cover mounting bolt on the left front cover
Remove the gear chamber cover
Take out the large double gear and flat washer

Check the large and small double gears and disc gears Whether it is worn or damaged, if so, it needs to be replaced.

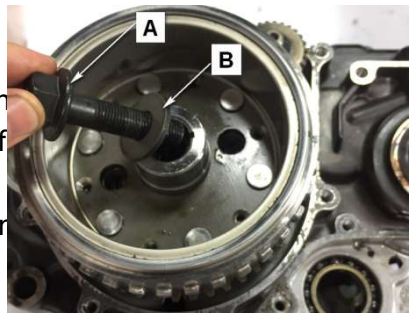
Installation of electric starting gear



Install disc gear bushing A
Install disc gear
Install small double gear and flat washer



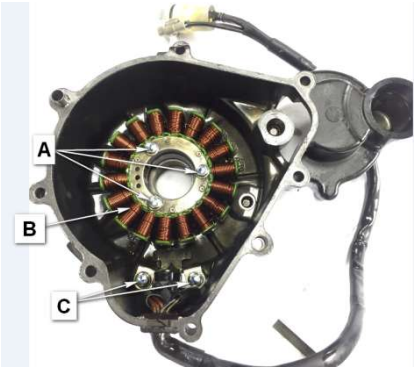
Installation of magnetic motor



Install the rotor parts of magneto, and before installation, clean oil stains in the conical surface of crankshaft and the conical hole of rotor;

Install rotor fastening bolts and apply appropriate amount of thr fastening glue to the threads

The bolt tightening torque is: (100 - 120) N · m

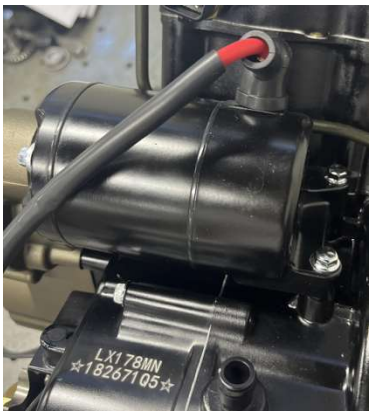


Install magneto spindle component B
Install spindle fastening bolts A
The tightening moment is: (5 - 9) N · m
Install spindle crimping plate
Fasten crimping plate bolts
The tightening moment is: (5 - 9) N · m

Installation of left front cover

Install left front cover locating pin
Install new sealing paper pad
Install left front cover
Fasten the left front cover mounting bolt
The tightening moment is: (8 - 12) N · m

Installation of starter motor



Install the starter motor in the left cover
Fasten motor mounting bolts
The tightening moment is: (8 - 12) N · m

Install large double gear and flat washer, one upper and one lower

Install a new gear chamber cover gasket in the gear chamber cover

of the left front cover.

Install gear chamber cover

Fasten gear chamber cover bolts

The tightening moment is: (8 - 12) N · m

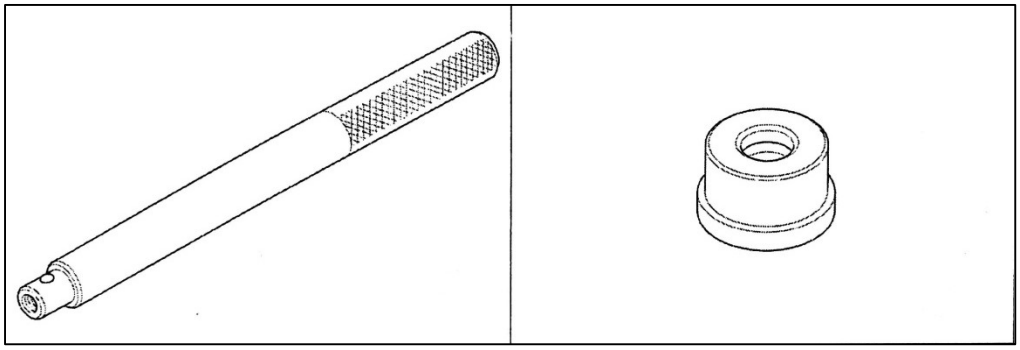
VIII. Box and power train system

Maintenance information

Overview

- The crankcase must be separated to serve the following components:
  1. Power train system
  2. Crankshaft
  3. Balance shaft
  4. Piston, connecting rod, cylinder block
- The following components must be removed prior to separating the crankcase:
  1. Engine
  2. Shift system
  3. Magneto assembly
  4. Cylinder head part
  5. Cylinder block component
  6. Tensioner
  7. Tensioning plate, guide plate
  8. Clutch assembly
  9. Balancing master and driven gears
  10. Thermostat assembly
  11. Gear display switch part
- Do not to damage the joint surface of the box during maintenance.
- Clean the oil passages before assembling the crankcase.
- Before closing the box, apply the end sealant evenly on the closing surface of the box, and clean the excess sealant.

Tools



Box, power train system specifications

Unit: mm

Items			Standard value	Maintenance threshold value
Transmission mechanism	Gear inner bore	M5	22.013～22.034	22.054
		C1	20.013～20.034	20.054
		C2	25.013～25.034	25.054
	Diameter of main shaft	M5	21.980～21.993	21.960
	Counter shaft diameter	C1	19.980～19.993	24.960
		C2	24.959～24.980	24.939
	Gear and shaft clearance	M5	0.020～0.054	0.094
		C1	0.020～0.054	0.094
		C2	0.023～0.075	0.115
Shift fork & shift fork shaft	Diameter of fork declutch shift shaft		11.966～11.984	11.946
	Shift fork inner diameter		12.000～12.018	12.038
	shifter fork tip thickness		4.93～5.00	4.73

Troubleshooting

Hard to shift

- Improper clutch operation
- Improper viscosity of oil
- Shifting fork deformation
- Fork shaft deformation
- Fork pawl deformation
- Shift drum guide groove is damaged
- Shift arm deformation

Shifter jump

- Gear wear
- Shift drum guide groove wear
- Fork shaft deformation
- Shift drum damage
- Positioning plate torsion spring is damaged
- Wear or deformation of the pinion gear
- Shift arm is damaged

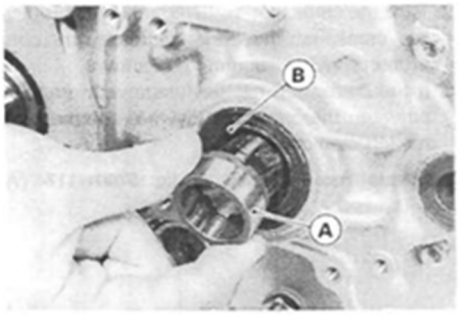
Excessive engine noise

- Worn or damaged transmission gears
- Worn or damaged transmission bearings

Crankcase/transmission

Breakdown of crankcase

Take out the countershaft sleeve A and O-ring B.

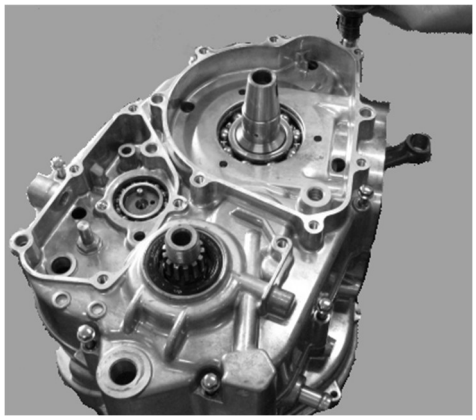


Loosen the crankcase connecting bolts.

Remove right crankcase

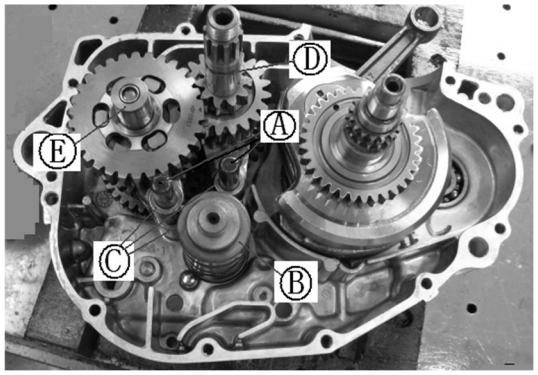
Remove box locating pin

Remove the sealant from the end face and do not damage the end face of the box.



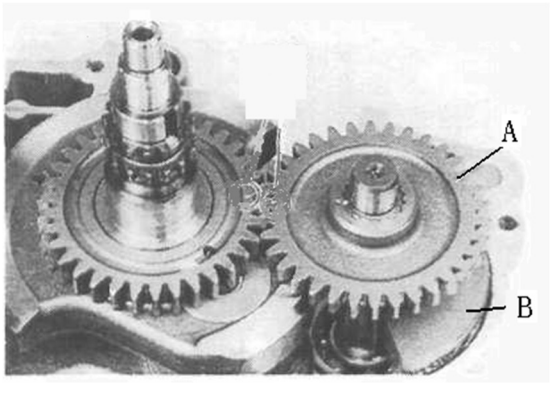
Note: Separate the crankcase by tapping the left and right crankcase bodies with a soft hammer. Do not pry the crankcase with a screwdriver or tap the crankshaft.

Removal of transmission mechanism



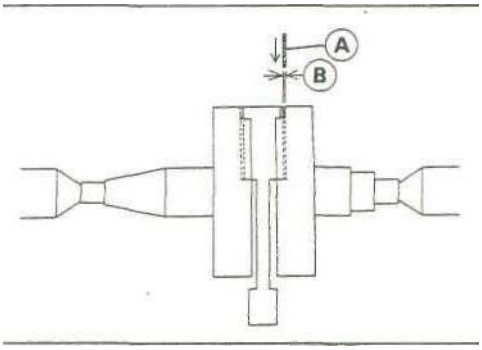
Remove fork shaft A
Remove fork C
Remove shift drum B
Remove spindle D and counter spindle E

Removal of crankshaft



Remove balance axis B
Remove the crankshaft

Inspection of crankshaft

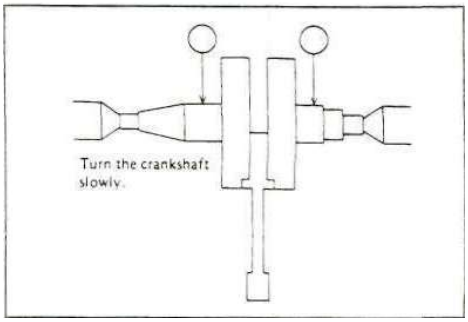


Use the thickness gauge A to measure the end face of the crankshaft connecting rod and

Total crank face clearance B.

The standard value is: 0.2 - 0.45

The maintenance limit value is: 0.5



Turn the crankshaft by hand, check its radial runout with a dial indicator

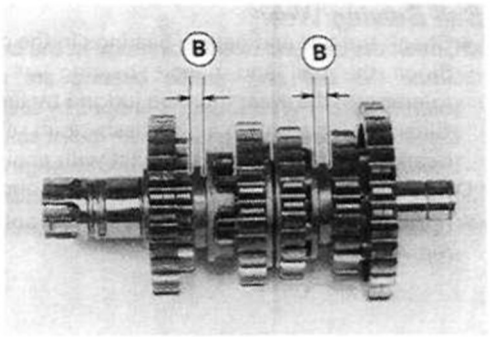
Standard value: ≤ 0. 03

The maintenance limit value is: 0.05

Check whether the crankshaft bearing is worn or damaged, and replace it if it is.

Inspection of transmission mechanism

Check whether the gear rotation and axial sliding of each gear of the main and auxiliary shafts are flexible.



Check the gears of each gear of the main and auxiliary shafts for wear or damage.

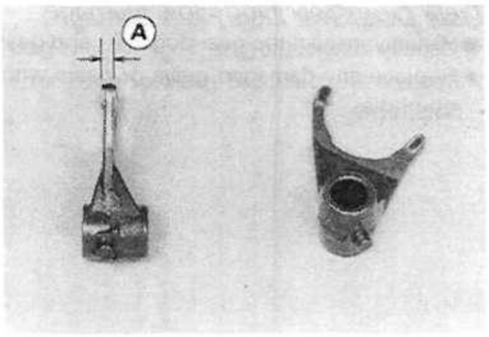
Check the fork groove width B:

The standard value is: 5.0 - 5.18

The maintenance limit value is: 5.33

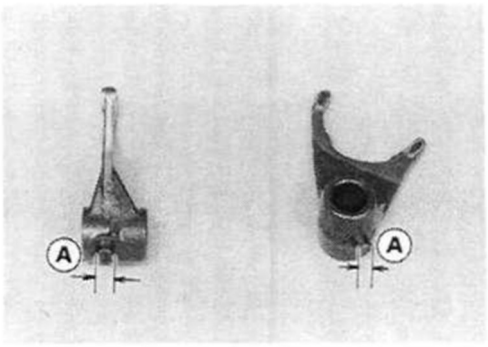
Check the thickness of the fork plate A

The standard value is: 4.93 - 5.0
The service limit value is: 4.83



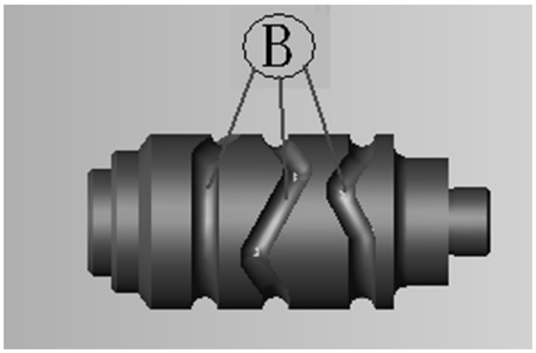
Check the fork pin diameter A

The standard value is: 5.9 - 5.95
The service limit value is: 5.8



Check shift drum fork groove width B

The standard value is: 6.05 - 6.15
The service limit value is: 6.2



Installation of crankshaft

After heating the crankshaft bearing hole of the left crankcase to (130 - 150)℃, gently press the crankshaft into the crankcase.

Turn the crankshaft to check whether it turns flexibly or not.

Turn the right end of the crankshaft upward, drip enough engine oil from the right end oil hole, and slowly rotate the connecting rod until continuous engine oil overflows from both sides of the big end of the connecting rod.

Installation of transmission mechanism

The main and auxiliary shafts are combined and assembled into the crankcase at the same time.

Assembly of shift drum

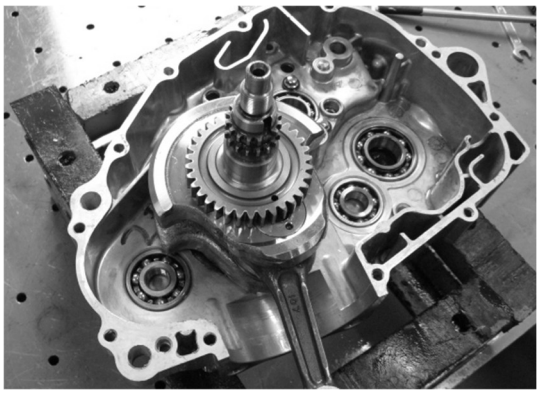
Assemble the shifting fork, shift the shifting plate into the main and auxiliary shafts, and put the shifting fork pin into the groove of the speed change drum.

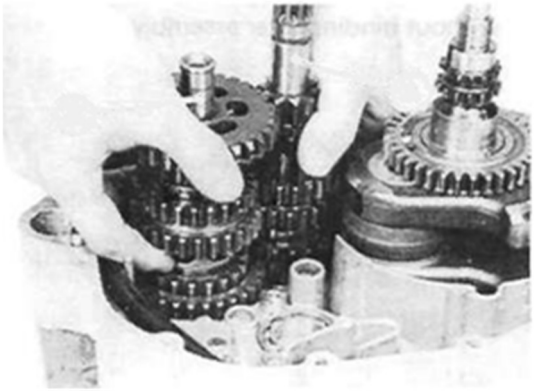
Do not install the marks on the shift fork incorrectly.

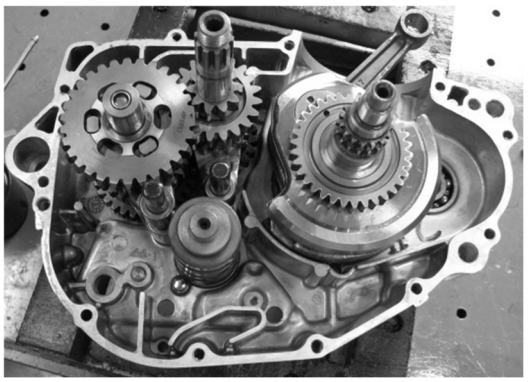
Align the shift fork shaft hole of the shift fork, insert the shift fork shaft to rotate the main and auxiliary shafts to see if they can rotate flexibly. If not, you need to reassemble all parts of the transmission mechanism according to the above steps.

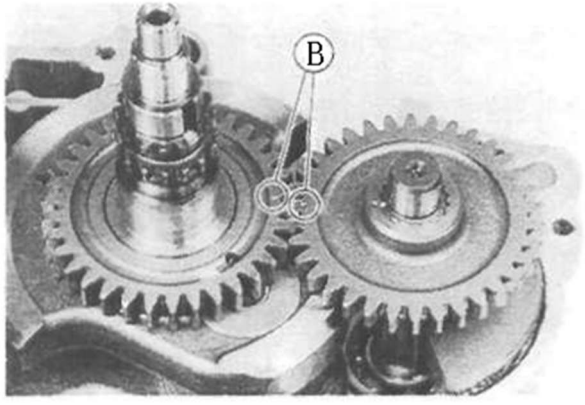
Assembly of balance shaft

Press the balance shaft driven gear combination onto the balance shaft through the alignment and guidance of the key firstly; Then, put the balance shaft parts into the box by aligning the matching mark B on the master and slave teeth.









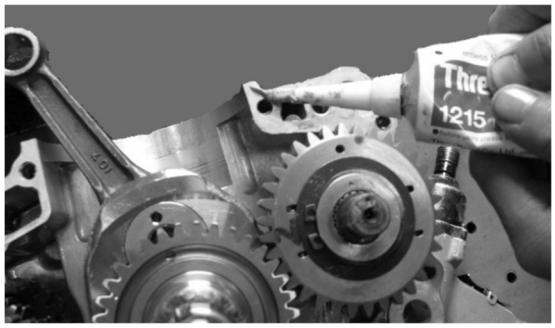
Apply lubricating oil to each gear and rotating part.

Apply sealant to the joint surface of the box.

Close the left crankcase to the right crankcase.

Tighten crankcase mounting bolts

The bolt installation torque is (8 - 12) N · m.



Install O-ring B and countershaft sleeve A on the countershaft.

Apply an appropriate amount of thread fastening glue to the thread of the auxiliary shaft, and install the auxiliary shaft driving sprocket (flywheel), sprocket locking washer and driving sprocket locking nut in turn. The tightening torque of the nut is (119 - 131) N · m, and pry up the lock washer at the flat position of the lock nut to lock the nut.

Install chain, chain adjusting plate and chain tensioning plate

Install piston component

Fitting cylinder block components

Install cylinder head part

Install stop plate combination and five-star dial plate

Install shift arm assembly

Install the transmission cover

Install electric starting gear and starting motor

Install magneto components

Install left front cover

Install oil pump components

Install clutch components

Install right crankcase cover

Inject lubricating oil

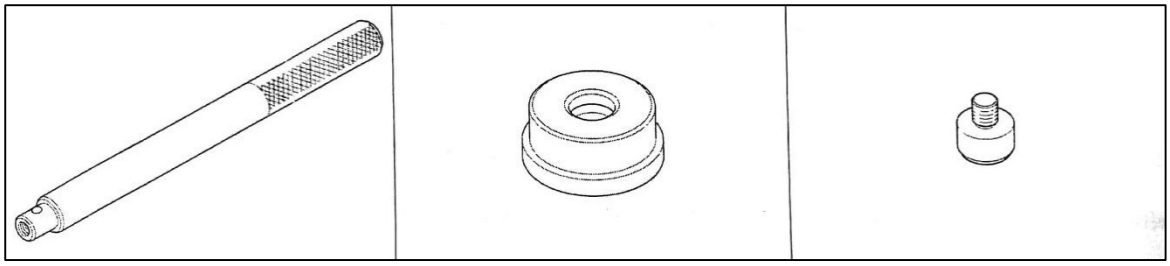
IX. Crankshaft, piston, cylinder block, balance shaft

Maintenance information

Overview

When servicing the crankshaft, connecting rod and balance shaft, the crankcase must be separated. Refer to the case section for the method of separating the crankcase.

Tools



Specifications of crankshaft, piston, cylinder block, balance shaft

Unit: mm

Items		Standard value	Maintenance threshold value
Crankshaft	The clearance on the large end of the connecting rod	0.2～0.45	0.5
	Clearance between connecting rod big end bearing and crank pin	0.008～0.023	0.025
	Clearance between left crankshaft journal and bearing inner ring	-0.002～-0.021	0.04
	Hop	0.03	0.05
Cylinder block	Cylinder diameter	78.00～78.01	78.04
	Cylindricity	0.006	0.01
	Flatness	0.03	0.05

Piston, piston pin, piston ring	Piston skirt diameter		77.965～77.980	77.915
	Pin bore hole		15.002～15.008	15.028
	Piston pin diameter		14.994～15.000	14.974
	Piston-to-piston pin clearance		0.002～0.014	0.04
	Piston ring closing clearance	1st ring	0.15～0.35	0.4
		2nd ring	0.20～0.40	0.45
		Oil ring	0.20～0.70	0.75
	Clearance between piston ring and piston ring groove	Clearance between the ring and the groove	0.020～0.050	0.07
		Clearance between the 2nd ring and groove	0.020～0.050	0.07
Cylinder clearance			0.020～0.045	0.08
Inner diameter of connecting rod small end			15.013～15.025	15.035

Troubleshooting

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

- Cylinder head gasket leakage
- Worn, stuck or damaged piston rings
- Cylinder head/piston worn or damaged

Cylinder pressure is too high, cylinder block is overheated or cylinder knocking

- Excessive carbon deposits on top of piston or combustion chamber

Excessive exhaust

- Cylinder block, piston or piston ring wear
- Incorrect assembly of piston ring
- Scratch of piston or cylinder wall

Abnormal engine noise

- Clearance between piston pin and piston pin hole
- Connecting rod small head wear
- Cylinder block, piston or piston ring wear
- Crank pin needle roller bearing wear

Engine vibration

- Excessive crankshaft runout

Piston/piston ring/cylinder block

Removal of cylinder block

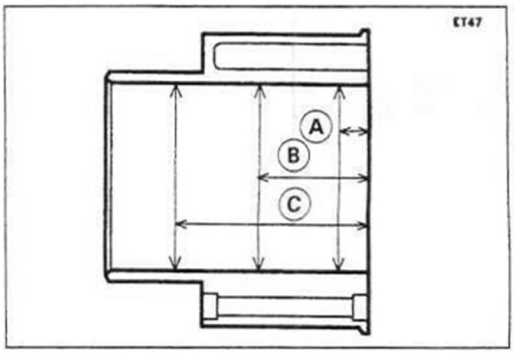
Remove the cylinder head (see Chapter V)
Remove gasket A and location pin B.
Remove cylinder block C.

Note: When the cylinder is removed, the timing chain cannot fall into the crankcase.

Scrape the paper pad remaining on the surface of the cylinder clean with a spatula.

Note: If the paper pad is dipped in gasoline, it is prone to disassemble. Avoid damaging the cylinder contact surface when performing this operation.

Cylinder inspection



Check the cylinder for wear or damage. When measuring the inner diameter of the cylinder, three positions should be measured, that is, the top A, middle B and bottom C of the piston stroke, and they should be at right angles to each other.
A = 10 B = 60 C = 100

The standard value of cylinder bore is: 78.00 - 78.01 Maintenance limit value: 78.1

Removal of piston
Remove the piston pin retaining ring with pliers

Note: Do not drop the retaining ring into the crankcase.

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

Inspection of pistons/piston rings

Use a thickness gauge A to measure the clearance between the piston ring and the piston ring groove.

Measurement standard value:
First ring: 0.02-0.06
Second ring: 0.02-0.06

Maintenance limit value:
1st/ 2nd ring: 0.16

Remove the piston ring.

Caution: Do not damage the piston rings during disassembly.

Insert each piston ring into the cylinder and measure the clearance.
Standard value:
First ring: 0.15-0.3
Second ring: 0.20-0.35

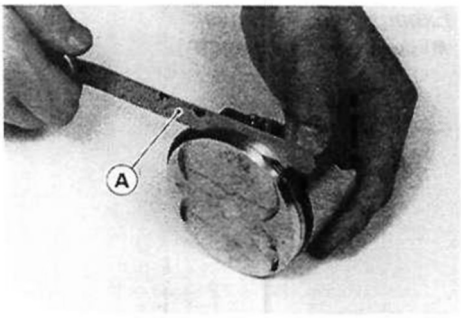
Maintenance limit:
First ring: 0.65
Second ring: 0.7

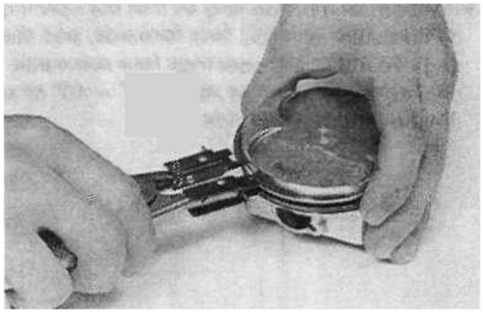
Check whether the piston is worn or cracked, and whether the piston ring groove is worn.

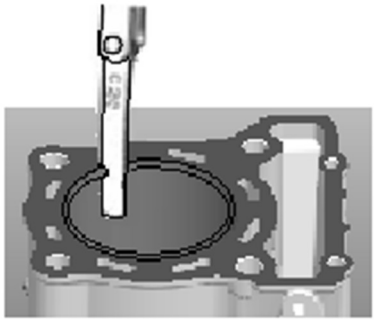
Measure the outside diameter at a position 5mm above the bottom end of the piston skirt.

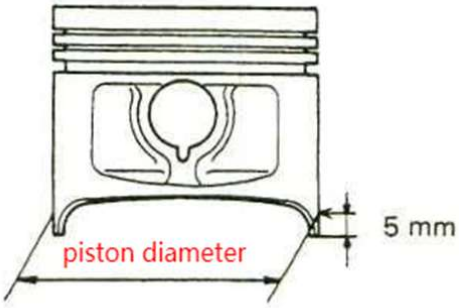
The standard value is: 77.950 - 77.97
Service limit: 77.805

Work out the clearance between the cylinder and the piston.
Maintenance limit: 0.12 mm









Measure piston pin bore diameter:

Standard value is: 17.002 - 17.008
Maintenance limit value: 17.04

Measure the outer diameter of piston pin:

The standard value is: 16.994. 0 - 17.000
Maintenance limit value: 16.96

Installation of piston ring

Clean the piston ring grooves thoroughly. Install the piston rings.

Note: During installation, the piston and piston ring should be prevented from being damaged. Install the piston ring with the marked side facing up.
After installation, the piston ring should be able to rotate freely.

Do not reverse the installation positions of the first and second rings.

Precautions when installing piston rings:

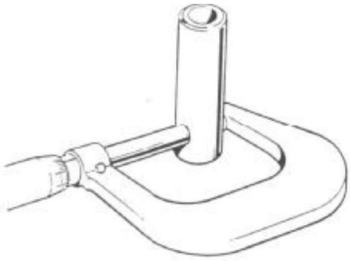
The opening of the first ring should be facing the exhaust direction;

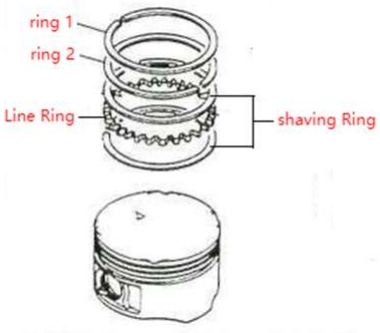
The opening of the second ring and the oil ring spacer should be facing the air intake direction;

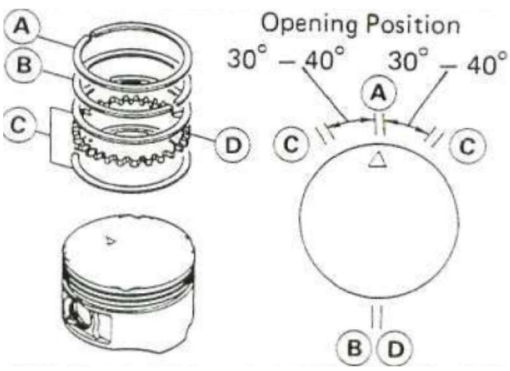
The openings of the two scraper rings are spaced (30 - 40) degrees from the opening of the first ring, and are arranged left and right.

For an oil ring composed of three circles, the gap between the rings should match the gap between the spacer rings. When installing the oil ring, the spacer should be installed first, and then the scraper ring should be installed.

The end clearance of the piston pin retaining ring should be staggered from the piston notch. Use a new piston pin retaining ring when reassembling after disassembly.



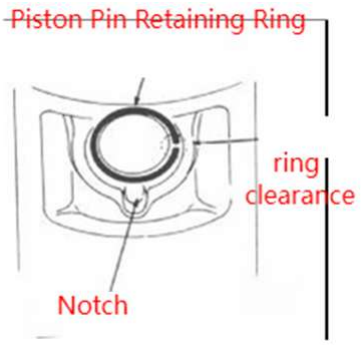




Installation of piston

Install the piston, piston pin and new piston retaining ring.

Note: When installing the piston, the side marked with "IN" should be aligned with the exhaust valve.
The end clearance of the piston pin retaining ring should be staggered from the piston notch. Use a new piston pin retaining ring when reassembling after disassembly.
Do not allow the piston pin retaining ring to fall into the crankcase.



Installation of cylinder block

Install the new paper pad and dowel.

Apply oil to the cylinders and piston rings.
Install the cylinder.

Note: Avoid destroying the piston during installation.
Do not allow the timing chain to fall into the crankcase.

Install cylinder head gasket and dowel
Installing cylinder head

Crankshaft/balance shaft

Refer to Chapter 8 for disassembly and installation of crankshaft and balance shaft.

RIEJU