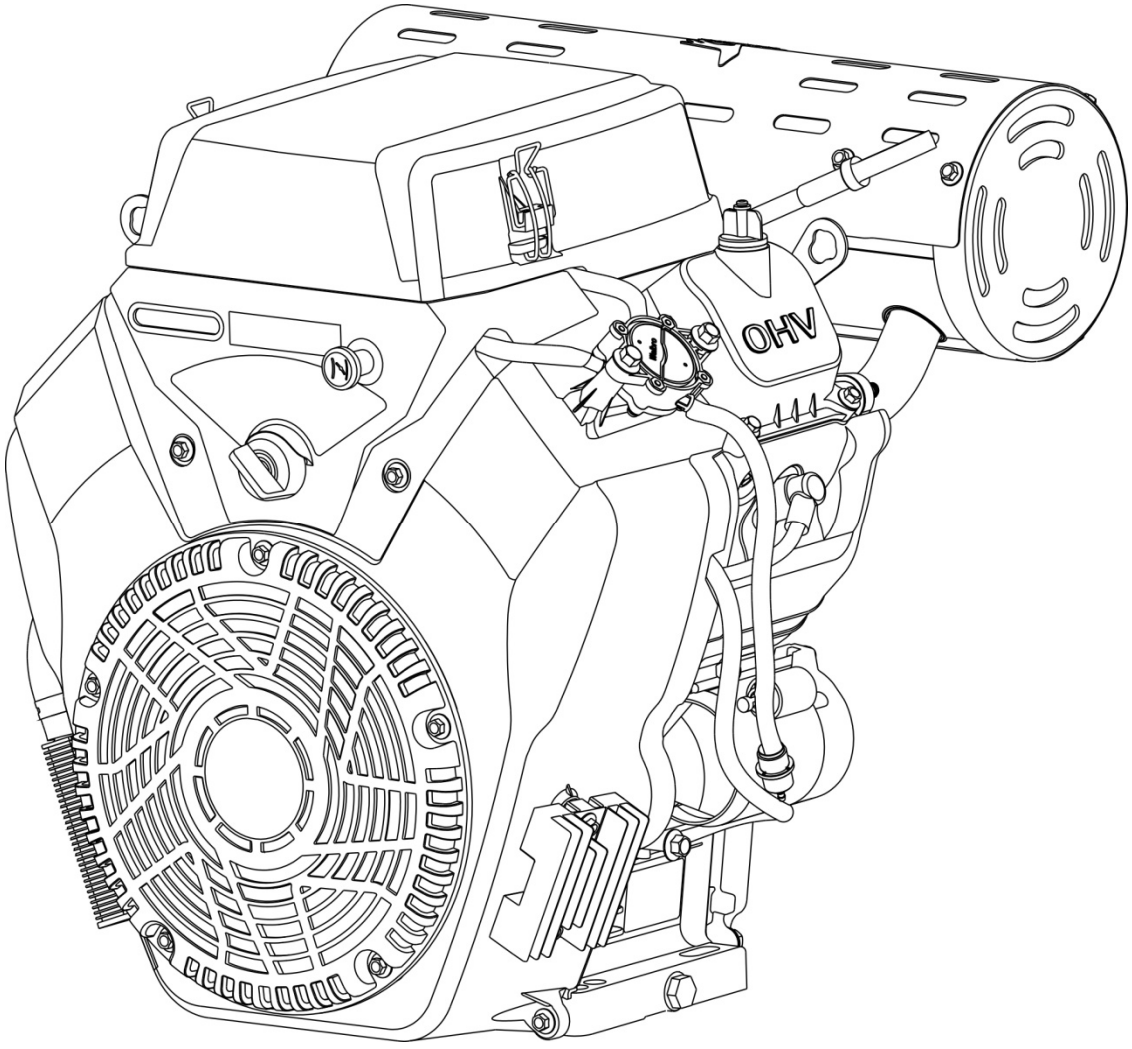
LC2V80FD

Maintenance Manual



LONCIN MOTOR CO., LTD.

SAFETY INFORMATION

Before operating and maintaining the engine, please carefully read and understand the Maintenance Manual. To use the machine safely and efficiently, you must conduct proper maintenance and operation to the machine.

The following identifications throughout the Manual may give prompts to operators and maintainers as well as illustrate matters that cause dangers.

⚠ DANGER ***The identification reminds you to note that it may cause severe personal injury or death which is imperative.***

⚠ WARNING ***The identification reminds you to note that it may cause severe personal injury or death or improper operation.***

⚠ CAUTION ***This identification reminds you to note that it may cause personal injury or property damage or improper operation.***

Be vigilant to fuel oil, exhaust emissions and moving parts to avoid severe personal injury or death.

Add fuel carefully!

- Gasoline is inflammable. Please add the fuel oil in the outdoor, well-ventilated area after the engine is stopped.
- It is prohibited to smoke when adding gasoline and be away from flame and spark.
- It is prohibited to start the engine before the gasoline splashed area is dry.

Heat Exhaust

- The temperature of silencer can be very high during the operation of engine; even if the machine is stopped for a moment, it would be hot. Be careful not to touch the burning silencer. Prior to maintenance, the engine shall be placed indoor and cooled down.
- To prevent fire, when the engine is working, the distance between the engine and the wall shall be kept at least 1 m. Inflammables must be away from the engine.

Carbon Monoxide Poisoning

- The exhaust contains poisonous carbon monoxide. Avoid inhaling the exhaust.
- Don’t use indoors.
- Don’t operate the engine in the closed garage or enclosed area.

General Precautions

- Carefully read the Maintenance Manual, get familiar with all the control mechanisms and the correct using and maintenance & installing method of the machine and master the operating method of stopping and fast separating the machine.
- When you feel fatigue, have discomfort or have a drink, please don’t operate the engine; otherwise, it may cause severe injury.
- Children and people who don’t read the Manual or without training are prohibited to use the engine.
- Don’t repair the machine without mastering the method of engine repair.
- Don’t refit the machine or change its structure. Once the machine loses its balance, it may easily cause damages and injury incidents.

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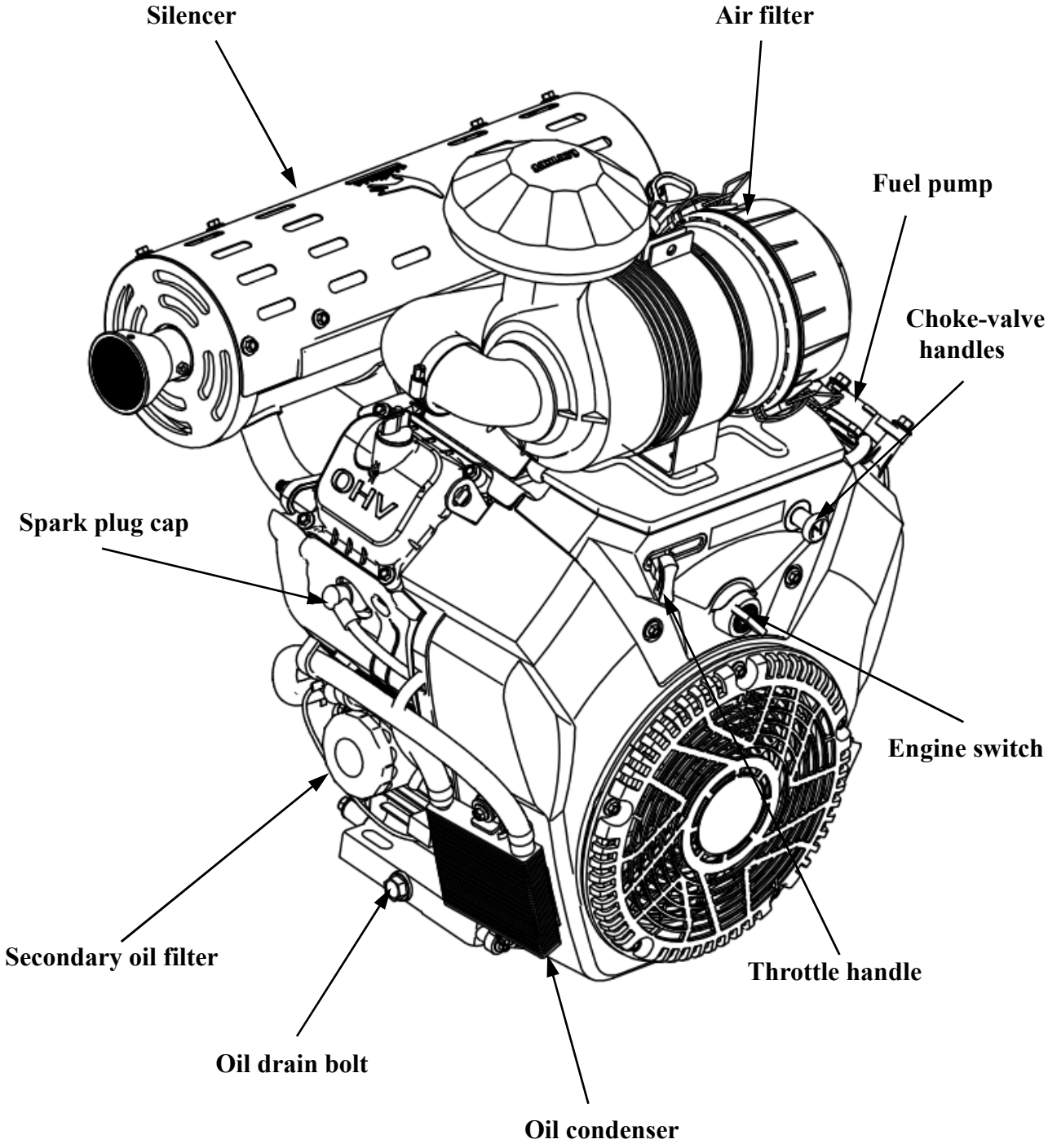
1-1 Introduction of engine



Part I Technical Specifications

Air filter - protect the engine through filtering dusts and impurities in the air.

Spark plug - input high voltage at ignition coil to the engine combustor, generate spark through air discharge between electrodes and introduce combustion of mixed gases.

Silencer - a device to prevent the transmission of engine sound and reduce the noise of exhaust system.

Fuel filter - filter impurities in the fuel through oil pipes between fuel tank and carburetor.

Oil condenser - pump the engine oil into it through the oil pump and enter the lubricating main oil gallery after it is cooled down by the cooling fin.

Secondary oil filter - oil passes it to filter impurities and then enters the lubricating main oil gallery.

Choke-valve handle - cold start the engine and close the choke valve, the carburetor would supply concentrated mixed gas, which makes the engine to be easily started. After preheating the engine, fully open the choke-valve handle.

Engine switch - before starting the engine, turn the switch to "ON" position; the engine can be shut down when turning the switch to "OFF" position.

Throttle handle - turning throttle handle may adjust the rotating speed of the engine to achieve the power and rotating speed expected.

Oil drain plug - swinging out drain plug may drain all the oil in the engine out so as to replace the oil.

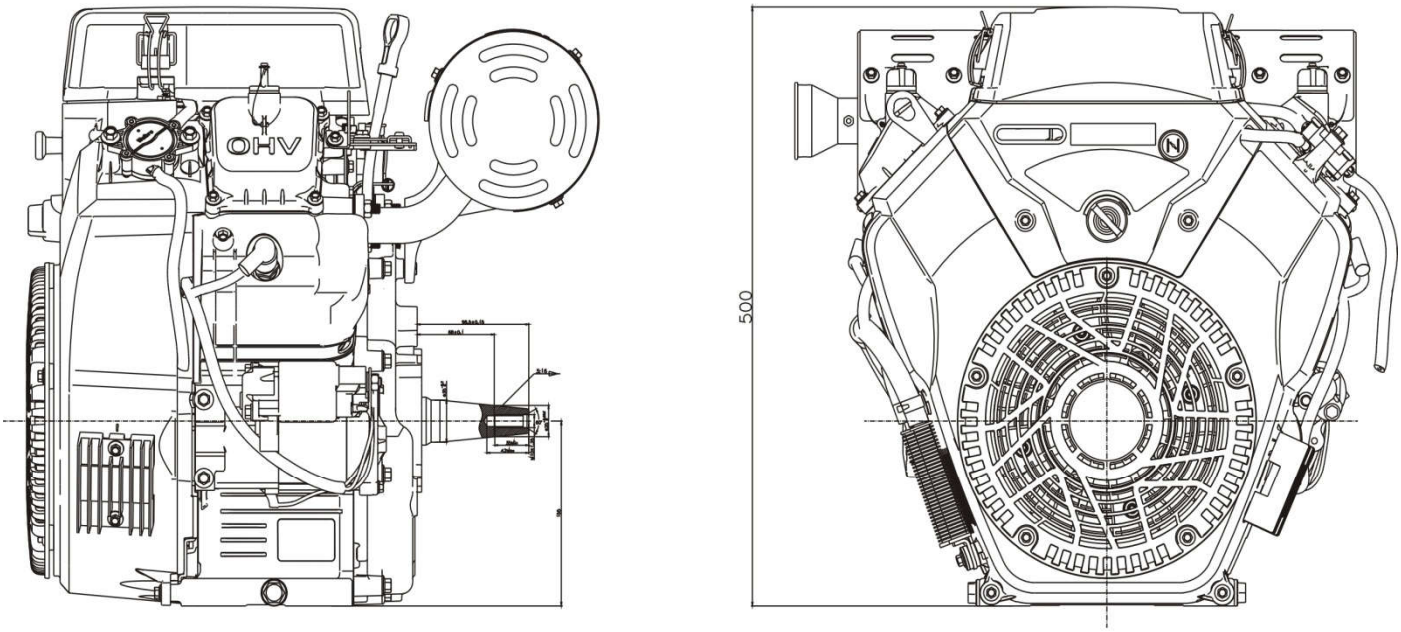
1-2 Technical parameters

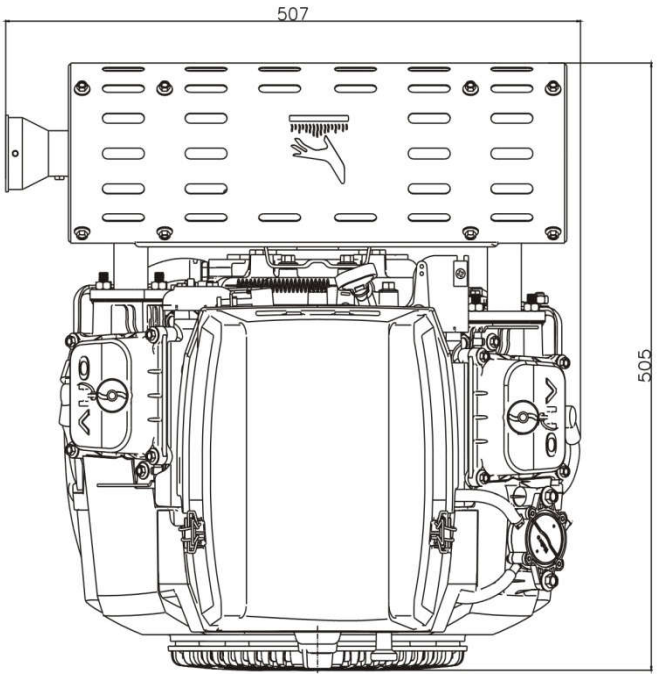
	Single-engine Power	Unit Power
Type of Engine	Double-cylinder, four-stroke-cycle, forced-air cooling and overhead valve	
Air displacement (diameter of cylinder × stroke)	764ml（80mmX76mm）	
Maximum power (kW/3600rpm)	19	
Maximum torque (N·m) Corresponding rotating speed (rpm)	52/2800	
Fuel consumption rate (g/kW·h)	≤ 350	
Idle speed (rpm)	1,800±150	
Speed fluctuation rate	≤ 10%	
Compression ratio	8.7:1	
Starting mode	Electronic start	
Direction of rotation	Anticlockwise (output terminal)	
Valve clearance (mm)	Inlet valve 0.10 ~ 0.15	
	Exhaust valve 0.15 ~ 0.20	
Spark plug	RC12YC	
Spark plug gap (mm)	0.7 ~ 0.8	
Ignition mode	Transistorized magneto ignition	
Type of air filter	Double filter cartridge	
External dimensions (mm) L × W × H	507×502×690	507×502×500
Net weight (kg)	50	49

The rated power of the engine indicated in the Manual is the net output power (net power) at 3,600 rpm of an engine under the production status measured in accordance with SAE J1349. For mass production engines, the value may vary.

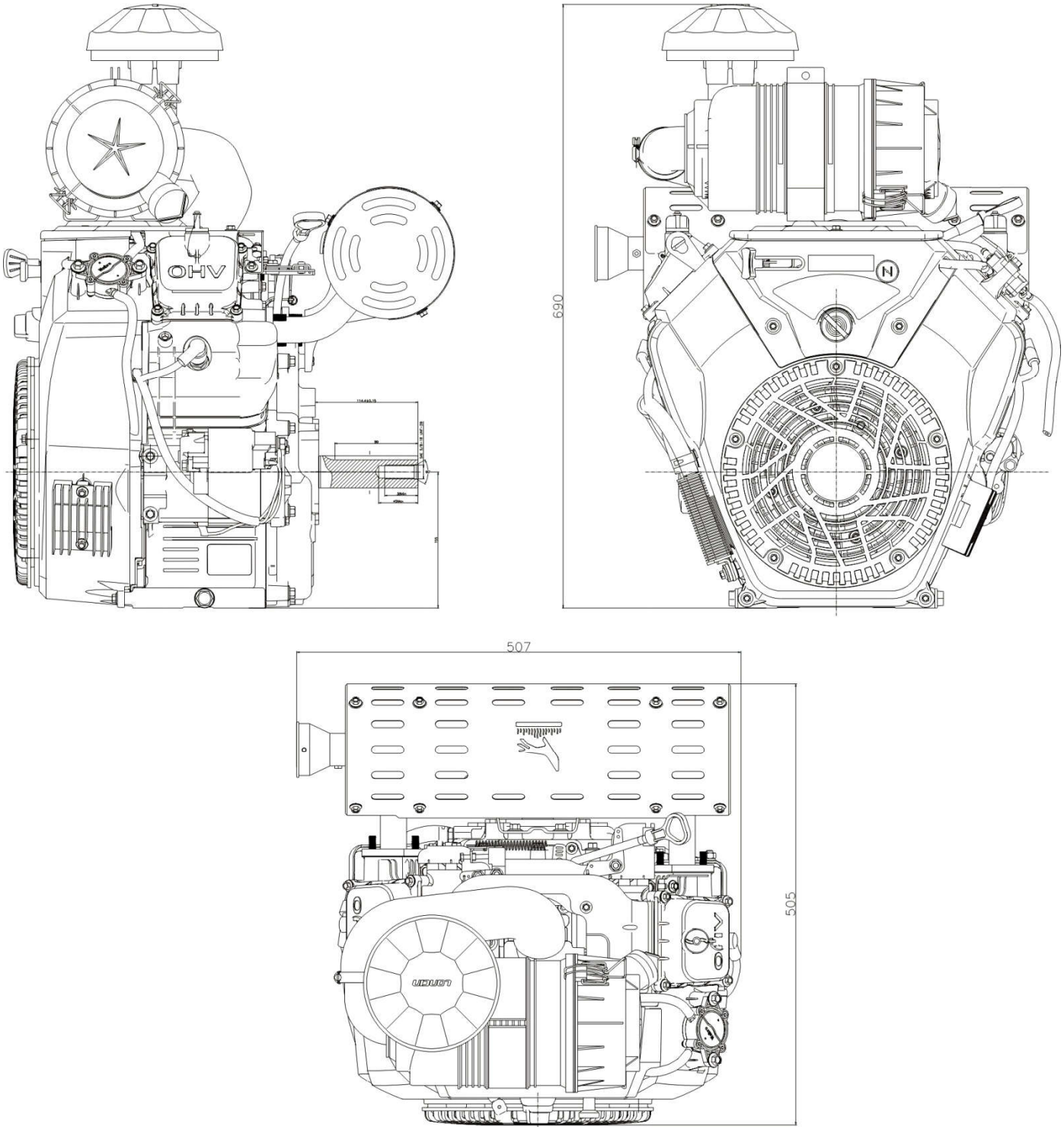
The actual power of engine installed on the terminal may vary in output, which depends on several factors including the rotating speed of engine during practical use, environmental conditions, maintenance and other variants.

1-3 Model installation dimensional drawing
Unit power

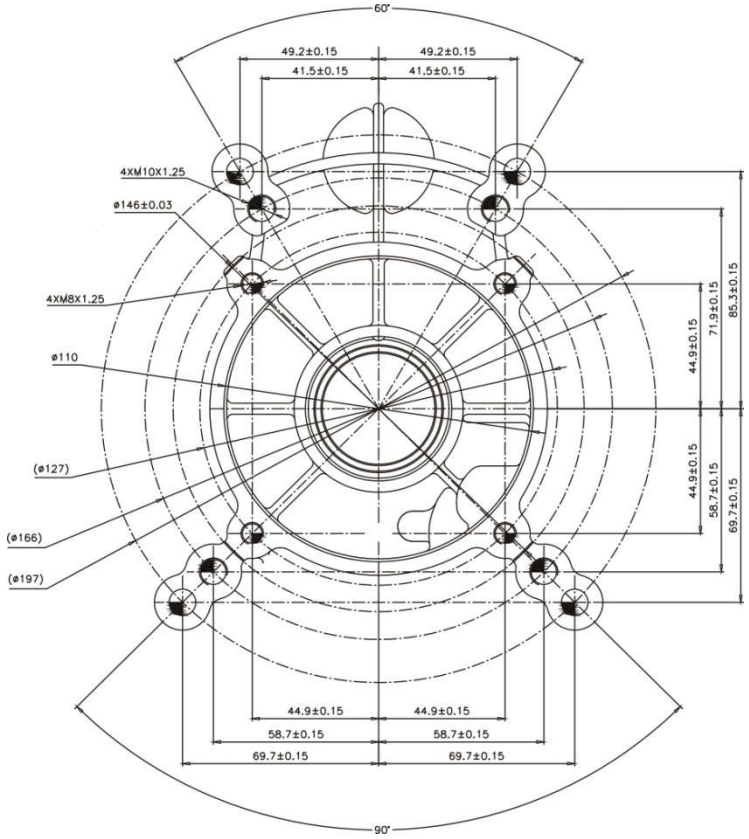




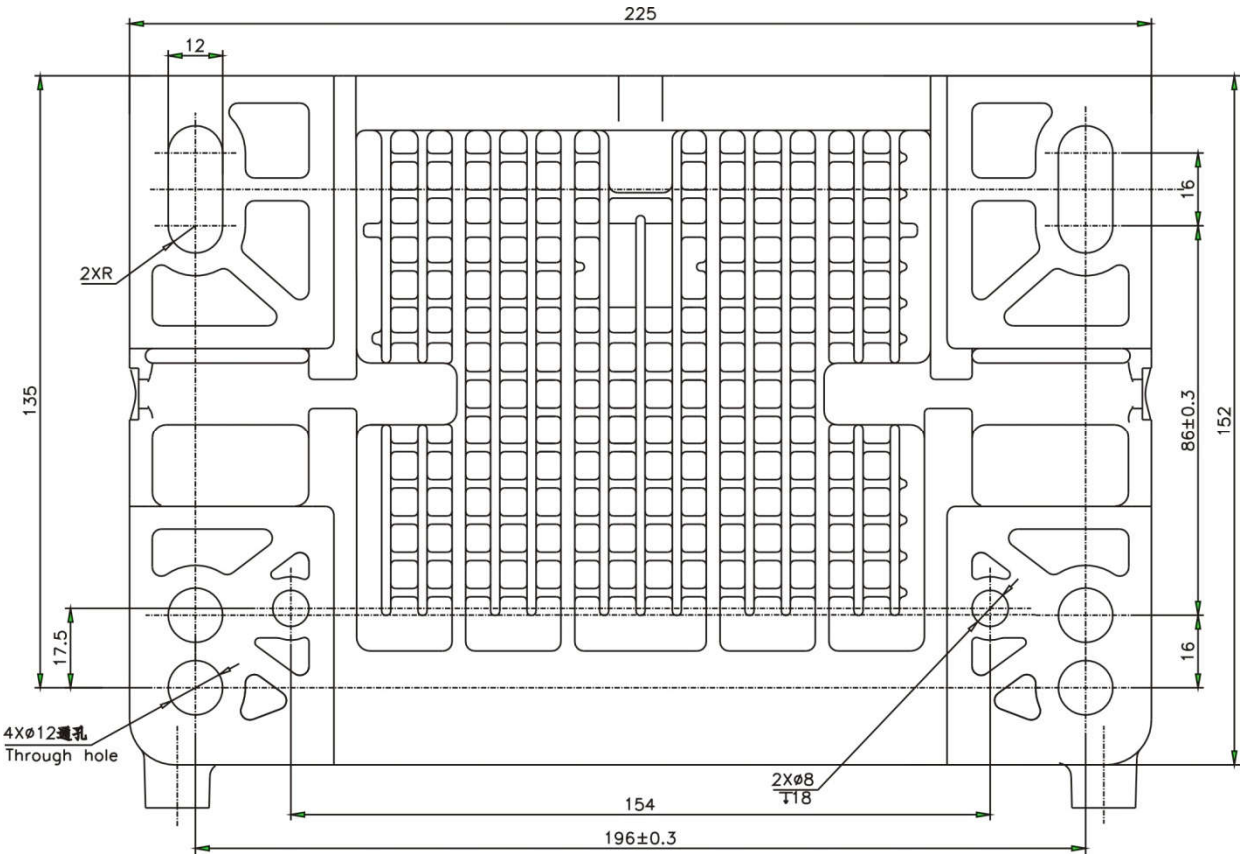
Single-engine power



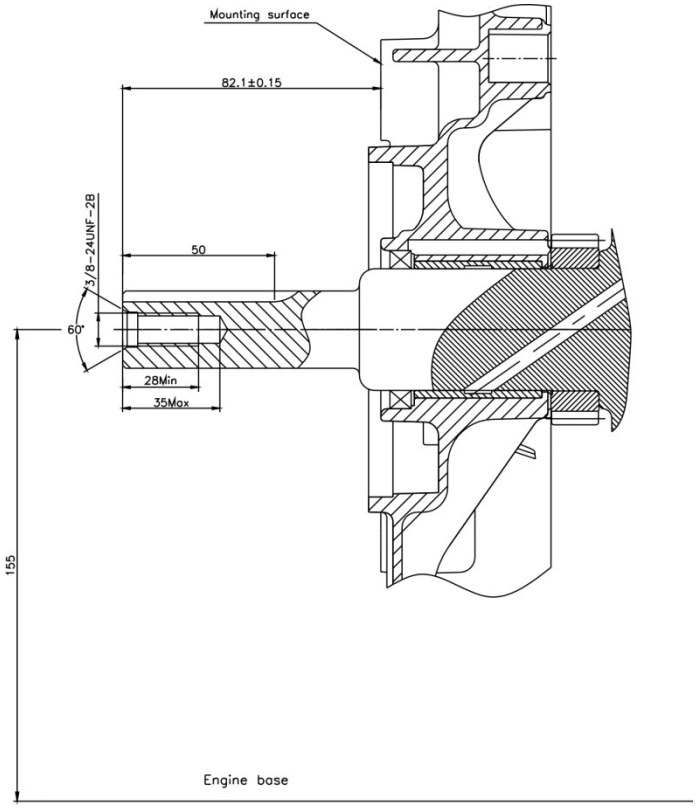
Crankcase cover interface dimensions



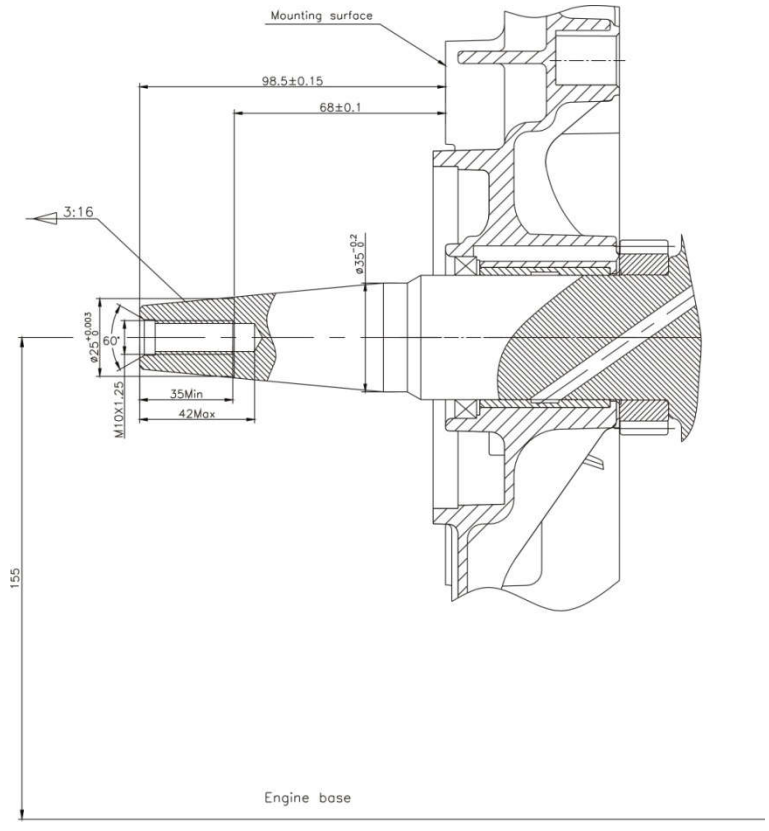
Mounting size of base



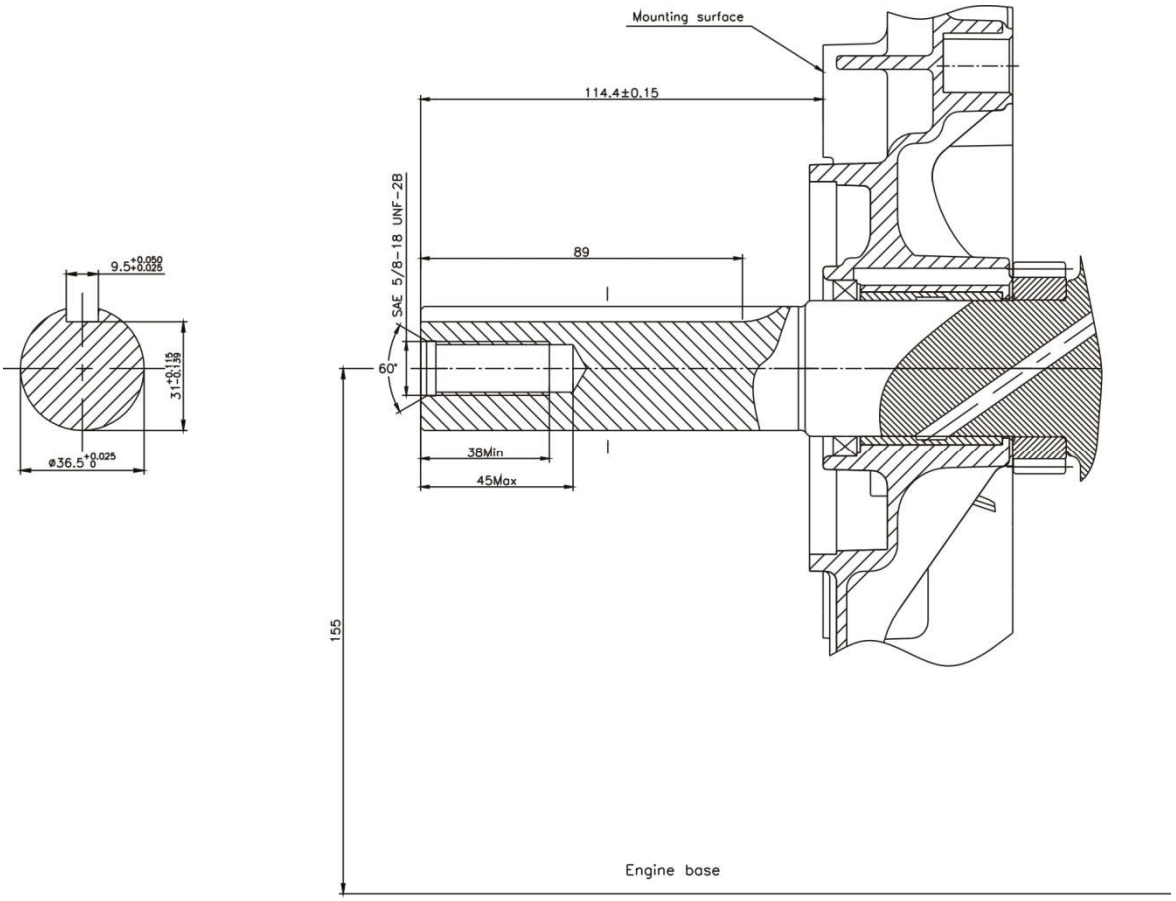
1-4 P.T.O dimensional drawing



A 轴/Type A

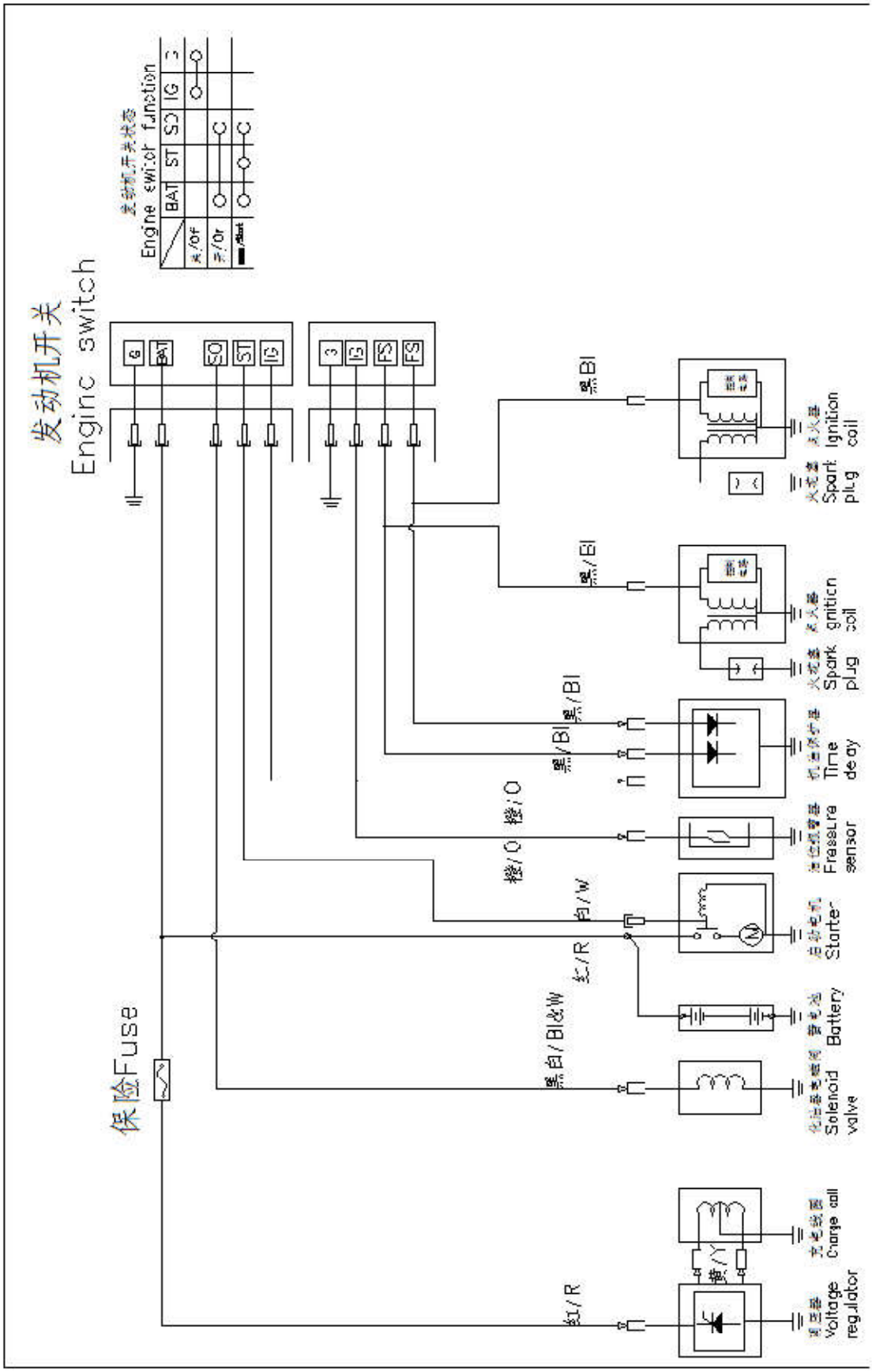


B轴/Type B


Mounting surface
114.4±0.15
89
SAE 5/8-18 UNF-2B
60°
38Min
45Max
155
Engine base
9.5
ø36.5

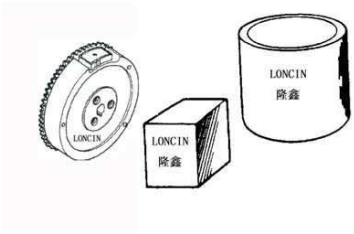
C轴/Type C

1-5 Electric wiring diagram

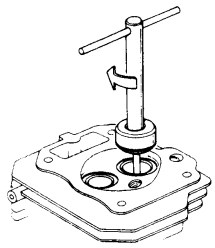


2-1 Maintenance Precautions

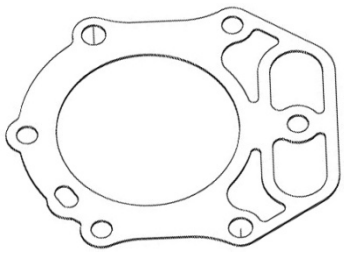
1. Use pure LONCIN parts or the specified parts and lubricating oil. Parts not meeting LONCIN's design specifications may damage the device or the engine.



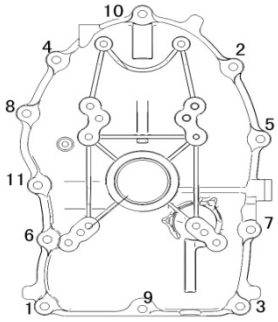
2. Operations requiring special tools must be completed with special tools and corresponding devices.



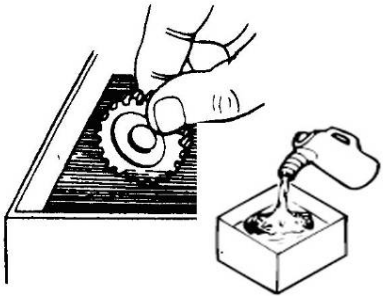
3. The washer, gasket, O-ring, oil seal, etc. shall be replaced after being dismantled.



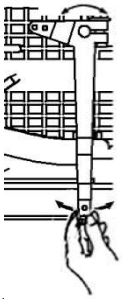
4. When fastening bolts, nuts and screws, fasten them in an order from larger diameter to smaller one and from inside to outside in a crossing way to the specified torque.



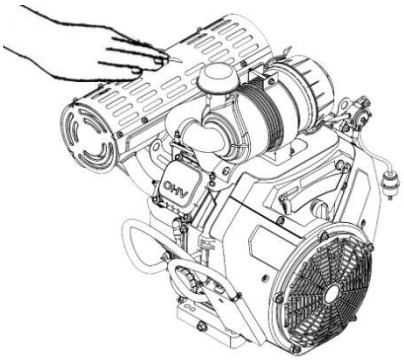
5. Parts shall be cleaned after being dismantled and shall be coated with oil on the sliding surface during assembly.



6. Fastening places and action status must be checked after the assembly.



7. The engine shall be shut down when it is under check and maintenance. Operation shall be done after the engine is completely cooled down. Operation in high temperature of the engine may cause accidents such as burning injuries.



8. After maintenance, if it needs to carry out running test on the operation site, please note full ventilation. In addition, fire must be prohibited near inflammables such as fuel and grease.

Follow up the guidance indicated by the signs below:

Coat oil at the indicated position.

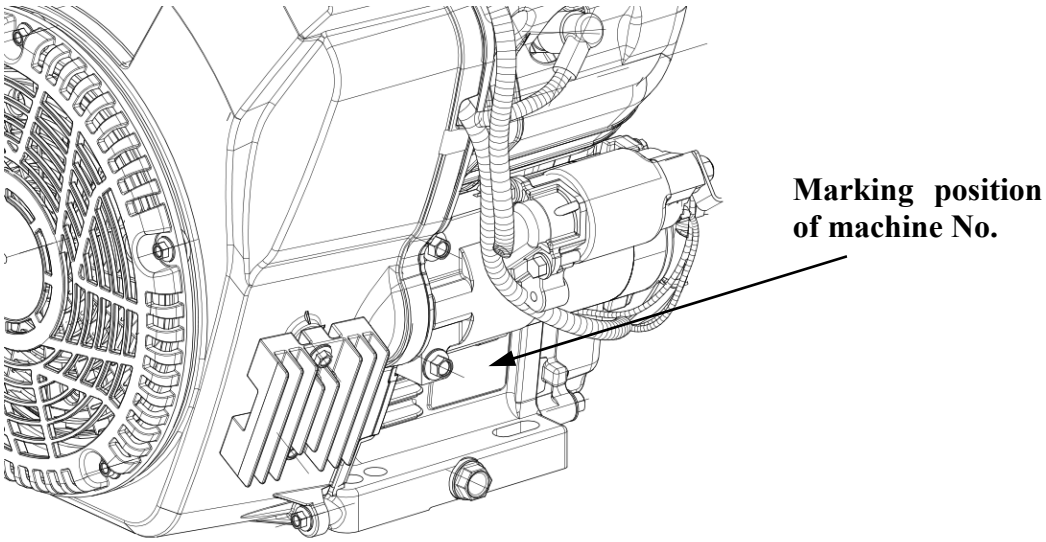
Operate with special tools.

Coat grease at the indicated position.

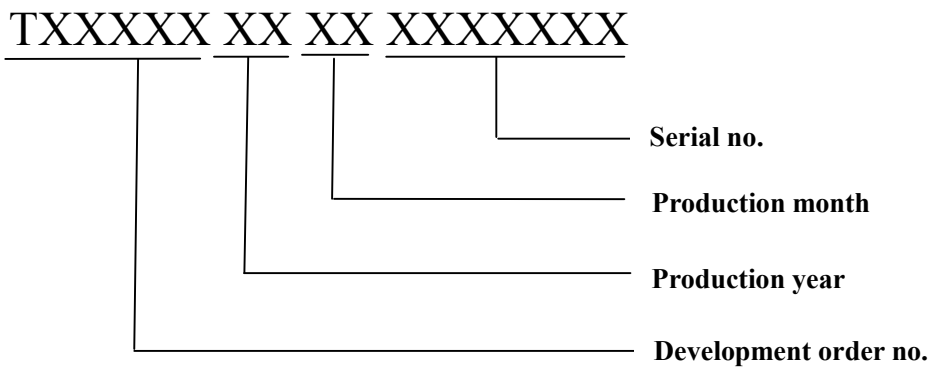
○×○(○): the mode, length and quantity of flange bolt.
P.: the page shall be referred to.

2-2 Marking position of machine No.

Machine No. is marked on the crankcase as shown in the figure below. When LONCIN dealers require correct parts during maintenance, the machine number is used to check the engine or to order parts.



Engine No.:



2-3 Maintenance standards

Unspecified unit: mm

Parts	Item	LC2V80FD	
		Standard	Maintenance limit
Engine	Compression pressure (kgf/cm^2)*	11-13	—
Air cylinder	Inner diameter of cylinder liner	80-80.01	80.15
Piston	Outer diameter of skirt	79.965-79.975	79.755
	Clearance to the air cylinder	0.025～0.045	0.255
	Inner diameter of piston pin hole	17.002～17.008	17.12
	Clearance between the piston pin and piston pin hole	0.004～0.016	0.029
Piston pin	Outer diameter	16.992～16.998	16.9
Piston ring	Clearance to the side of the piston ring (gas ring 1 / gas ring 2)	0.02～0.06	0.11
	Clearance to the side of the piston ring oil ring	0.03～0.08	0.15
	Clearance to the end of the piston ring gas ring 1	0.20～0.40	0.7
	Clearance to the end of the piston ring gas ring 2	0.30～0.50	0.8
	Clearance to the end of the piston ring oil ring	0.20～0.70	1.0
	Width of ring (gas ring 1)	2.90	2.77
	Width of ring (gas ring 2)	3.30	3.17
	Width of ring (oil ring)	2.60	2.07
Connecting rod	Inner diameter of the small end	17.006～17.017	17.05
	Inner diameter of the big end	40.015～40.025	40.065
	Oil-film clearance of the big end	0.024-0.059	0.115
	Side clearance of the big end	0.203～0.403	1.0
Crankshaft	Outer diameter of the crankshaft journal (big end of the connecting rod)	39.966～39.991	39.906
Valve	Valve clearance (cold) Inlet	0.10~0.15	—
	Valve clearance (cold) Exhaust	0. 15~0.20	—
	Outer diameter of valve stem Inlet	6.565～6.58	6.438
	Outer diameter of valve stem Exhaust	6.545～6.56	6.435
Valve guide	Inner diameter of valve guide Inlet & exhaust	6.6～6.615	6.672
	Clearance between valve stem and valve guide Inlet	0.02～0.05	0.15
	Clearance between the valve stem and valve guide Exhaust	0.04～0.07	0.17
Valve seat	Contact width of valve seat	0.7～0.8	2.0
Valve spring	Free length	39.5～40.5	39
Camshaft	Cam height Inlet	29.95～30.05	29.75
	Cam height Exhaust	29.95～30.05	29.75

	Outer diameter (bearing position)	15.966～15.984	15.916
Crankcase cover	Inner diameter of camshaft hole	16～16.018	16.068
Spark plug	Electrode clearance	0.7-0.8	—
Spark plug cap	Resistance	10kΩ	—
Ignition coil	Resistance value Primary side	1-1.4Ω	—
	Resistance value Secondary side	6.2-7.6Ω	—
	Clearance to the flywheel	0.3～0.4	—

2-4 Torque parameters of fasteners

(1) Torque parameters of parts

Fastening Item	Specification of Thread	Fastening Torque (N.m)
Fastening bolt of connecting rod	M6×1	11-13
Fastening bolt of cylinder head	M10×1.25	50-55
Fastening bolt of flywheel	M12×1.25	80-100
Fastening bolt of crankcase cover	M8 × 1.25	25-30
Seal screw plug (crankcase-body oil drain plug)	M14 × 1.5	30-35
Valve adjusting bolt	M8×1.25	28-32
Valve lock nut	M6×0.75	12-16
Fastening bolt of cylinder-head-cover	M6 × 1	8-12
Fastening bolt of breather slot cover plate	M6 × 1	8-12
Oil pipe connection of radiator	M10 × 1	20-25
Mounting bolt for secondary oil filter	M20 × 1.5	40-45
Secondary oil filter	3/4-16UNF	10-13
Fastening nut of speed-regulating support	M6 × 1	8-10
Fastening bolt of starting motor	M8 × 1.25	22-28
Spark plug		25-30

Note: for unspecified bolts and nuts in the above mentioned table, please refer to standard torques.

(2) Standard torque parameters

Fastening Parts	Specification of Thread	Torque (N.m)
Bolt and nut	5 mm Bolt and nut	4-7
	6 mm Bolt and nut	8-12
	8 mm Bolt and nut	20-28
	10 mm Bolt and nut	35-40
	12 mm Bolt and nut	50-60

3-1 Table of maintenance periods

Periodic Maintenance Schedule		Time of Use	20 H or the first Month of Initial Use	50 H or Every 3 Months	100 H or Every 6 Months	300 H or Every Year
Engine oil	Check the oil level	○				
	Replacement		○		○	
Secondary oil filter	Replacement					○**(2)** 200 h
Air filter	Check	○				
	Clear			○(1)		
	Replacement					○(3)
Fuel filter	Replacement					○(1)
Position of battery electrolyte	Check	○				
Spark plug	Check and adjust the clearance				○(2)	
	Replacement					○
Valve clearance	Check and adjust the clearance					○(2)
Oil pipe	Replacement	Every 2 years (2)				

○ Maintenance matters

(1) Maintenance intervals shall be shortened when it is used in a place full of dusts.

(2) Unless users have professional repair tools and maintenance skills, or these projects shall be assisted and maintained by franchised dealers of LONCIN.

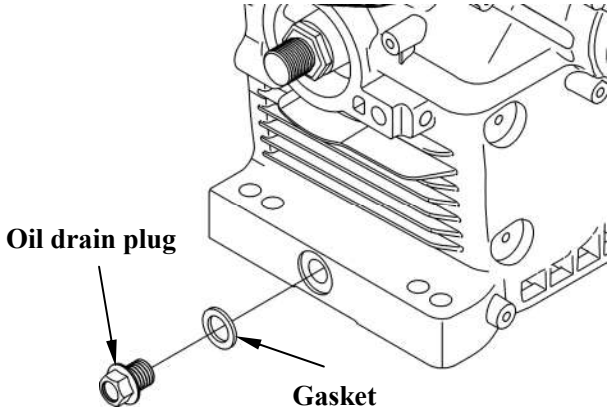
(3) Only replace foam and paper filter cartridge

Under circumstances of frequent use, long-term use can only be guaranteed through maintenance with correct intervals specified above.

3-2 Change engine oil

Note: drain engine oil when the machine is stopped but not cooled down so as to guarantee the fast and thorough exhaust of the oil.

The engine oil of gasoline is the main factor that affects the performance and life of gasoline. Suggest not using engine oil containing additive substance and two-stroke engine oil as they are lack of lubrication, which may shorten the service life of the gasoline.



When checking the engine oil, shut down the machine and place it on a horizontal plane.

Capacity for engine oil:

Without replacement of secondary oil filter: 1.6 L

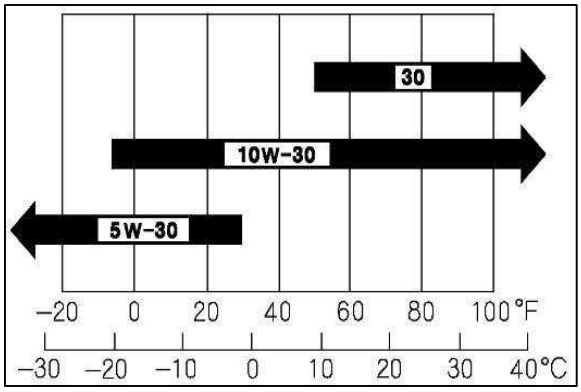
With replacement of secondary oil filter: 1.8 L

To make the engine achieve its ideal operating effect, it is suggested to use the qualified and dedicated engine oil of LONCIN.

Recommended engine oil:

4-stroke gasoline engine oil.

API-classified SE, SF or equivalent to SG grade's SAE 10W-30.



You can use engine oil in other viscosity when the local temperature is within the scope as shown in the figure.

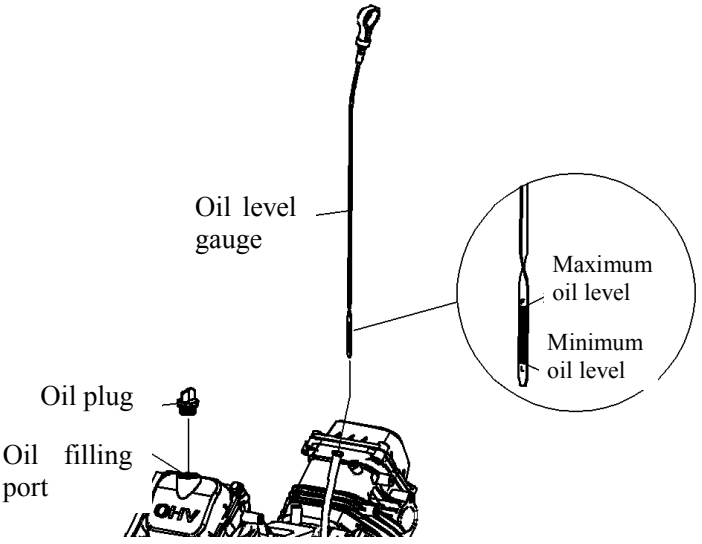
Check steps:

1) Remove the oil level gauge and wipe out the engine oil.

2) Insert the oil level gauge into the oil-filling hole but do not screw it up, then check the oil level.

3) If the oil level is too low, fill the recommended engine till it reaches the upper limits indicated by the oil level gauge.

4) Re-install the oil level gauge.



⚠WARNING

The waste oil contains hazardous substances which may cause skin cancer for long-term exposure to the waste oil. After exposing to the waste oil, please thoroughly clean your hands with soap and clear water as soon as possible. Please dispose the waste oil and container after use in an environmental protection manner. We suggest you putting the waste oil into a sealed container and then send it to the local service station or to the waste oil recycling center.

Bear in mind: don't throw it into the garbage dump or pour it onto the ground.

3-3 Maintenance of air filter

Air inflow will be affected and the power of engine will be reduced after the filter element of the air filter gets dirty. If the operation area is full of dust, the maintenance shall be conducted more frequently.

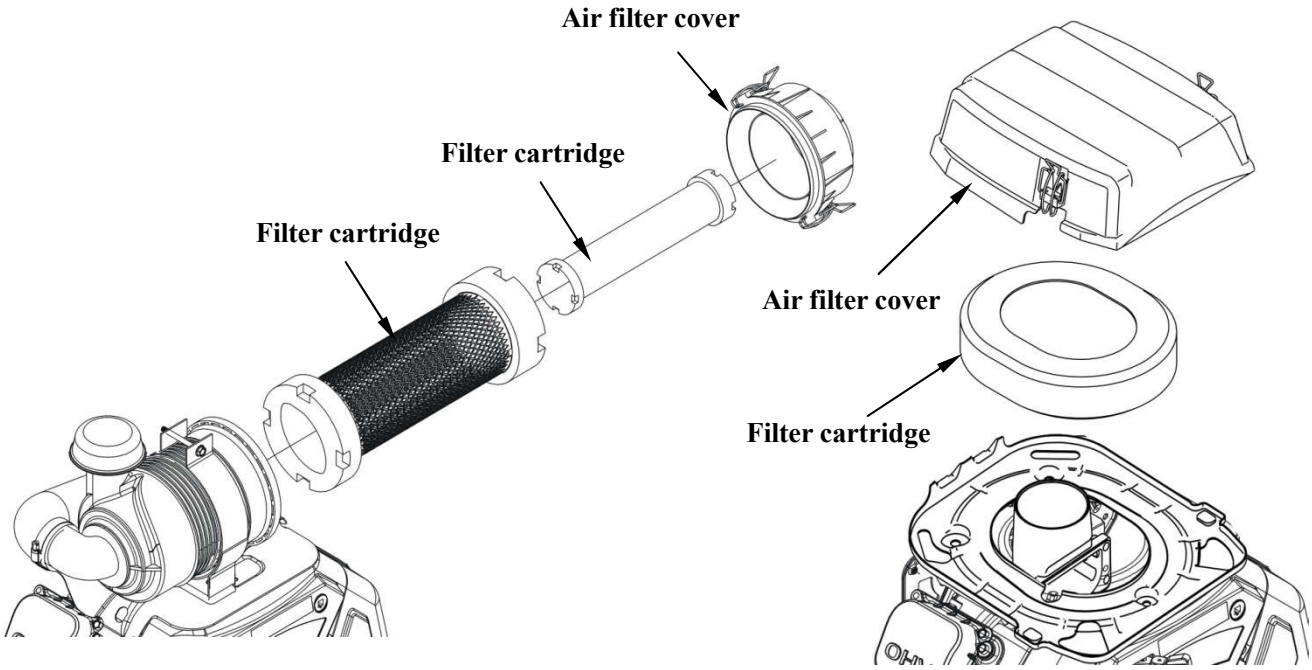
Caution **No filter cartridge or use of damaged filter cartridge may cause dusts to enter the engine and then cause the rapid erosion of the engine.**

Dual-filter cartridge air filter

1) Open the clip and remove the air filter cover.
2) Check the filter cartridge and replace it if it is damaged. Paper filter cartridge can usually replaced at the interval of maintenance schedule.

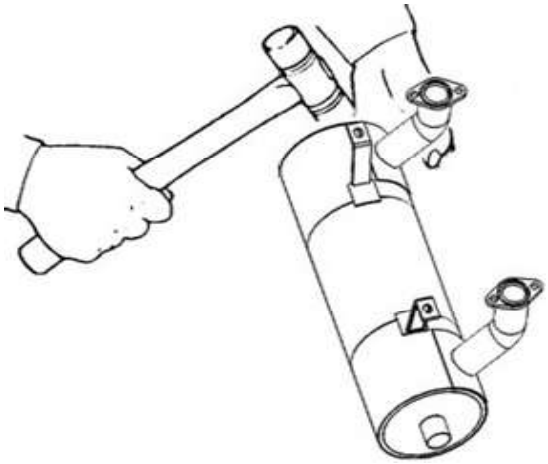
Clean the paper filter cartridge:

Slightly tap the filter cartridge for several times and then blow from inside to outside with the compressed air of the pressure not exceeding 207 KPa. Never brush the paper filter cartridge with brushes; otherwise, it may block the air vent hole.



3) Clean the base, housing lid, cushion, etc. of the air filter and prevent dusts entering the air inlet to the carburetor.
4) Install the filter cartridge well.
5) Install the air filter cover and fasten the clip.

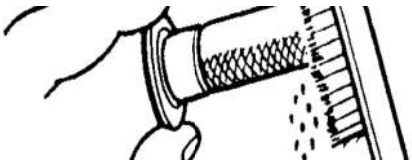
3-4 Maintenance of silencer



During the long-term use of silencer, it may cause carbon deposition and bring about severe influence to the exhaust system. To make the exhaust system work better, generally, we will remove the carbon deposition of the silencer.

When removing the internal carbon deposition inside the silencer, use a hammer to slightly tap it and blow it with the compressed air.

Please refer to the “Maintenance Schedule” for the cleaning of spark canceller. Remove the mesh of spark canceller after the electric generator is cooled down. Sweep away the carbon deposition accumulated on the mesh with wire brush. Re-install the spark canceller and fasten screws.



Caution

Don’t clean it with iron wire, or it may cause abscission of acoustic material and so reduce the sound deadening performance.

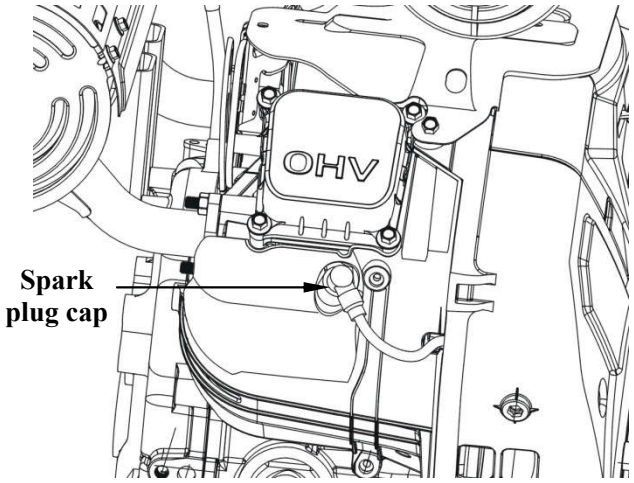
Sealing gasket of the silencer must not be used repeatedly. Replace a new one if the silencer is accumulated with water drops or severe erosion and cause increased noise.

⚠ WARNING

The silencer would become hot and please place the gasoline engine in a place that the passersby and children cannot reach.

When the gasoline engine is working, don’t place any inflammables close to the air vent.

3-5 Maintenance of spark plug



Recommended spark-plug types: RC12YC or equivalent spark plugs.

The replacement of spark plug has the following advantages:

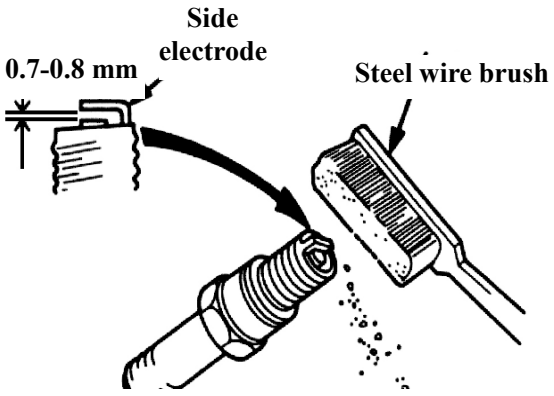
Guarantee the continuous spark; start with more reliability; better fuel conservation

Note

The use of spark plug with incorrect models and heat values may reduce the engine performance or damage the engine.

1. Take off the spark plug cap and remove dusts around the spark plug.
2. Dismantle the spark plug with socket wrench for spark plug.
3. Check if the electrode of the spark plug is excessive worn, and if the insulator is cracked or if there is too much carbon deposition.

   If it can be continuously used, use the steel wire brush to remove impurities such as carbon deposition.



4. Measure the electrode clearance of the spark plug with a feeler gauge and the correct clearance shall be 0.7 ~ 0.8 mm. If it requires adjustment, slightly tap (when the clearance is huge) or pry the electrode with a slotted screwdriver (when the clearance is small).
5. Impact the gasket tightly with the socket spanner of spark plug. When re-installing a used spark plug, screw 1/8-1/4 circle more after the gasket is impacted. When installing new spark plug, screw 1/2 circle more after the gasket is impacted.

Note

Too loose spark plug may be overheat and damage the engine. Fastening too tight may cause the

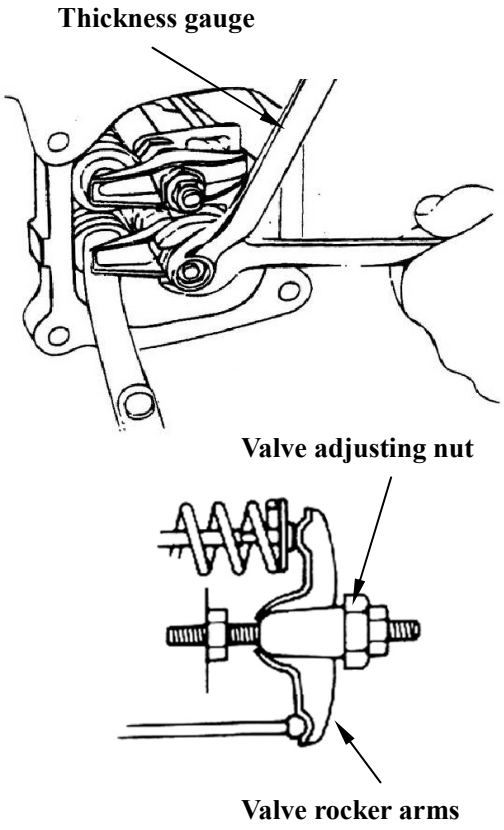
spark plug mounting thread disorder inside the engine.

6. Install the spark plug cap onto the spark plug.

3-6 Adjustment of valve clearance

The check and adjustment of valve clearance must be conducted when the engine is cold.

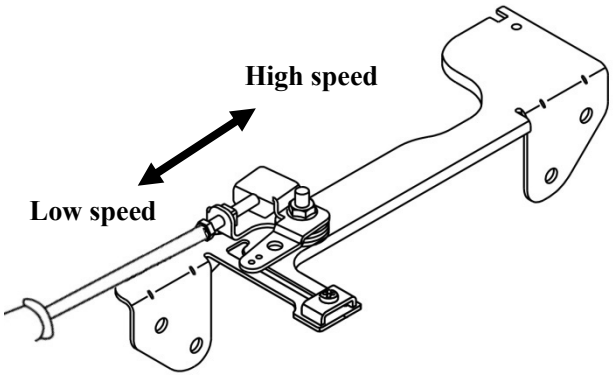
Seen from the output end of the engine, firstly adjust the valve clearance of the left cylinder, then rotate anticlockwise the crankshaft to 270° before adjusting the right cylinder.



1. Remove the cylinder-head cover and place the piston on the upper dead center of compression stroke,
   The two valves are both closed.
2. Measure the clearance between the rocker arm and valve stem with a thickness gauge.
   Inlet valve: 0.10 ~ 0.15 mm
   Exhaust valve: 0.15 ~ 0.20 mm
3. To adjust the valve, the valve-adjusting nut shall be fixed and loosen the valve while fastening the nut.
4. Rotate the valve-adjusting nut to obtain the specified clearance.
5. Re-check the valve clearance and re-adjust it if necessary.
6. Install the cylinder-head cover.

3-7 Adjustment of idle speed

● Mechanical speed regulating engine



1. Start the engine outdoors to warm it for a while.
2. Place the control level to the minimum rotation speed location.
3. Adjust the idle adjusting screw with tools to control the rotation speed within the scope of standard idle speed.

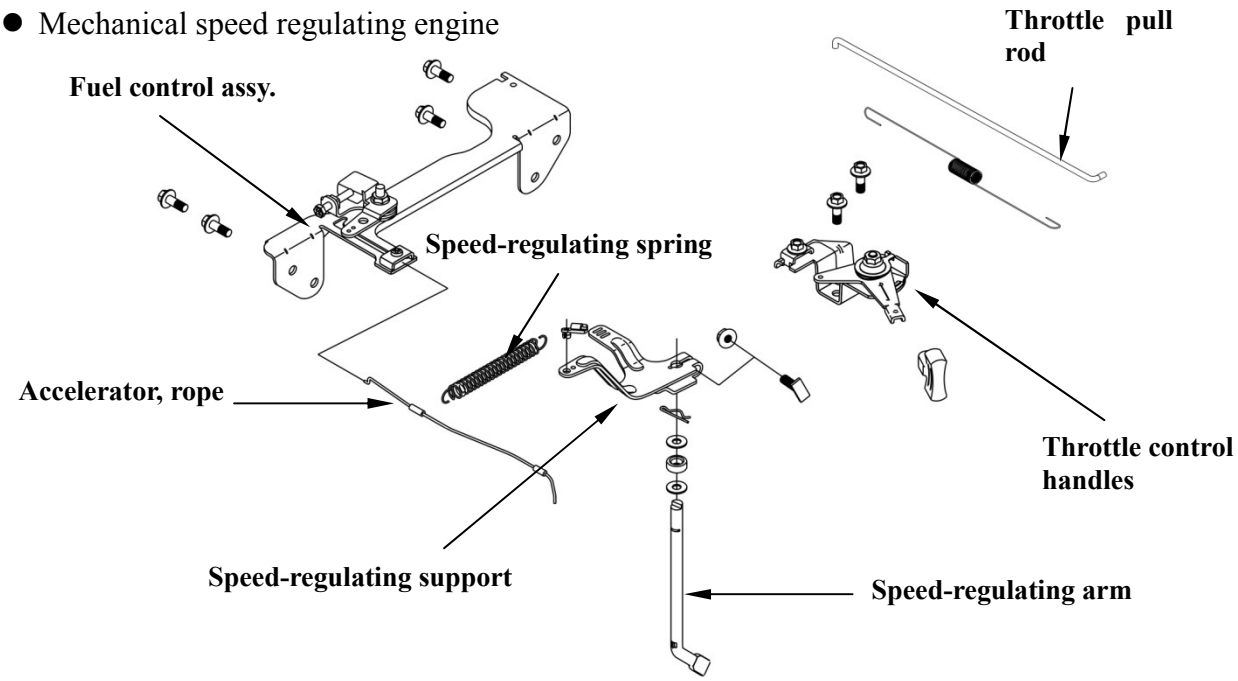
● Electronic adjustable speed engine

1. Start the engine outdoors to warm it for a while.
2. Connect idle switch

Standard engine idle rotation speed: 1,800±150 rpm

3-8 Adjustment of speed regulator

- Mechanical speed regulating engine



1. Loosen the fastening nut of speed-regulating arm.

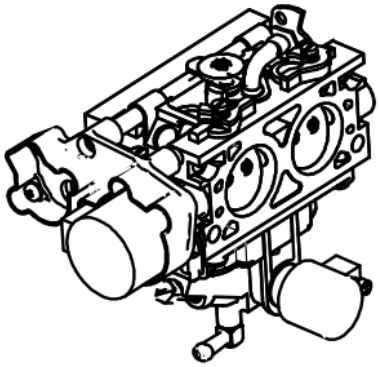
2. Rotate the speed-regulating support till the valve is fully opened and fix it at the location.

3. Rotate the speed-regulating arm anticlockwise till the end (i.e. position that the speed regulator is fully closed) and then fasten the nut.

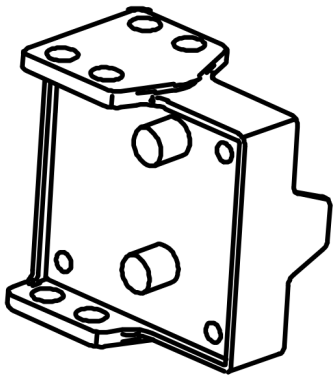
4. Check if activities of the speed-regulating support and valve are flexible.

5. Start the engine to warm it till it achieve the normal operating temperature, and then adjust it to the specified working rotation speed.

- Electronic adjustable speed engine



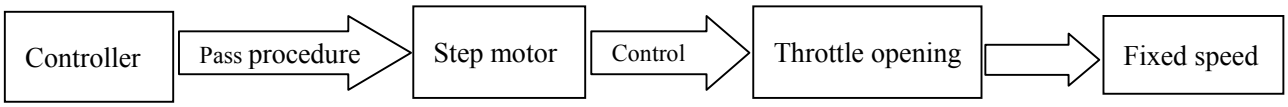
Carburetor with step motor



Electronic speed controller

1. Determines the program commands in the control module

2. The control module controls the stepper motor
3. Stepper motor controls throttle opening of carburetor
4. Ensure fixed speed, high speed and low speed



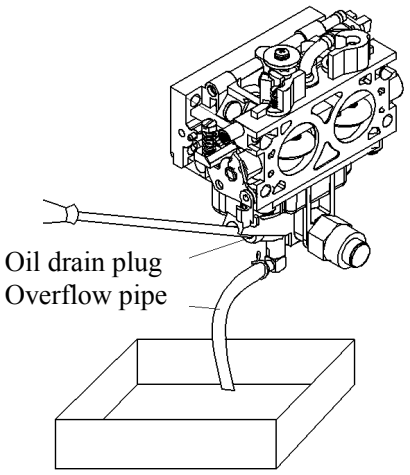
3-9 Storage of engine

After it is shut down, cool the engine down for at least half an hour prior to cleaning. Clean the outer surface, repair the damaged baking finish and coat thin rust resisting oil on areas that are possible rust.

Caution

Washing water with high pressure can enter the air filter and silencer and even enter the cylinder along with the air passage and cause corrosion and damage.
Water splashing on the hot engine may wreak damage. Therefore, cleaning must be done after the engine is cooled down.

1) Place a suitable container for containing gasoline under the carburetor (under the overflow pipe).
2) Loosen the oil drain bolt of carburetor, drain the oil in the carburetor to the container for containing gasoline and fasten the oil drain bolt of carburetor after completing oil drain.

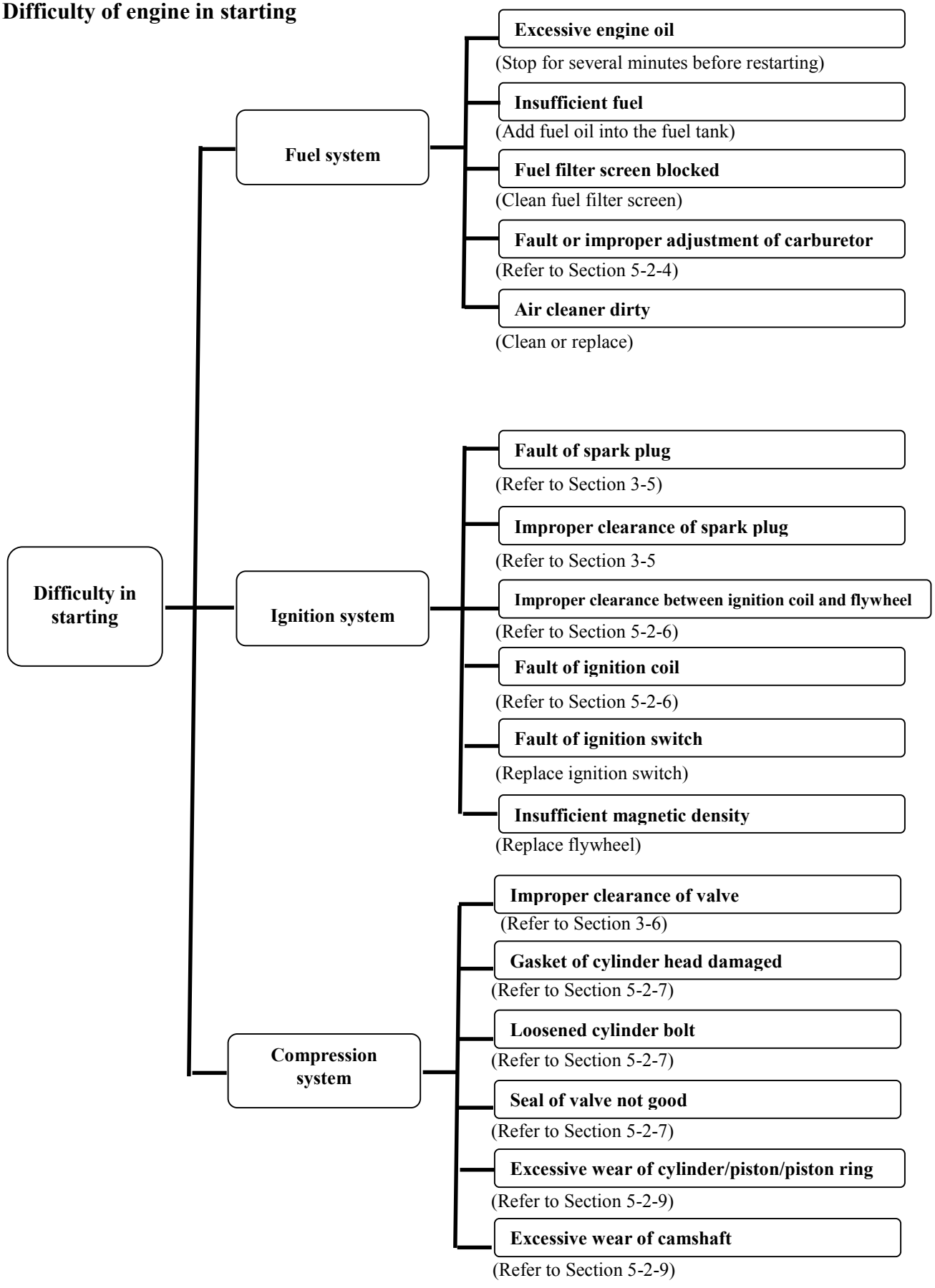


3) Replace engine oil when use it again.
4) Remove the two spark plugs.
5) Pour into a spoon of (5-10 ml) clear engine oil into the cylinder head.
6) Rotate the engine for several circles to scatter the engine oil spread throughout the cylinder head.

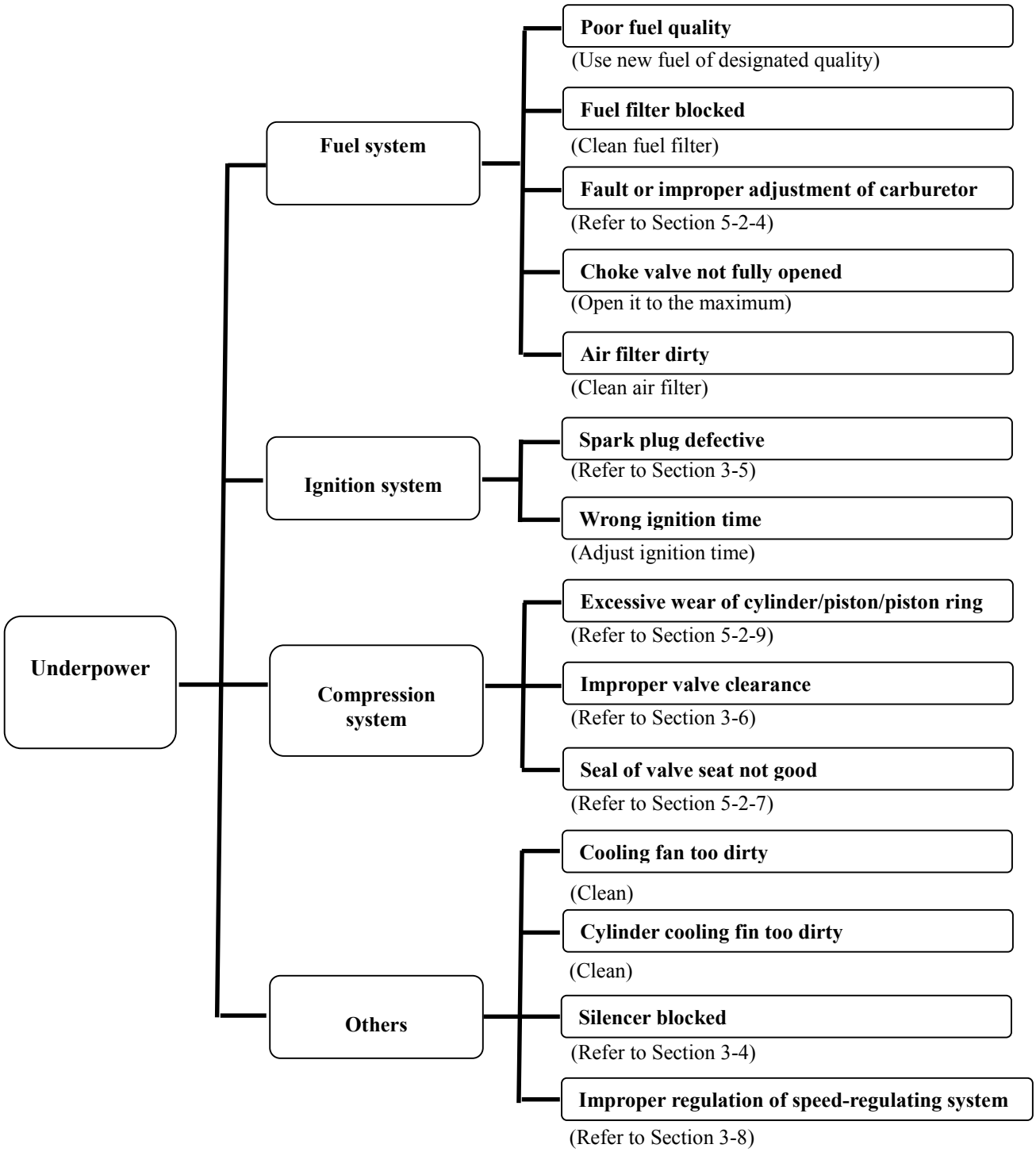
7) Re-install the spark plug.
8) Rotate the engine slowly till you feel the resistance. The inlet and exhaust valves are both in the closed status, which prevent moisture entering the cylinder head.
9) Cover an anti-dust coating to the engine and place it in a ventilated dry place.

During the storage, charge the battery every month. It is benefit for prolonging the service life of the battery.

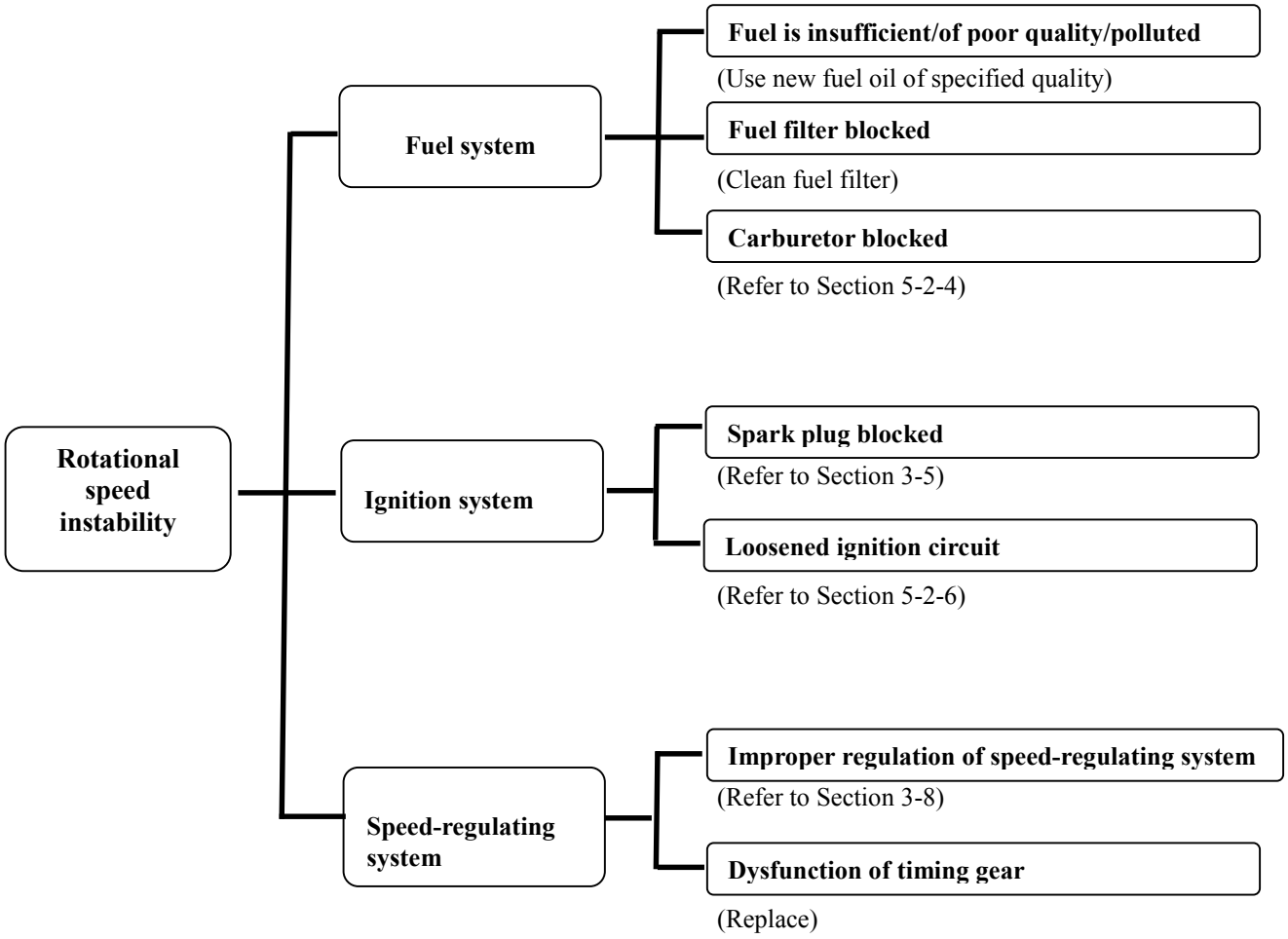
4-1 Difficulty of engine in starting



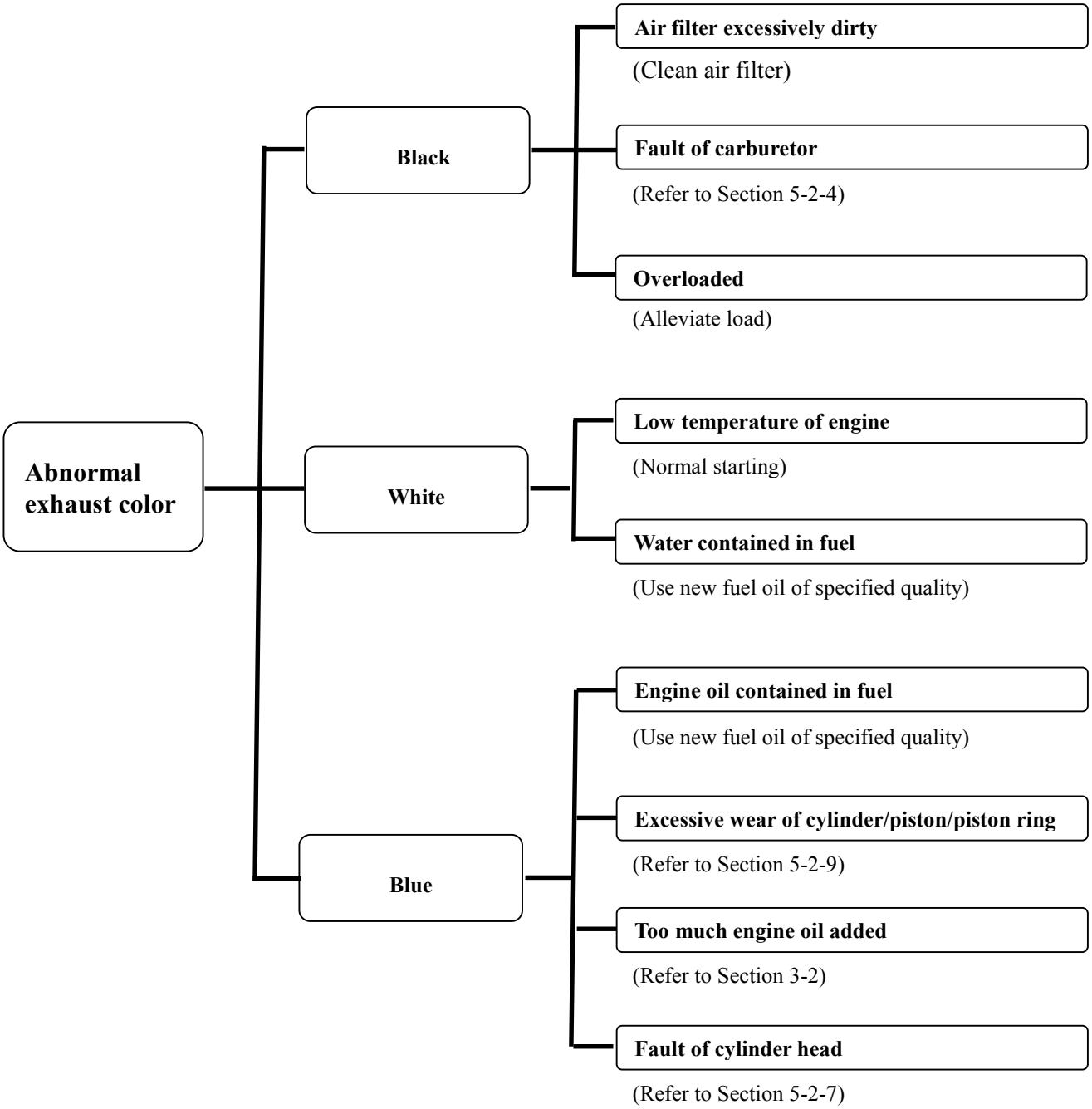
4-2 Underpower of engine



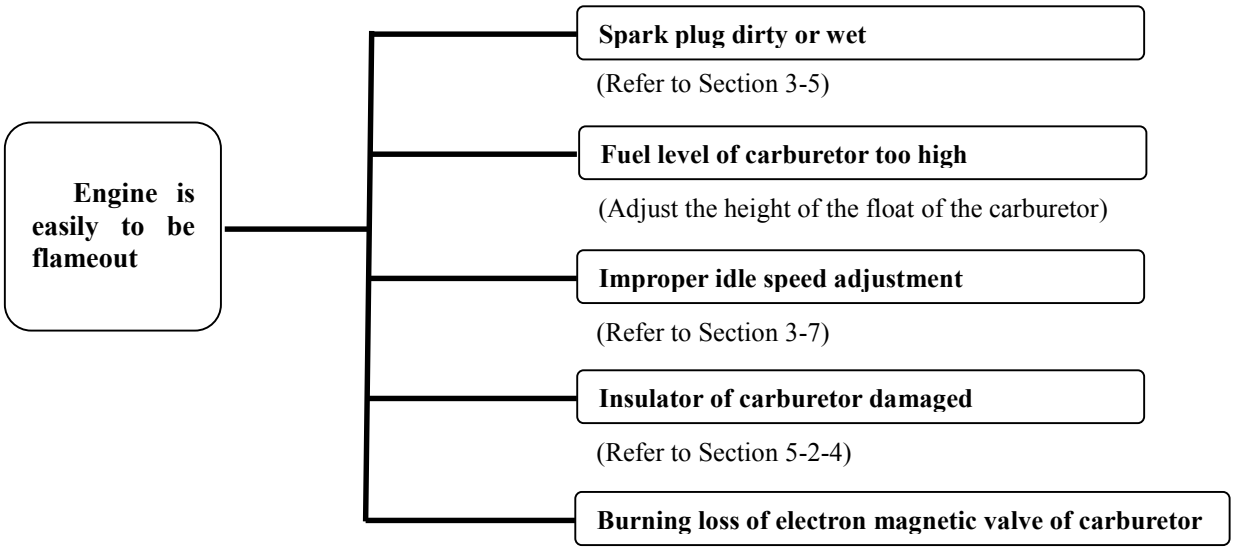
4-3 Rotating speed instability of engine



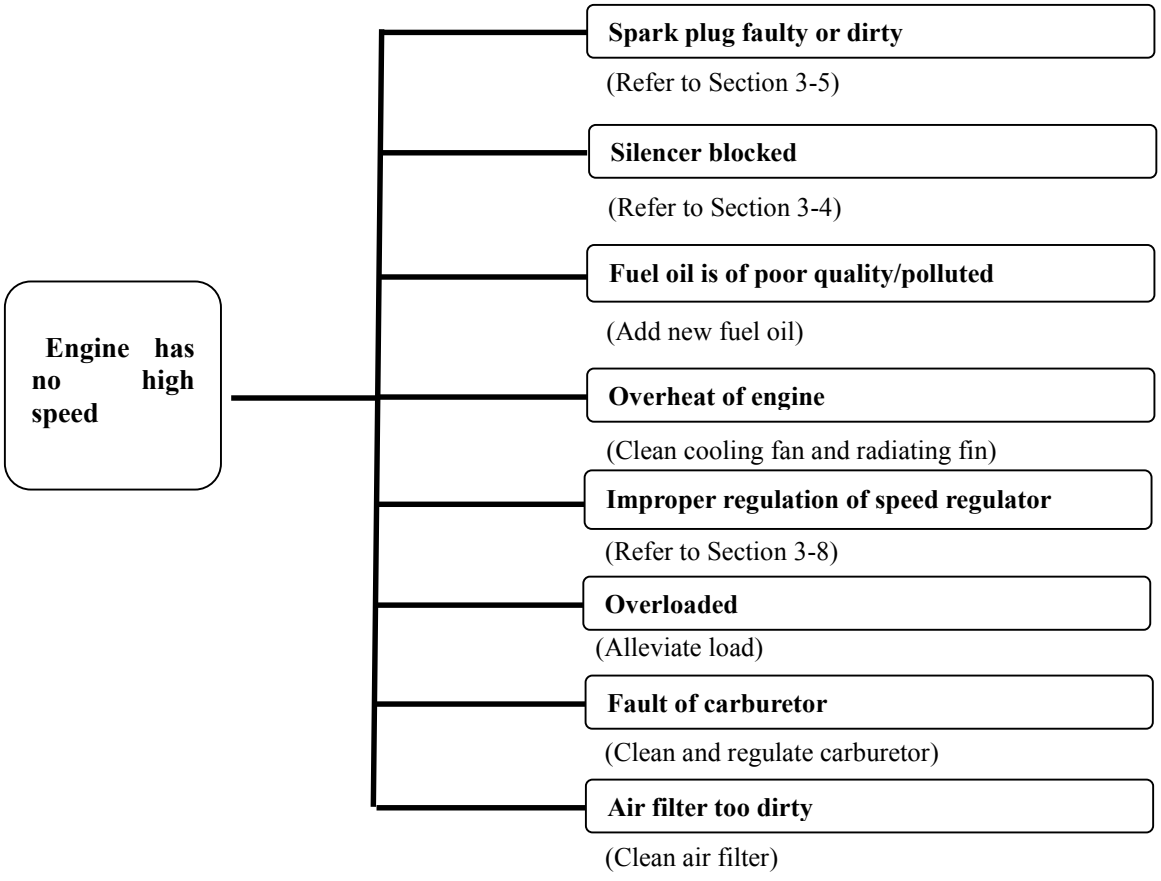
4-4 Abnormal exhaust colors of engine



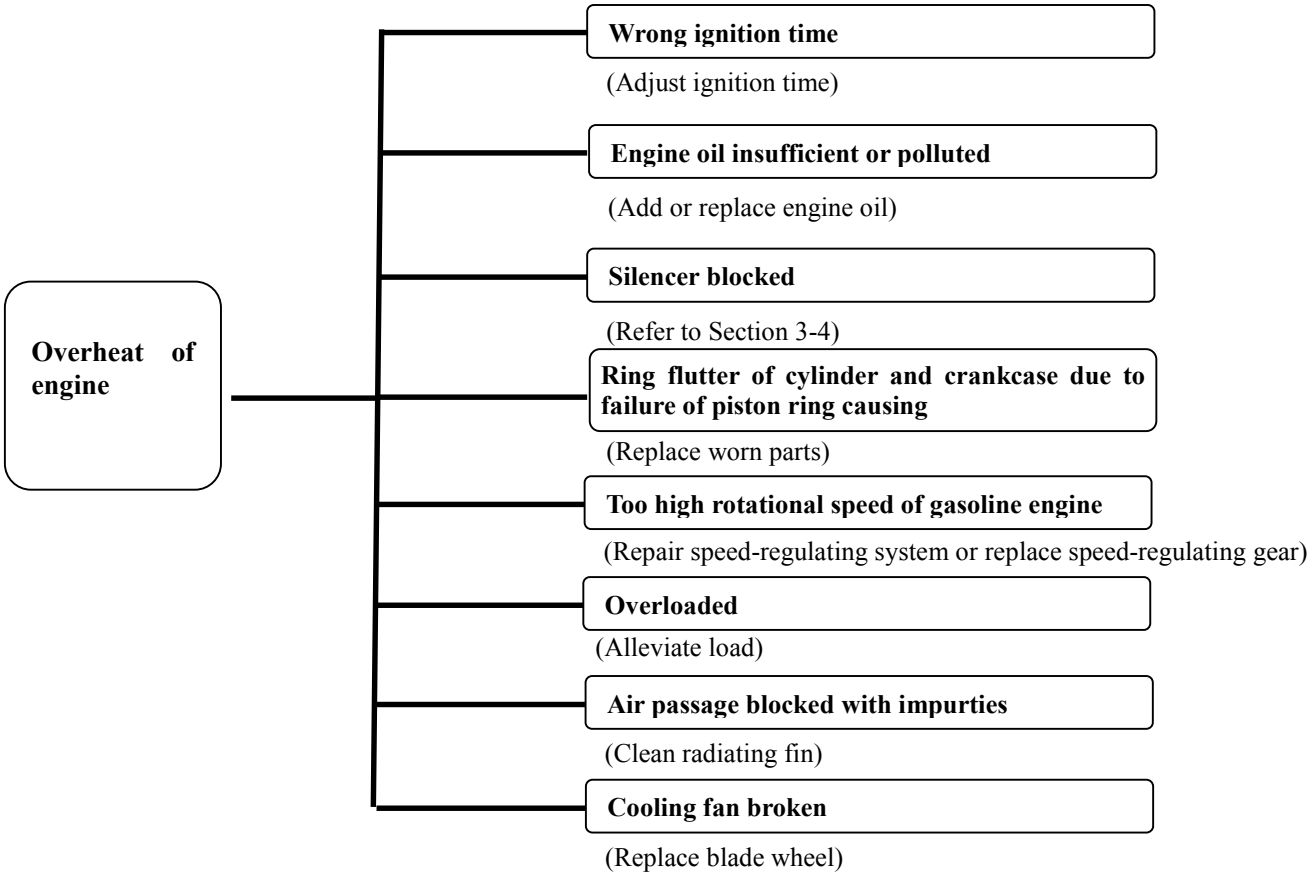
4-5 Engine is easily to be flameout



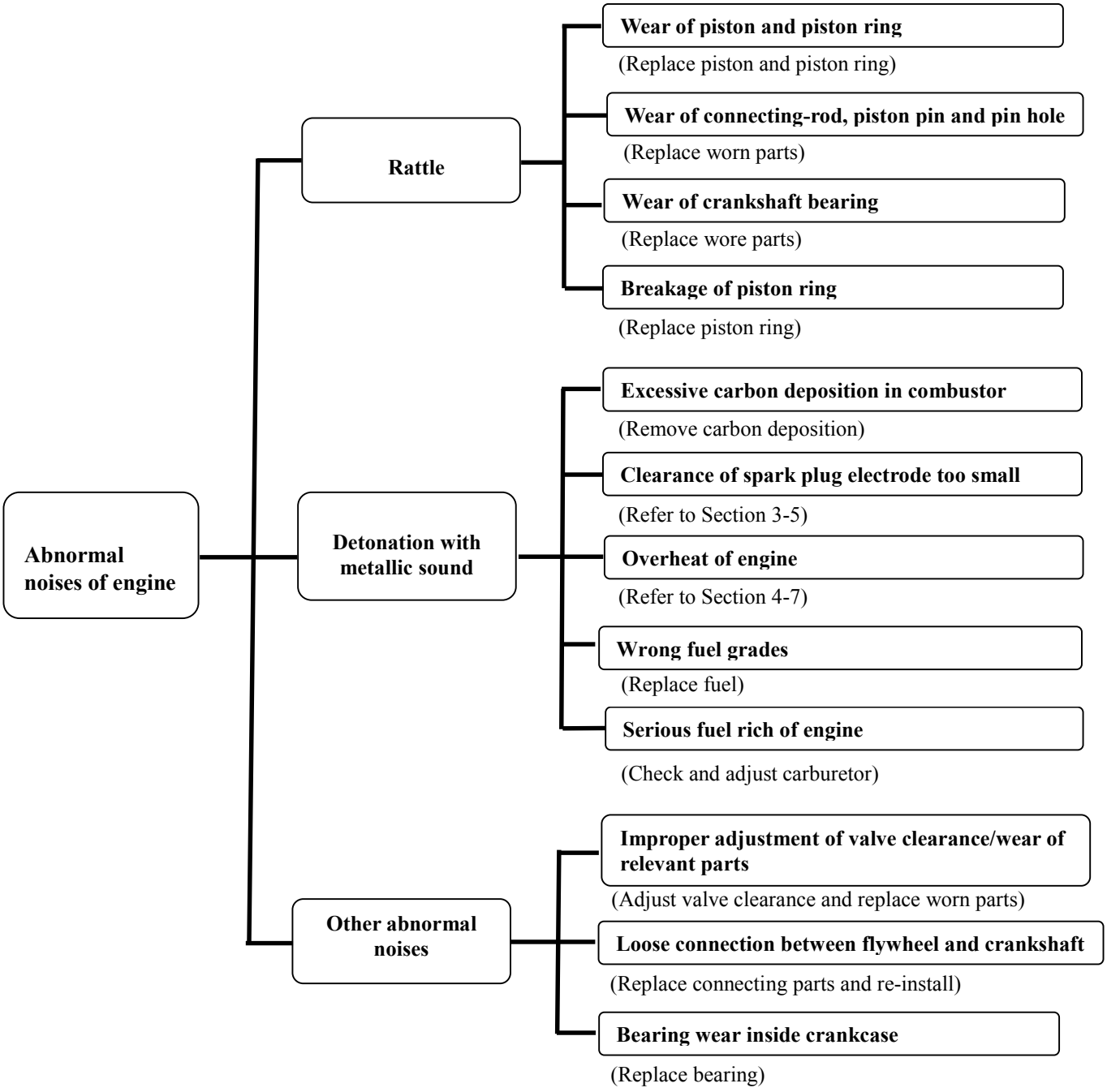
4-6 Engine has no high speed



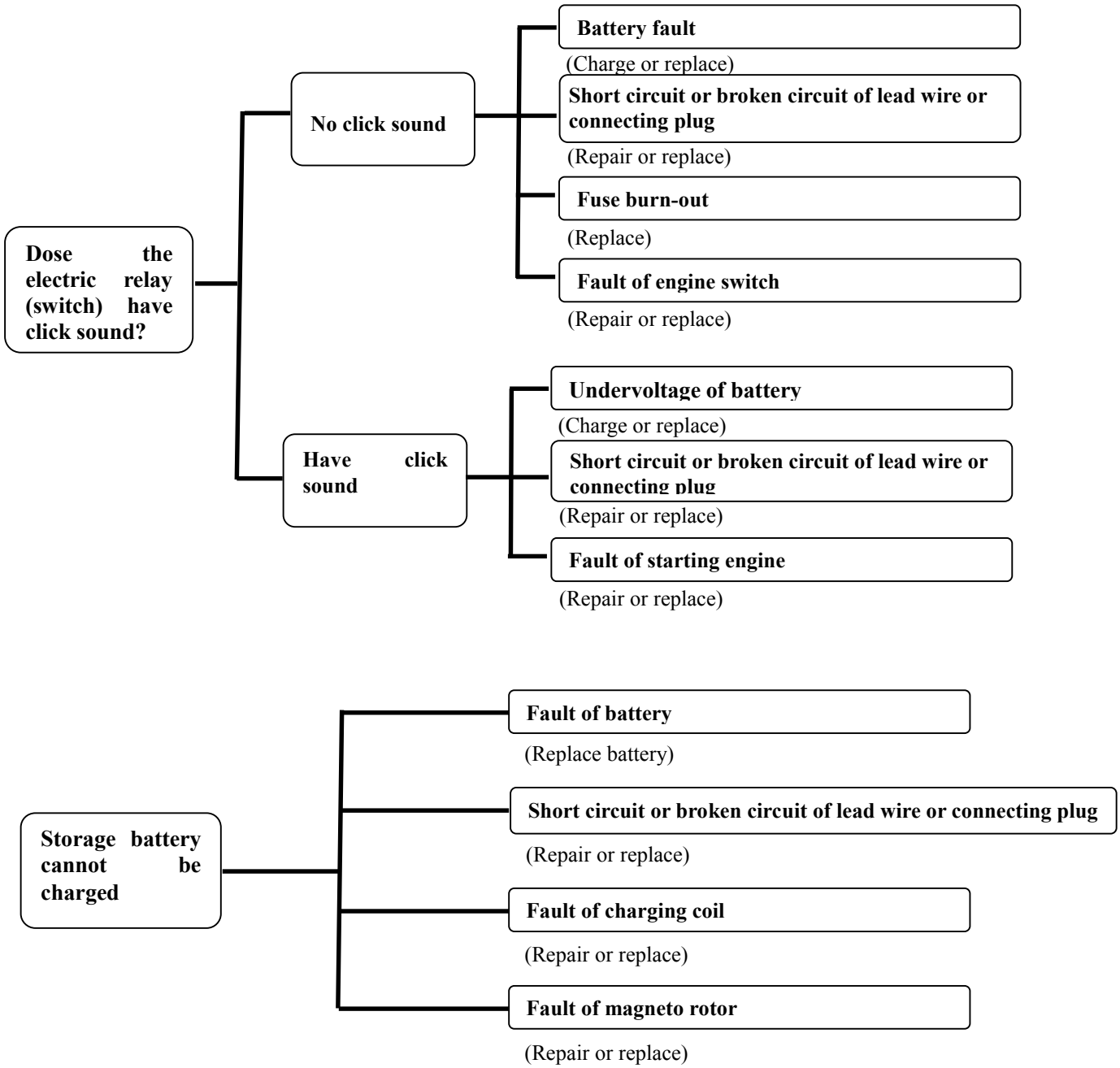
4-7 Overheat of engine



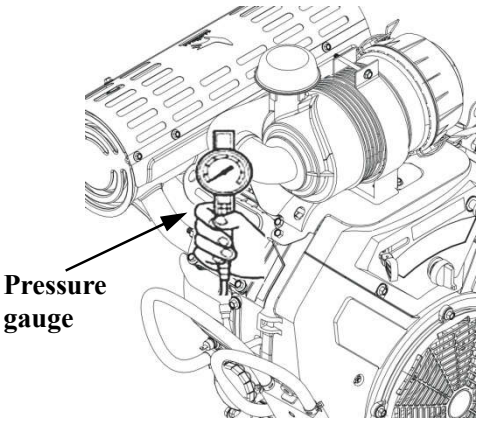
4-8 Abnormal noises of engine



4-9 Fault of electric starting system



4-10 Check the cylinder pressure



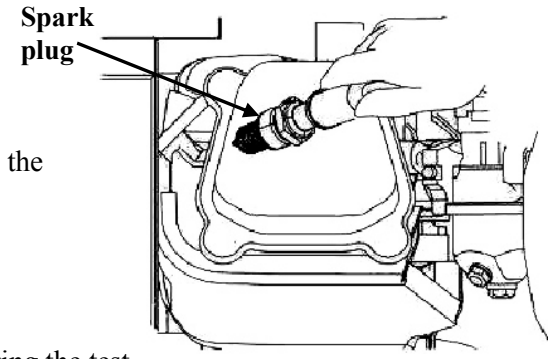
1) Remove the spark plug cap and spark plug.

2) Install the pressure gauge onto the spark plug hole

3) Start the engine for several times to measure the compression pressure.

Cylinder pressure	11-13 Kgf/cm^2

4-11 Detection of spark



1) Remove the spark plug

2) Install the spark plug onto the spark plug cap.

3) Ground the (-) electrode (thread part) of spark plug and start the engine to check the spark.

Warning

It is prohibited to touch the spark plug wire with wet hands during the test.

When touching the high-voltage line with wet hands, starting engine may cause high voltage, which is very dangerous.

The falling fuel oil may ignite around the spark plug. Remove the fuel oil and then check. Stay away from the spark plug hole when testing.

Chapter V Disassembly & Repair

5-1 Precautions on disassembly/assembly

5-1-1 Disassembly

1. Get familiar with the constitution and operating principle of the machine prior to disassembly, which is the precondition for correct disassembly.

2. Not disassemble those without the need. Blind disassembly will not only increase workload of repair but also damage the original good coordinating relation and precision among parts so as to cause new hidden faults.

3. Use proper disassembly tool and adopt the correct disassembly method. It is prohibited to tap strongly during disassembly so as to avoid deformation and damage of parts. To enhance repair efficiency, it prefers to use special disassembly tools.

4. The disassembly must be gradually conducted from the outside to the inside. Generally, the disassembly order is “overall machine, assembly, components and then parts”.

5. To assemble the machine smoothly after repair, the following shall be noted during disassembly:

1) Check and make marks (such as scribing, arrow and text on some parts). For parts without marks, make signs on non-operating sides so as to re-install them correctly.

2) Place parts reasonably and store them in categories. Parts of the same assembly or components shall be stored together. Parts (e.g. gasket) that are easily to be deformed or lost shall be stored separately.

5-1-2 Assembly

1. The assembly site shall be clean.

2. Prepare proper assembly tools and devices.

3. Parts must be cleaned and dusts, soil, metallic debris, carbon deposition, grease stain and other impurities shall be removed from the surface. Clean and blow it with compression air, cleaning agent, etc.

4. As per the opposite order of disassembly, i.e. assemble as per the order of “from inside to outside and from main part to auxiliary part” and “parts, components, assembly, and then overall machine”.

5. Note to check part marks and assembly signs during assembly so as to avoid neglected assembly.

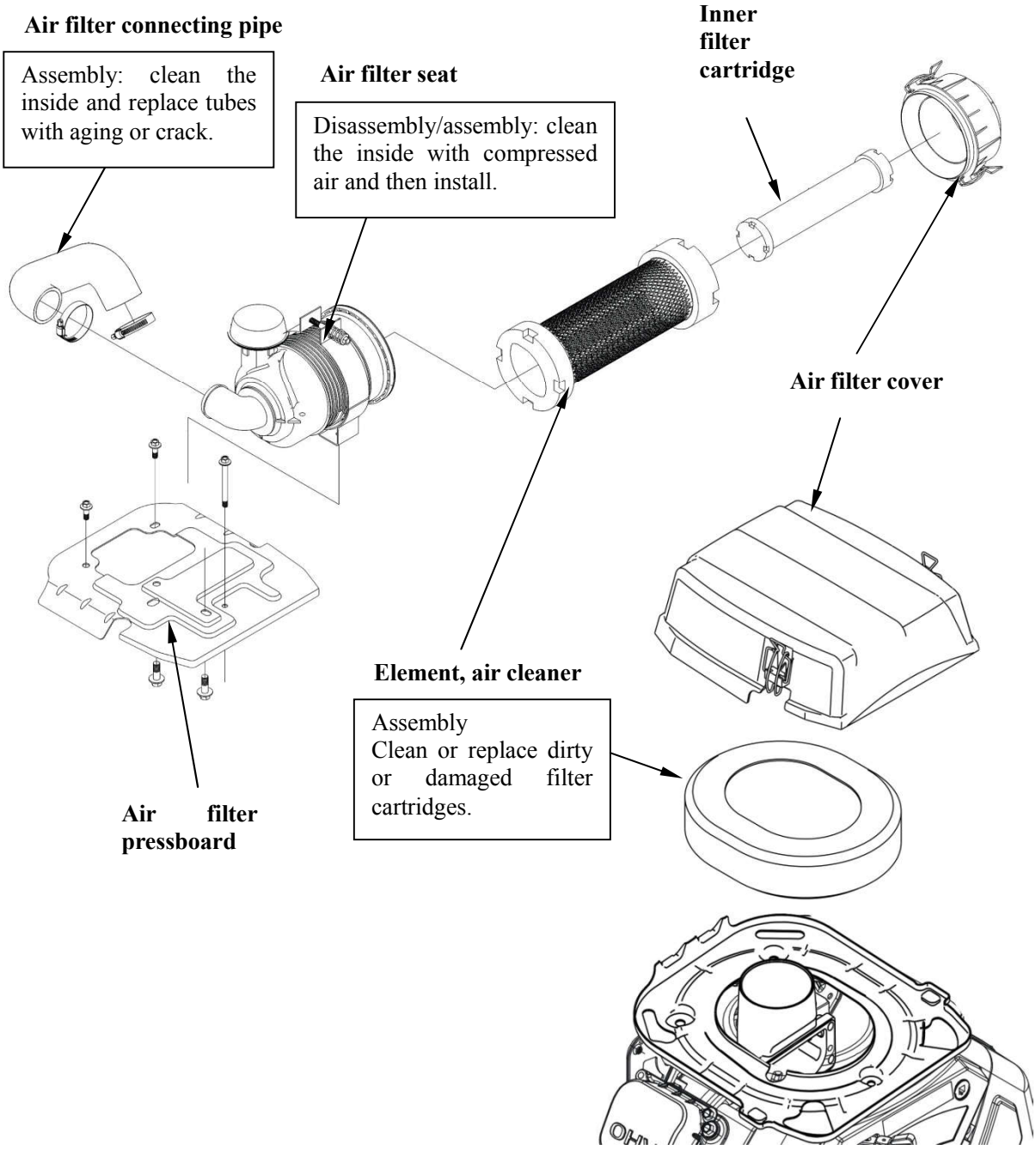
6. When assembling fastening parts, fasten it from center to both sides and diagonal crossing direction to fasten it for several times. Then fasten it in place with torque wrench.

7. Timely replace each sealing gasket during assembly.

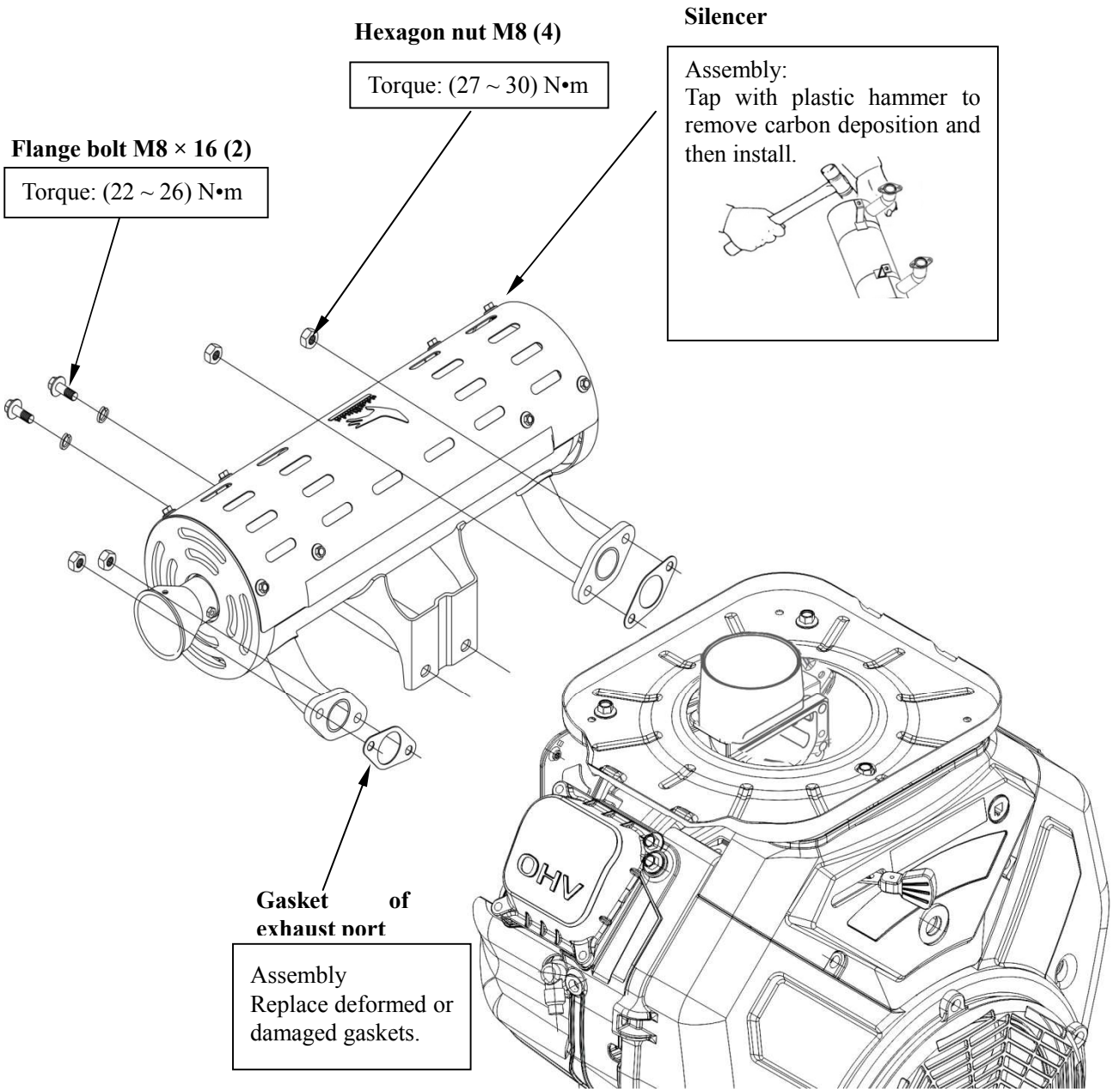
8. Conduct the test running for the machine after the overall machine is assembled, adjusted and checked without errors.

5-2 Disassembly and maintenance of engine

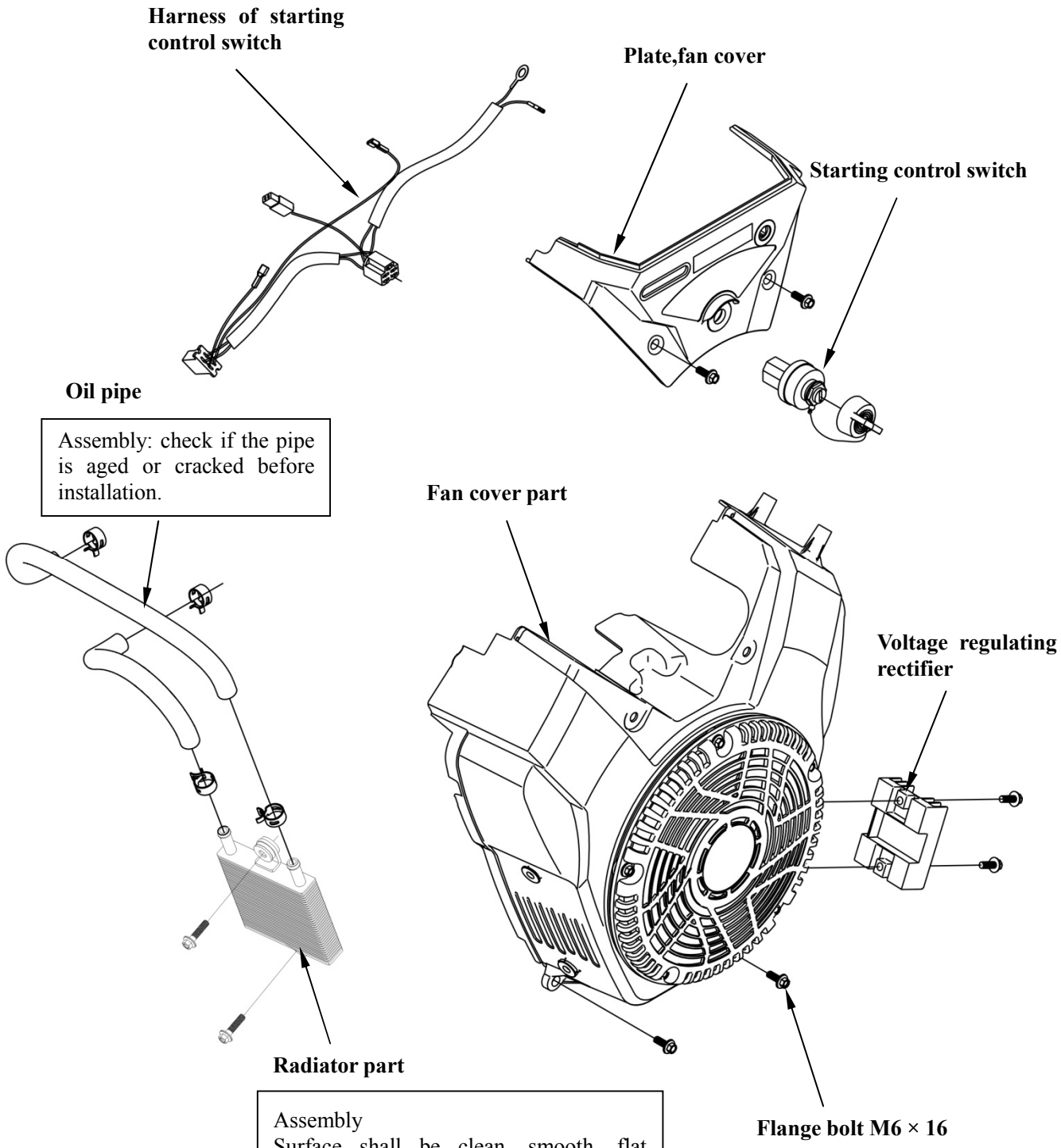
5-2-1 Air filter



5-2-2 Silencer



5-2-3 Fan cover - starting control switch



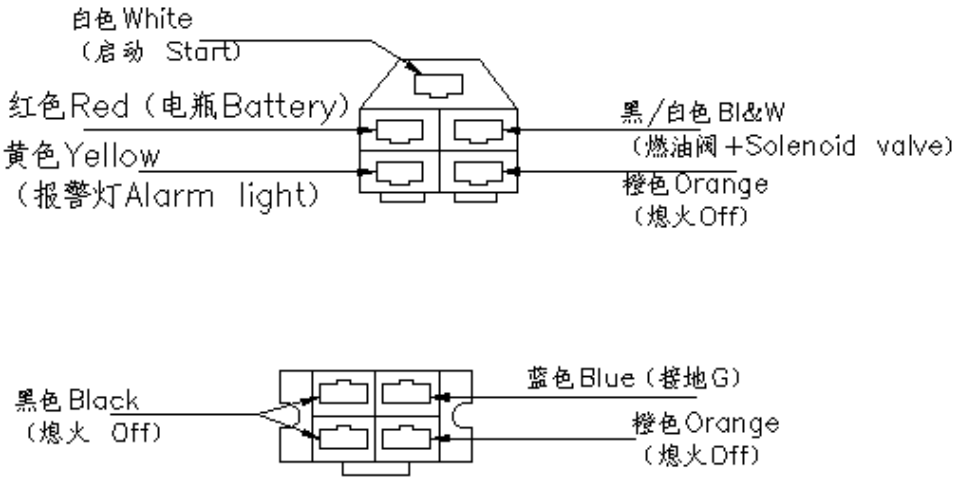
b. Check

Engine switch

Check the conductivity of switch terminal at each location of the switch.

发动机开关状态
Engine switch function

	BAT	ST	SO	TI	IG	G
关/Off					○	○
开/On	○		○	○		
电起动/St	○	○	○			



1. When the switch is under the Off status, connect the orange terminal to the switch (at the surface of lock nut of the switch);
2. When the switch is under the On or electric starting (St) status, disconnect the orange terminal to the switch (at the surface of lock nut of the switch);
3. When the switch is under the electric starting (St) status, connect the red terminal of starting engine to the white one;
4. When the switch is under the On or electric starting (St) status, connect the black/white terminal of carburetor to the switch (at the surface of lock nut of the switch);
5. When the switch is under the Off, On or electric starting (St) status, connect the green and blue terminals of carburetor to the switch (at the surface of lock nut of the switch);

Voltage regulating rectifier

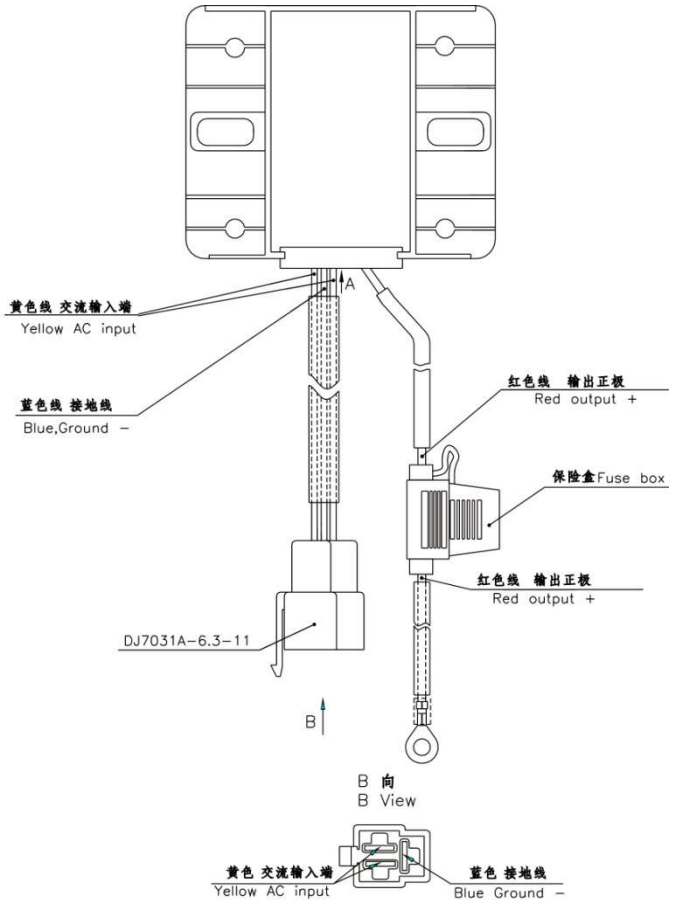
120W

2900rpm~3900rpm,

Module output voltage:DC13.8±0.5V;

It should carry rated load 120W ,voltage should more than DC13V；

Current limiting protection: when the load current is greater than 9A, voltage stabilizer into protection state, but maintain the output 12A current;



180W

2900rpm~3900rpm,

Module output voltage：13.8±0.5V;

It should carry rated load 180W ,voltage should more than DC13V；

Current limiting protection: when the load current is greater than 16A, voltage stabilizer into protection state, but maintain the output 19A current;

260W

2900rpm~3900rpm,

Module output voltage：13.8±0.5V;

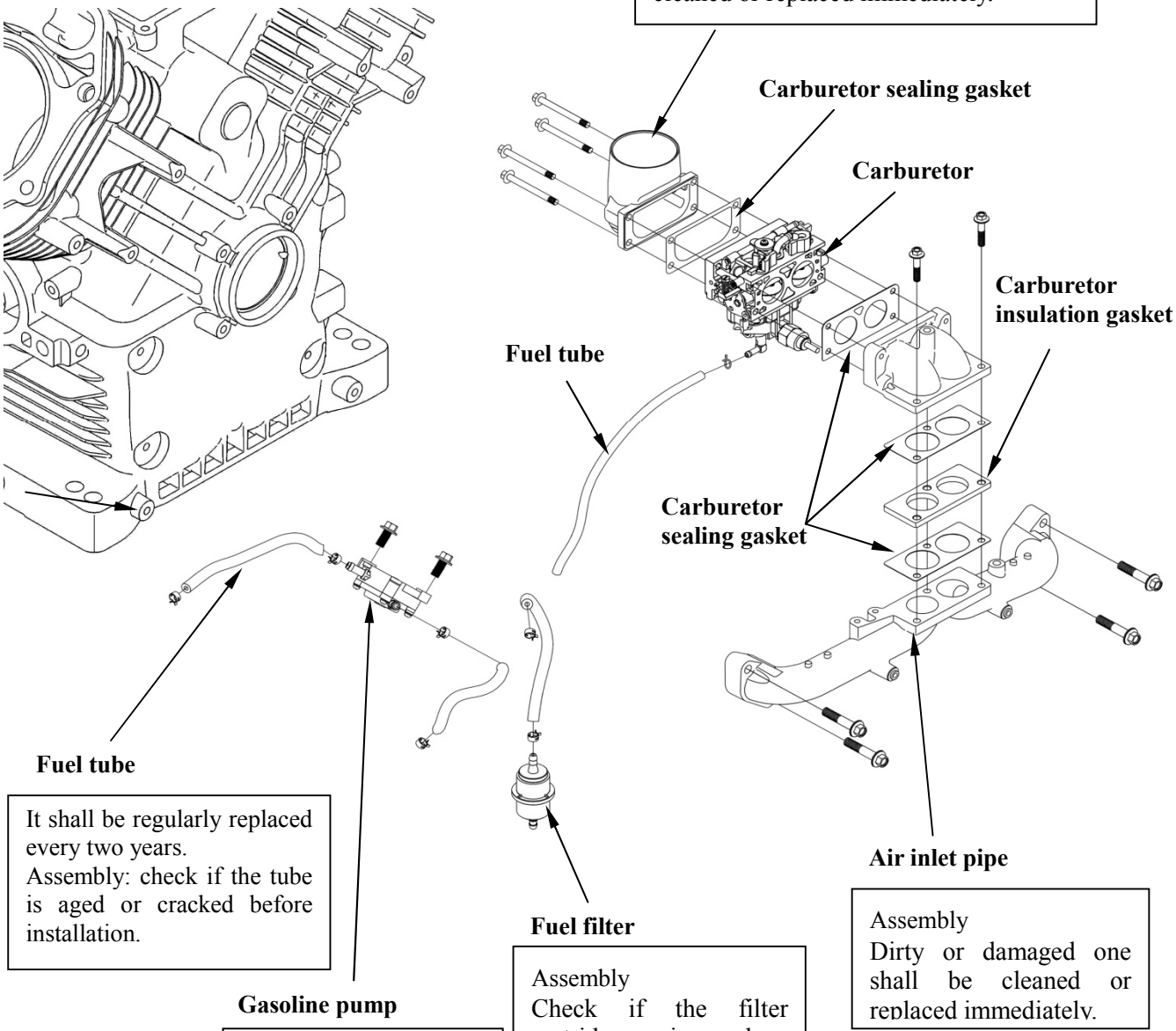
It should carry rated load 260W ,voltage should more than DC13V；

Current limiting protection: when the load current is greater than 20A, voltage stabilizer into protection state, but maintain the output 23A current;

5-2-4 Carburetor

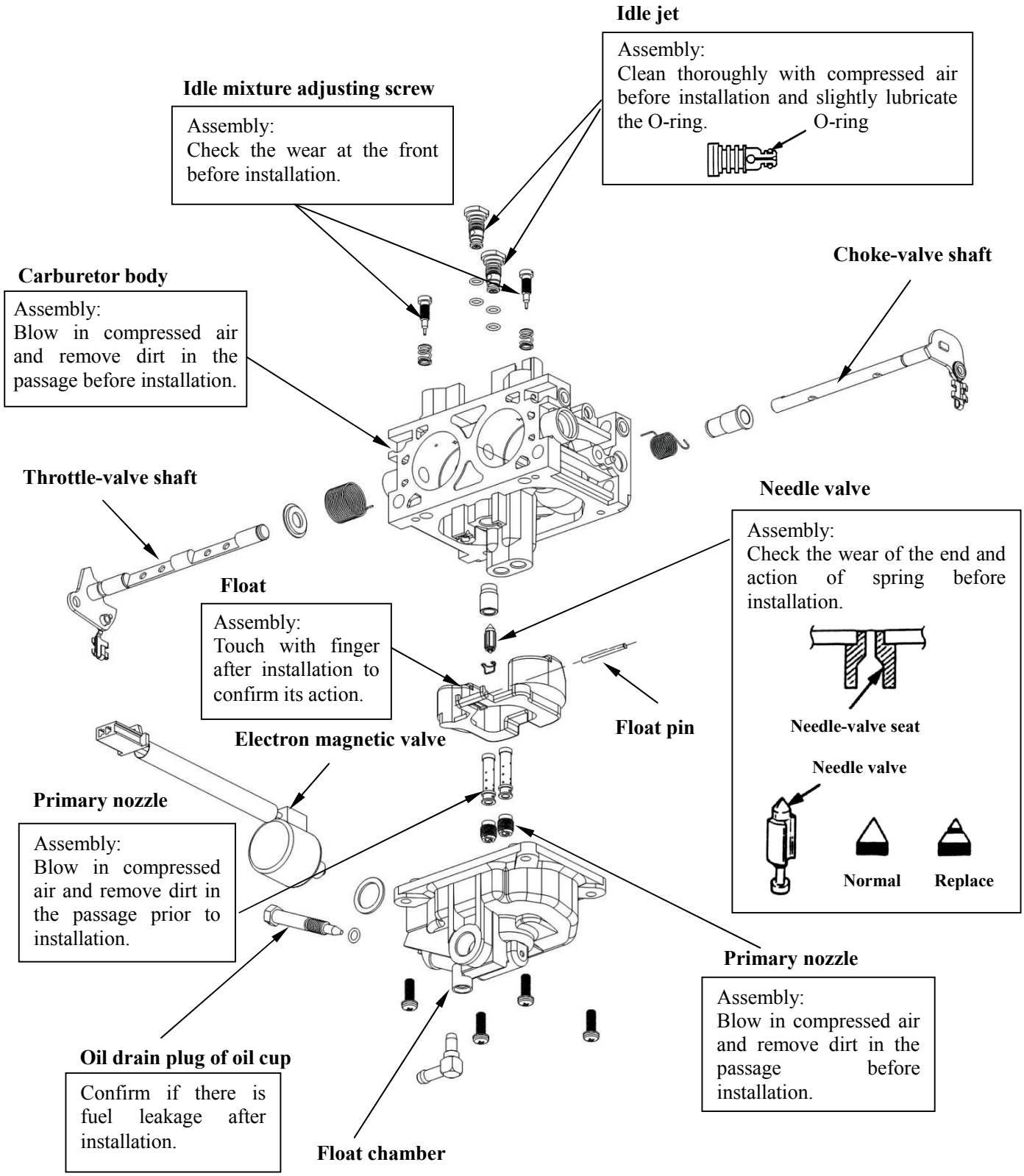
⚠ Warning

The gasoline is flammable and explosive. The fuel stop valve must be closed before repairing the carburetor and drain the fuel in the carburetor.



Disassembly/assembly

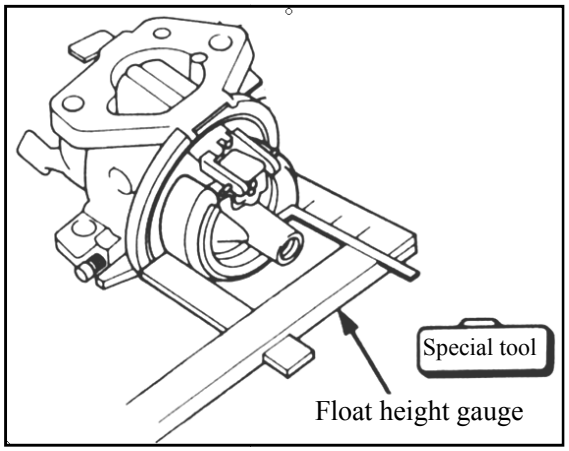
Note: clean the carburetor prior to installation



c. Check of float height

Place carburetor according to the figure and push in the float with fingers.

When the float valve touches the float seat and the spring doesn't compress, measure the dimensions between float and the shell (height of the float).



Standard height	14±1.5 mm

When the height of float is inconsistent with the specified value, replace the float or float valve.

d. Clean the carburetor

⚠ Warning

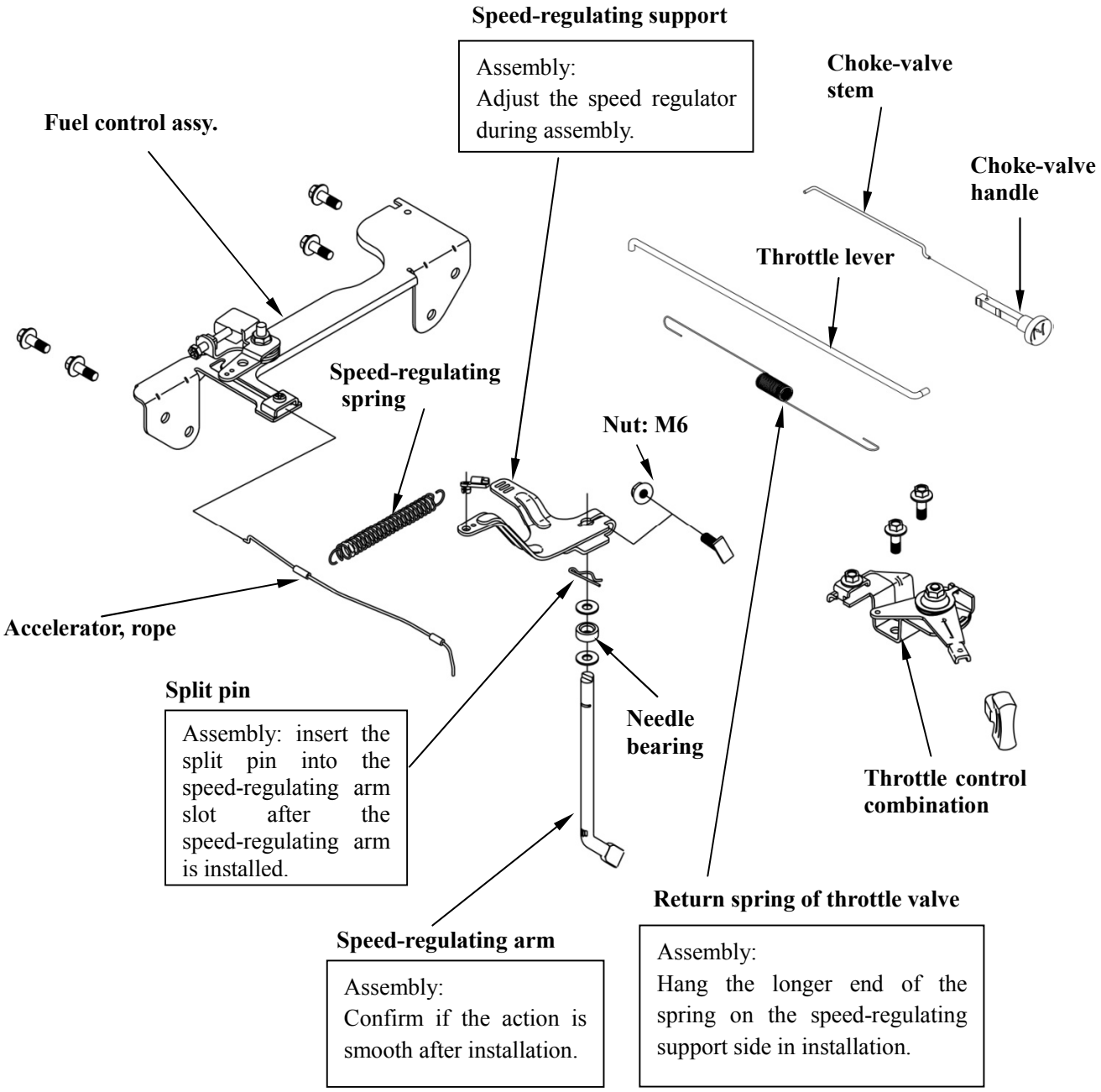
When using the compression air, to avoid injury, wear protective spectacles or other protective equipment.

Note

Some chemical solvents are of relatively-strong corrosivity and may damage plastic parts such as the O-ring and float. Please carefully read the Solvents Manual. Should you not confirm, don't use the solvent to clean the carburetor. The compression air of high pressure may also damage the carburetor. Please remove the dirt in the passage or pipe mouth with compression air of proper pressure.

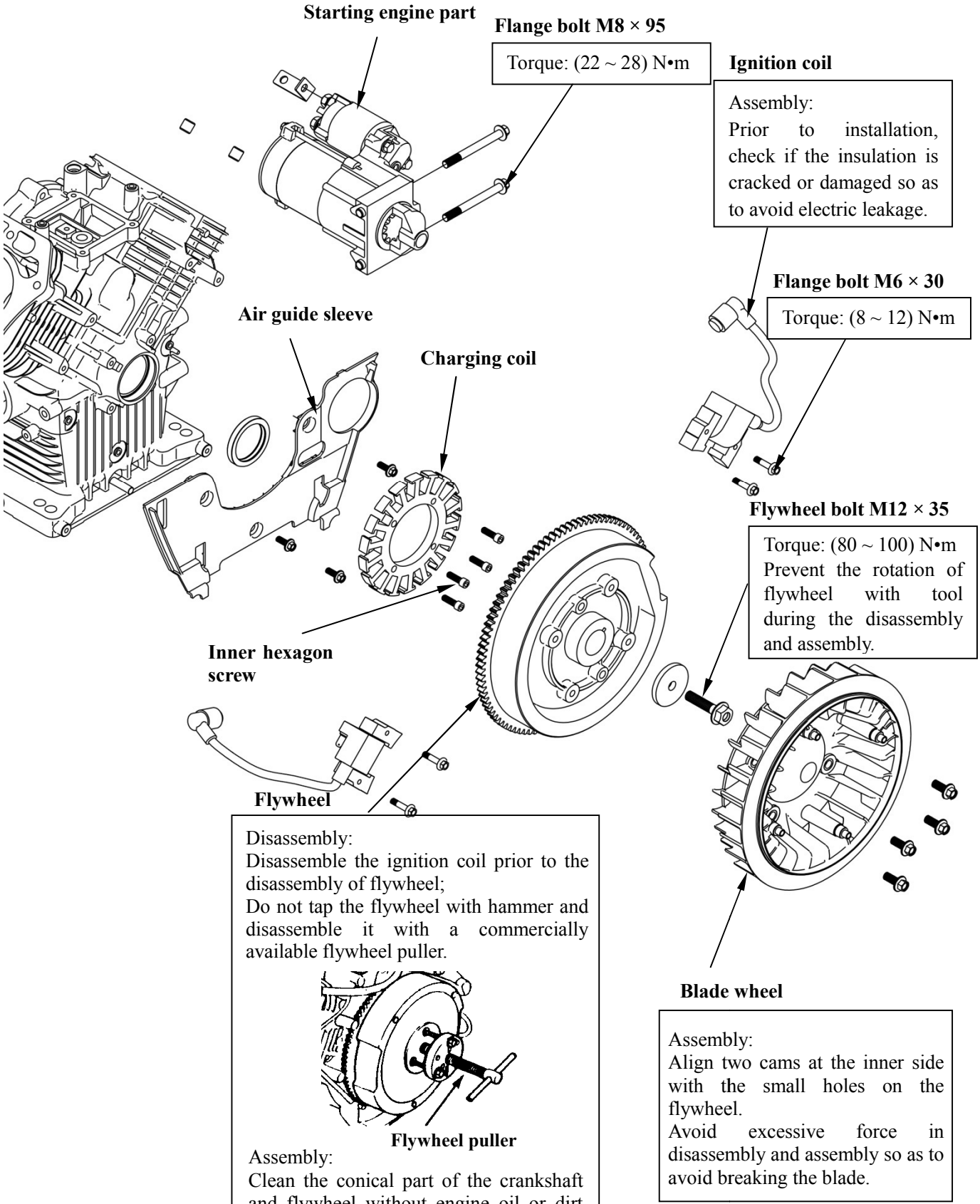
1) Clean the carburetor with cleanser.
2) Blow in the compression air to remove dirt in idle air jet, idle jet, air jet, main jet, main nozzle, etc. prior to installation.

5-2-5 Speed-regulating mechanism



5-2-6 Flywheel and ignition coil

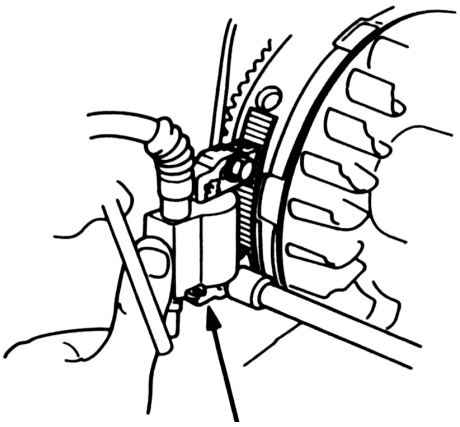
a. Disassembly/assembly



b.Adjustment of clearance between ignition coils

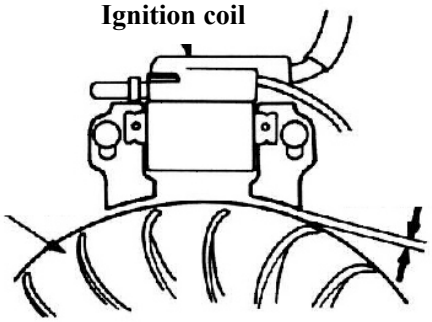
When re-assembling the ignition coil, adjust the clearance between ignition coil and flywheel.

1) Slightly screw the mounting bolt of ignition coil.
2) As shown in the figure, insert the thickness gauge into the clearance of ignition coil and flywheel, or
   Insert the paper of the same thickness on the circle of the flywheel.
3) Press the ignition coil on the flywheel with hand and
4) fasten these two bolts.



Clearance of ignition coils	0.3 ~ 0.4 mm

Ignition coil



Note

a) Adjust two ends of the ignition coil to the same clearance.

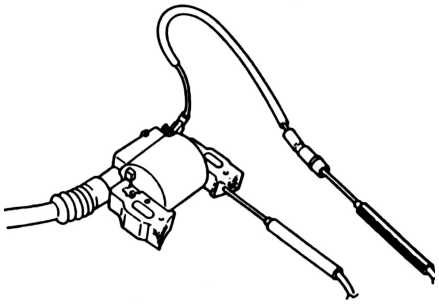
b) Avoid magnet steel of flywheel when adjusting.

Check

Ignition coil:

<Resistance value at the primary side>

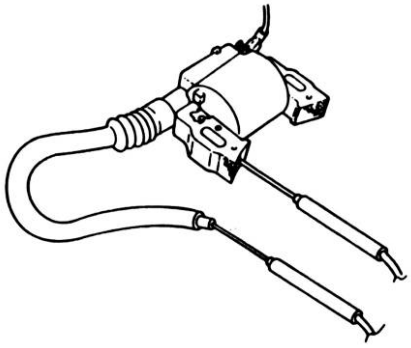
Connect the tester terminal with the conductor terminal and coil iron core to measure the resistance value at the primary side.



Resistance value at the primary side	1.0-1.4 Ω

<Resistance value at the secondary side>

Connect the tester terminal with the high-voltage wire with the spark plug cap removed and the coil iron core to measure the resistance value at the secondary side.



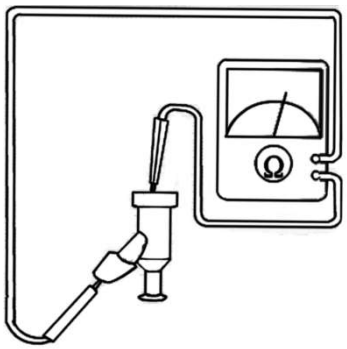
Resistance value at the secondary side	6.2-7.6 KΩ

Note

Not removing the spark plug cap during measurement will cause false readings.

c. Spark plug cap

Connect the ohm gauge to the two ends of the spark plug cap to measure the resistance of spark plug cap.



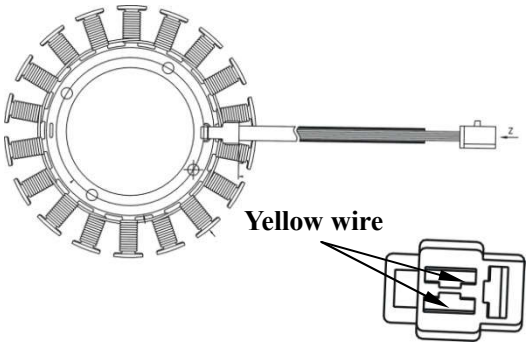
Resistance value	9-11 KΩ

Replace the spark plug cap if the resistance value doesn't meet specifications.

Charging coil

120W

Use multimeter to test the voltage between the two yellow lines of charging coil when the engine is of no load:
Average no-load voltage (32±2) V and peak voltage (84±4) V.
Equipped with the voltage regulator with 120 W load, and the Voltage not less than DC13V



180W

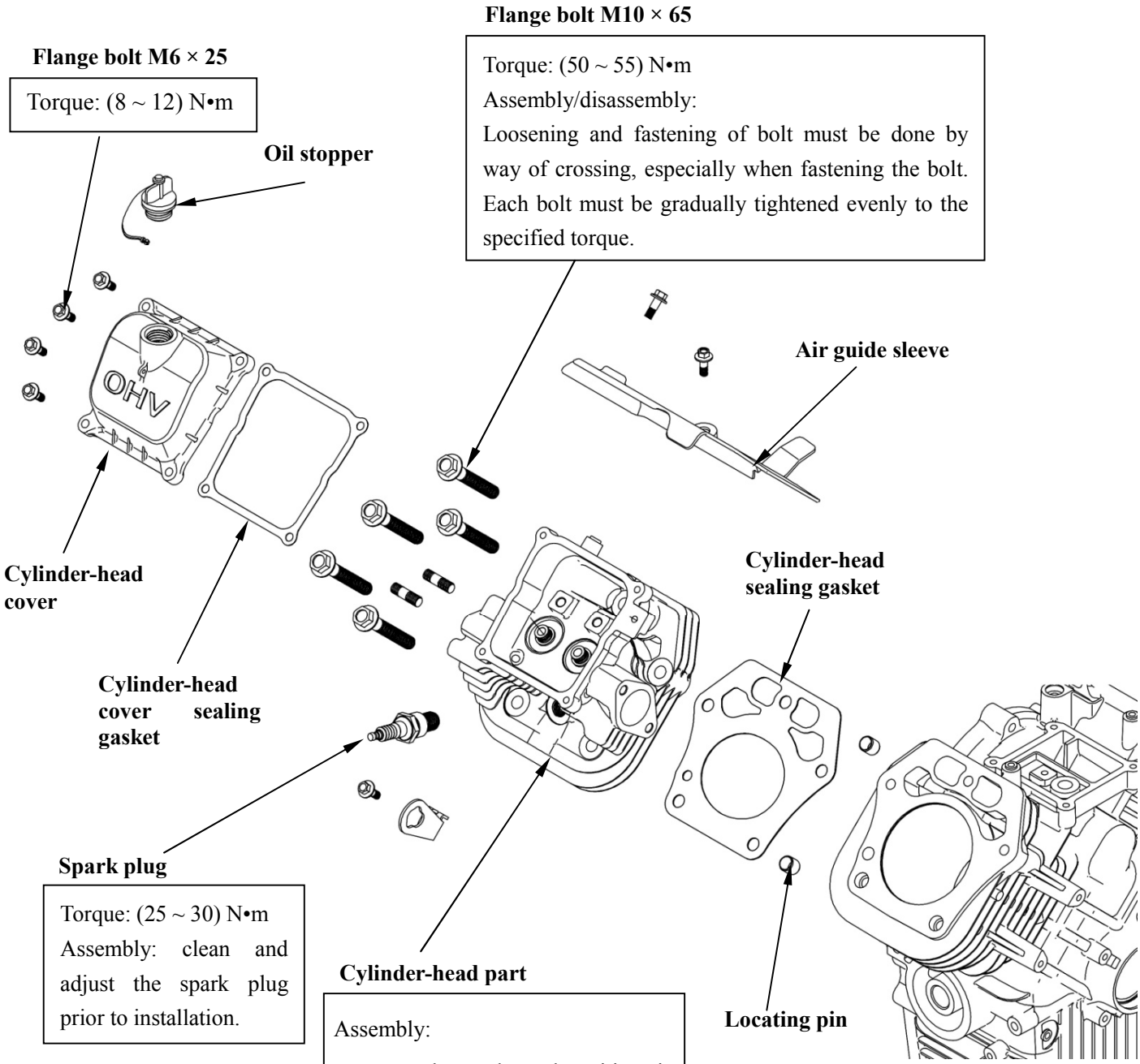
Use multimeter to test the voltage between the two yellow lines of charging coil when the engine is of no load:
Average no-load voltage (32±2) V and peak voltage (84±4) V.
Equipped with the voltage regulator with 180 W load, and the Voltage not less than DC13V

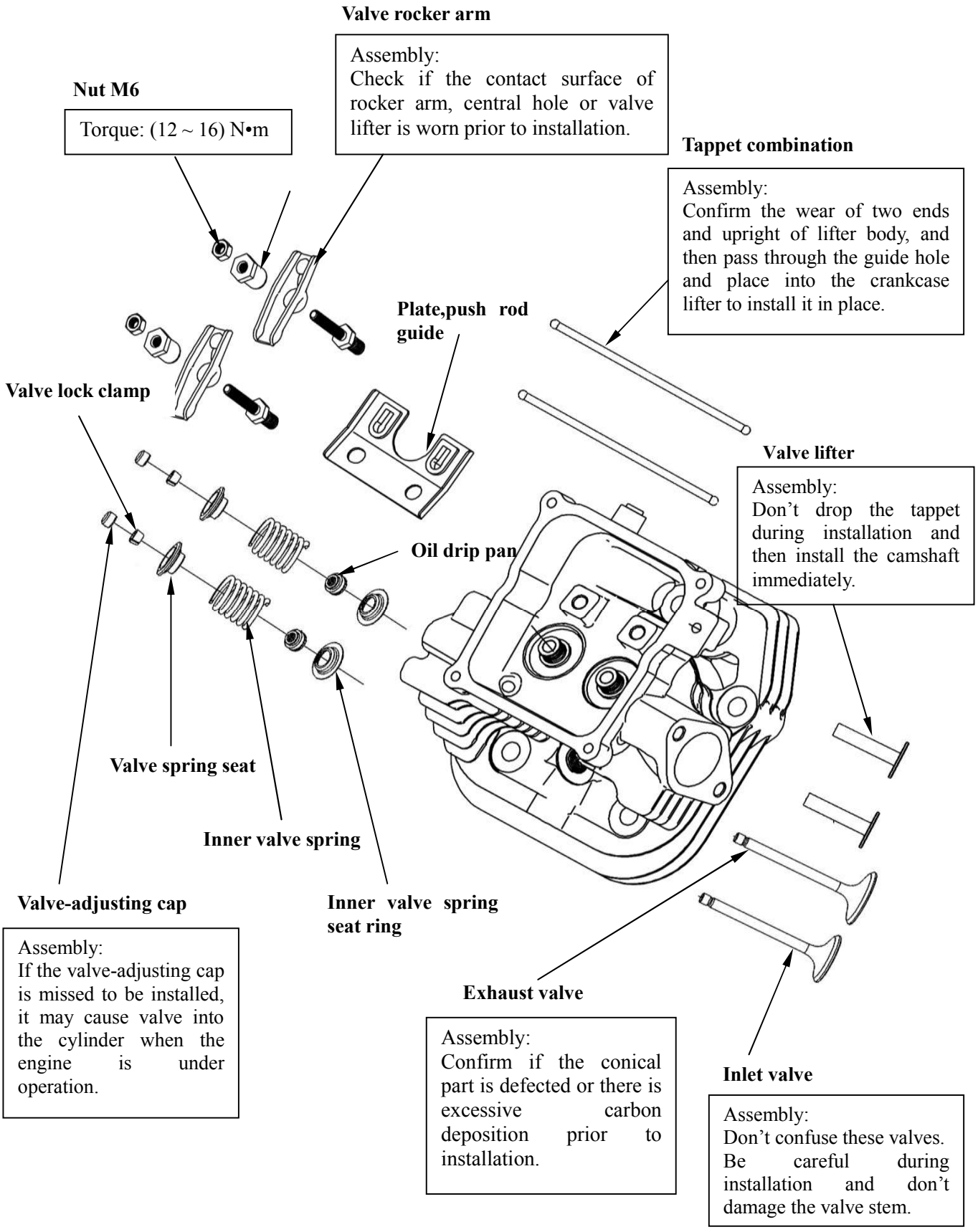
260W

Use multimeter to test the voltage between the two yellow lines of charging coil when the engine is of no load:
Average no-load voltage (33±2) V and peak voltage (86±4) V.
Equipped with the voltage regulator with 260 W load, and the Voltage not less than DC12.5V

5-2-7 Cylinder head and valve

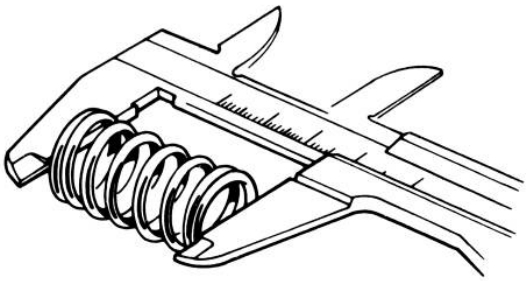
Disassembly/assembly




Valve rocker arm
Assembly:
Check if the contact surface of rocker arm, central hole or valve lifter is worn prior to installation.
Nut M6
Torque: (12 ~ 16) N•m
Tappet combination
Assembly:
Confirm the wear of two ends and upright of lifter body, and then pass through the guide hole and place into the crankcase lifter to install it in place.
Plate,push rod guide
Valve lock clamp
Valve lifter
Assembly:
Don't drop the tappet during installation and then install the camshaft immediately.
Oil drip pan
Valve spring seat
Inner valve spring
Valve-adjusting cap
Assembly:
If the valve-adjusting cap is missed to be installed, it may cause valve into the cylinder when the engine is under operation.
Inner valve spring seat ring
Exhaust valve
Assembly:
Confirm if the conical part is defected or there is excessive carbon deposition prior to installation.
Inlet valve
Assembly:
Don't confuse these valves. Be careful during installation and don't damage the valve stem.

Free length of the valve spring

Measure the free length of valve spring.



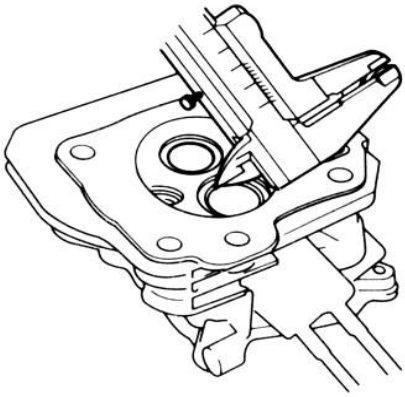
Standard	Maintenance Limit
39.5~40.5 mm	39 mm

Replace the spring if the maintenance limit is exceeded.

Width of valve seat

Remove the carbon deposition in combustor and check if the valve seat has corrosion or damage.

Measure the width of valve seat.

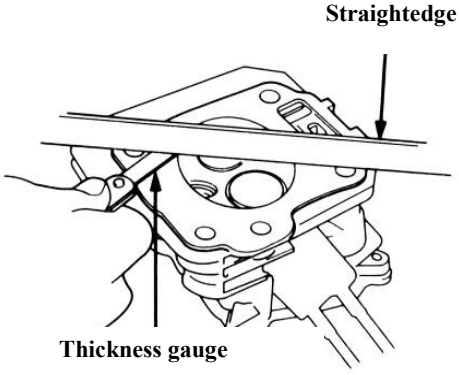


Standard	Maintenance Limit
0.7~0.8 mm	2.0 mm

If the width of valve seat is less than the standard value or exceeds the maintenance limit, trim the valve seat once.

Cylinder head

1. Remove the carbon deposition in combustor and residues of gasket attached onto the cylinder head.
2. Check if there is any crack at the spark plug hole, valve seat surface and valve pipe.
3. Check if there is deformation of cylinder head with straightedge or thickness gauge as shown in the figure.

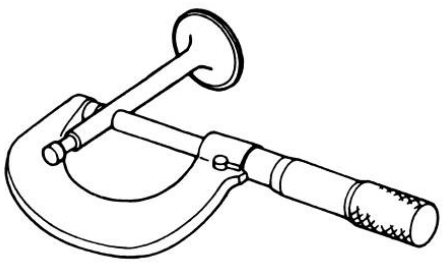


Maintenance Limit	0.10 mm

Outer diameter of valve stem

Check each conical side of the valve to see if there is any uneven, curved or abnormal wear of valve stem.

Replace the valve if necessary. Measure and record the outer diameter of each valve stem.



	Standard	Maintenance Limit

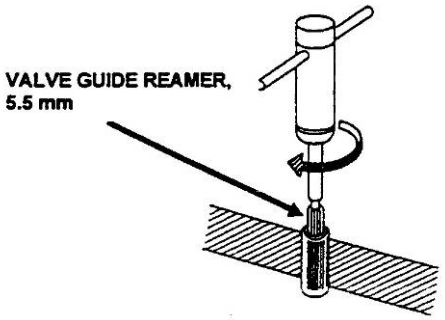
Inlet valve	6.565~6.58 mm	6.438 mm
Exhaust valve	6.545~6.56 mm	6.435 mm

Replace the valve if the outer diameter of valve stem is less than the maintenance limit.

Inner diameter of valve guide

Remove the carbon deposition in the exhaust valve pipe with reamer prior to measurement.

Measure and record the inner diameter of each valve guide.

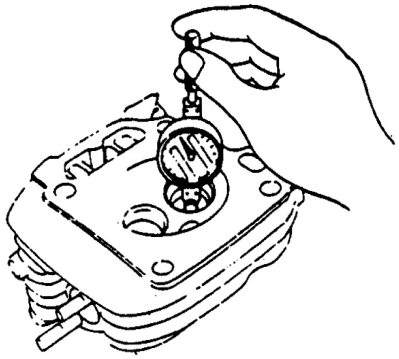


Standard	Maintenance Limit
6.6 ~6.615 mm	6.672 mm

Clearance between valve guide and valve stem

Deduct the outer diameter of valve from the corresponding inner diameter of valve guide.

Obtain the clearance between the valve guide and valve stem.

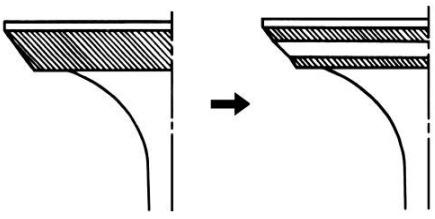


	Standard	Maintenance Limit
Inlet valve	0.02 ~ 0.05 mm	0.15 mm
Exhaust valve	0.04 ~ 0.07 mm	0.17 mm

If the clearance value between the valve stem and guide exceeds the maintenance limit, judge if replacing a new guide of standard dimension will make the clearance achieve within the maintenance limit; if yes, replace the valve guide (or cylinder head) as required and ream the valve guide to make it a better coordination. If the clearance between the valve stem and new valve guide still exceeds the maintenance limit, replace the valve too. Trim the valve seat again when replacing the valve guide.

Trim the valve seat

1. Thoroughly remove the carbon deposition in the combustor and on the valve seat.
2. Coat a thin layer of blue lead power on the surface of the valve or ink of marking pen which is easily to be erased.



3. Insert into the valve and press it for several times to make it tightly close to the valve seat. Assure not to rotate the valve on the valve seat. Coating on the valve seat will show the de-concentric feature of valve or valve

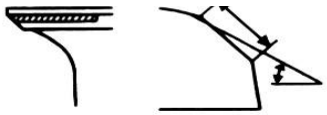
seat.

4. Grind the valve seat with a 45° grinder to make the valve seat smooth and concentric; operate as per the manual of valve seat grinder provided by the manufacturer.

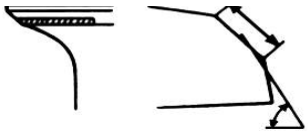
Rotate the grinder clockwise and the anticlockwise rotation is not allowed.

Lift the valve seat grinder from the valve seat and continue grinding.

High contact surface



Low contact surface



5. Shorten and adjust the valve seat a 30°-32° and 60° grinders,

Make the valve seat connect with the central part of the valve surface.

Grind the top edge of the valve seat with a 30°-32° grinder.

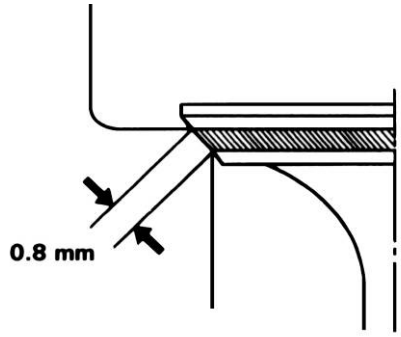
Grind the bottom edge of the valve seat with a 60° grinder.

Assure the contact width of valve seat after completion is within the specified scope.

Width of valve seat

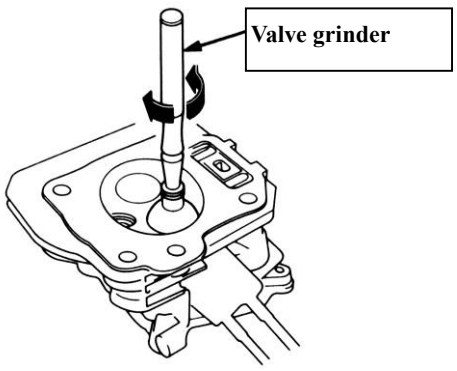
Standard	Maintenance Limit
0.7~0.8 mm	2.0 mm

1. Slightly grind with the 45° grinder to remove any burr at the edge of valve seat.
2. After trim the valve seat again, check that after the valve is put in, if it contacts evenly.
3. Coat a thin layer of blue crocus on the surface of the valve or ink of marking pen which is easily to be erased.
4. Insert into the valve and press it for several times to make it tightly close to the valve seat. Assure not to rotate the valve on the valve seat. If colorant is evenly coated on the conical side of the valve seat as shown in the figure, it indicates that the contact between valve and valve seat is good.



Note:

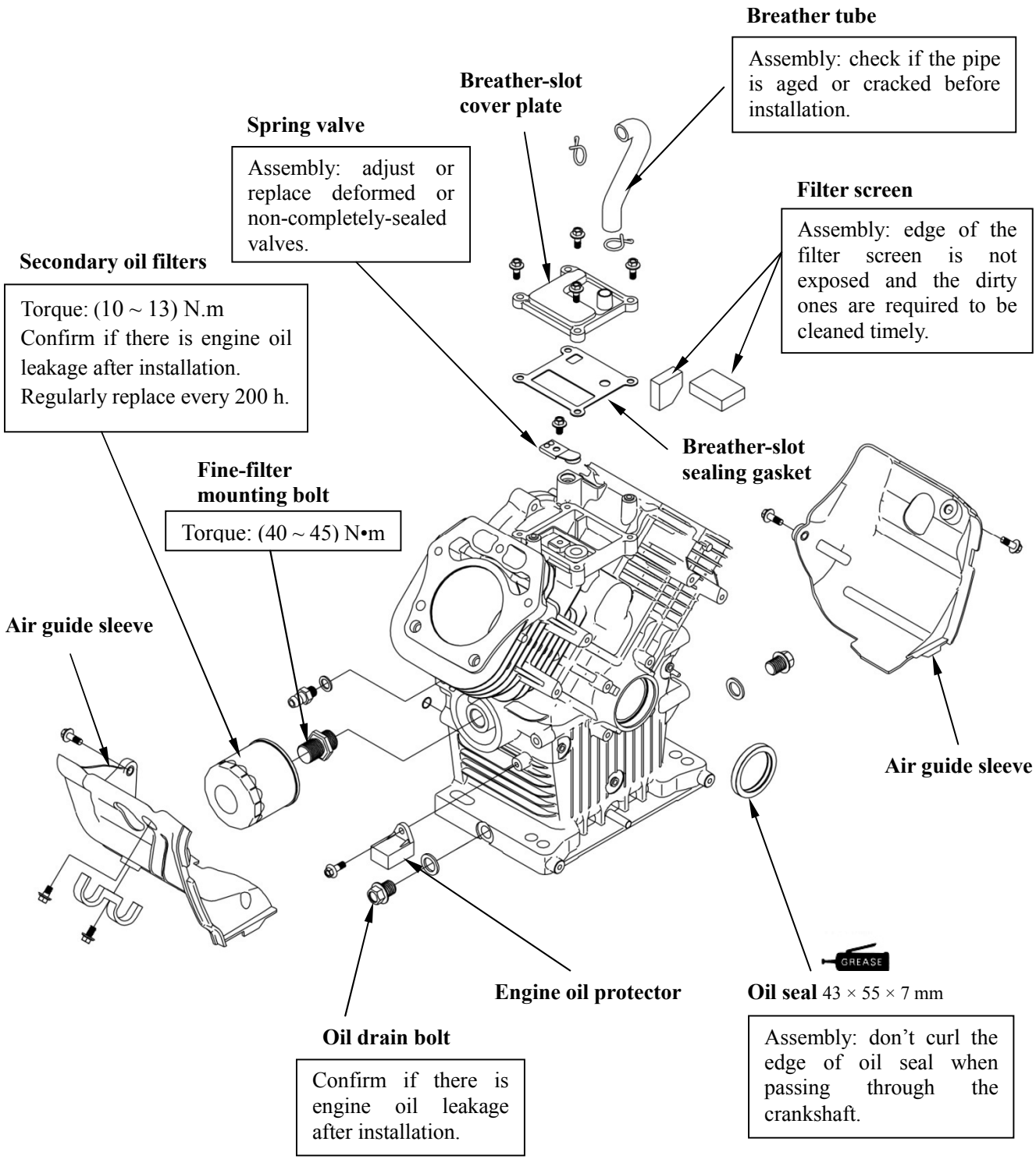
To avoid severe engine damages, thoroughly remove the abradant on the cylinder head prior to assembly.



5. Check the valve clearance after assembly.

5-2-8 Secondary oil filter, breather slot and air guide sleeve

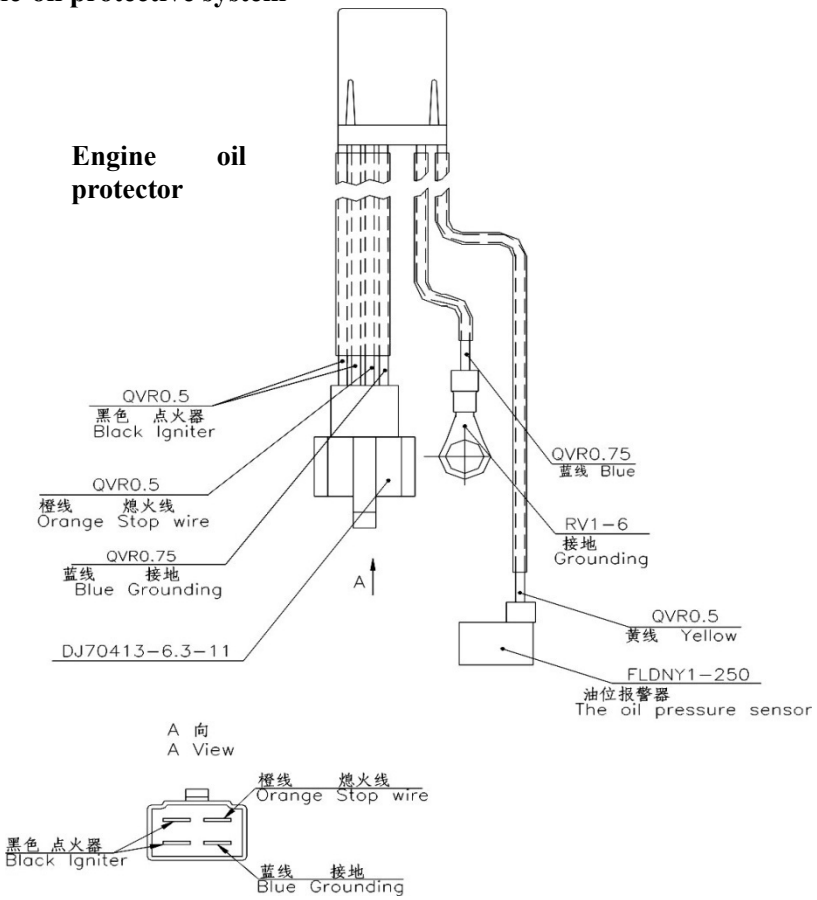
Disassembly/assembly



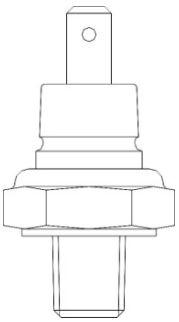
b. Check

Engine-oil protective system

Engine oil protector



Oil level alarm



The engine-oil protective system is designed for preventing damage from insufficient engine oil inside the crankcase. When the oil level decreases under the safety line, the engine-oil protective system will automatically shut down the engine (the switch of engine is still at the location of "On"); if the engine stops automatically and cannot start, firstly check the oil level and other faults then.

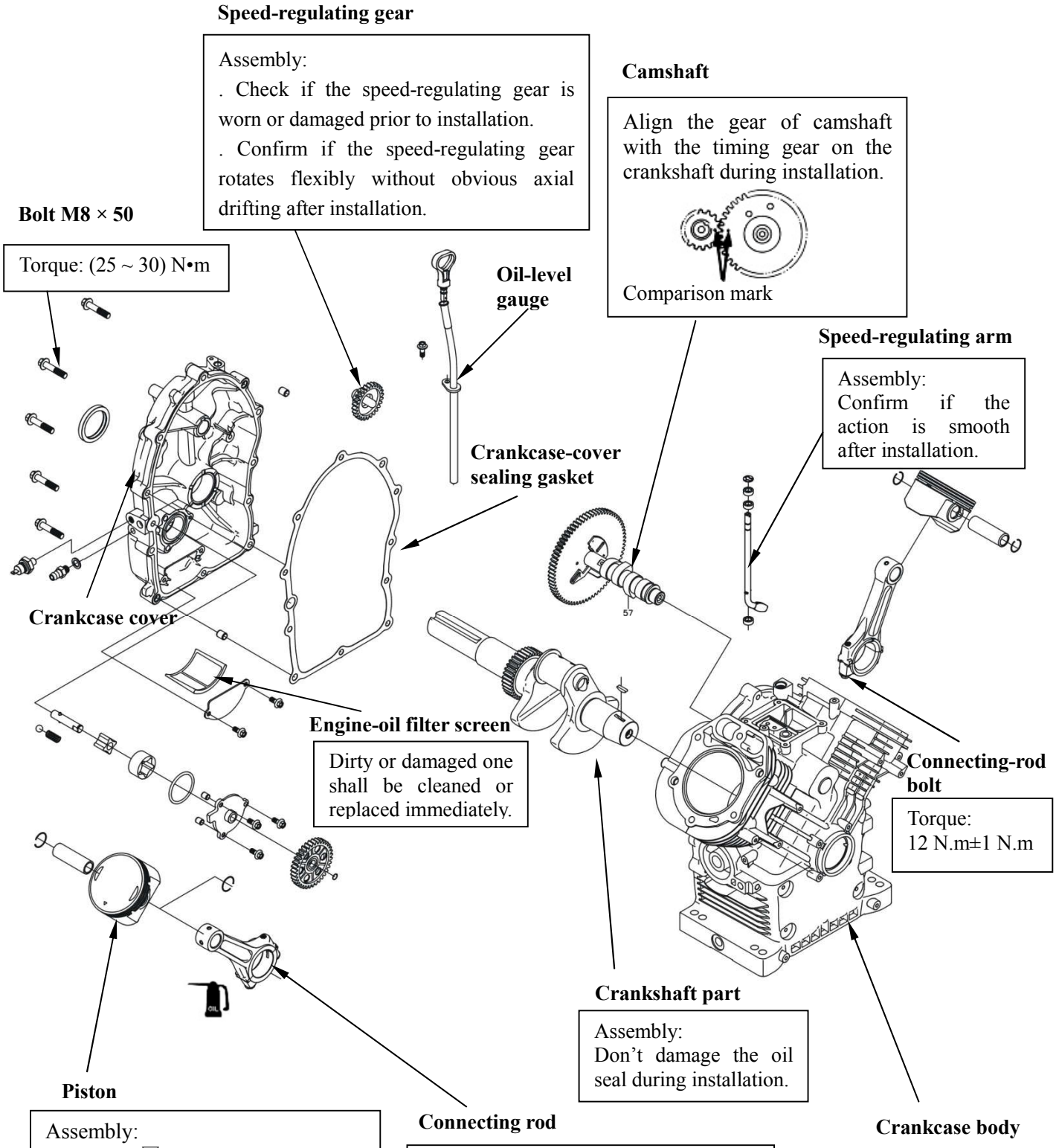
1) When the engine is under operation, disconnect the yellow lead wire of engine-oil protector and ground through the engine to confirm that the engine is shut down.

2) After shutting down the engine, it is normal that under the case that engine oil quantity meets specifications and don't disconnect the yellow lead wire of the oil level alarm, the yellow lead wire is conductive to the earth wire.

3) When the oil-level sensor grounds and the rotating speed of engine is less than 800±50 rpm, the engine-oil protector will not act; when the rotating speed of engine is greater than 800±50 rpm, the engine oil protector delays action for (1.8±0.2)S and the igniter flames out; when the engine operates normally and the oil-level sensor grounds, the engine-oil protector delays action for 1 S.

5-2-9 Crankcase, crankshaft and piston

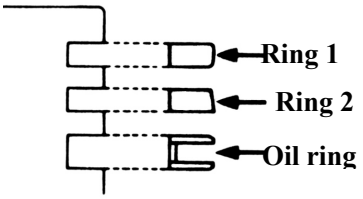
Disassembly/assembly

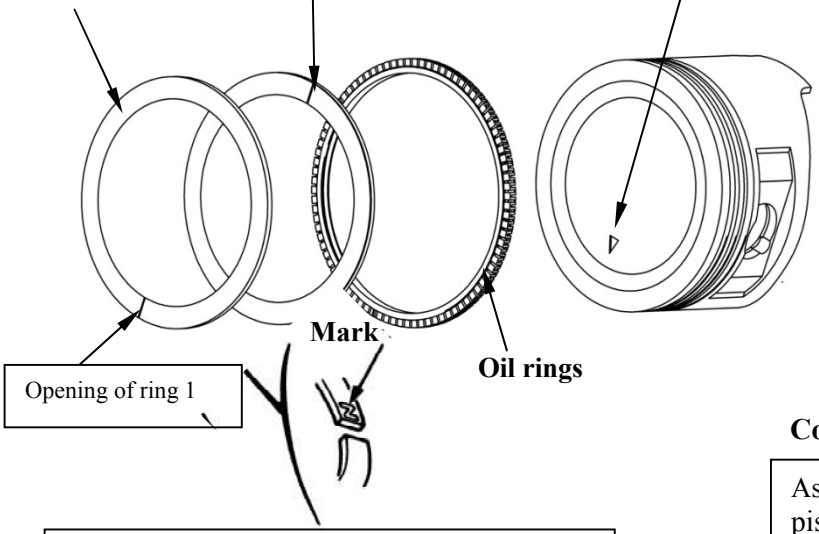


Disassembly/assembly

Piston and connecting rod

Assembly:
. Put upward the manufacturer's mark during assembly.
. Do not misplace the gas rings 1 and 2.
. Check if the piston ring can rotate flexibly after installation.
. Avoid the direction of piston pin for each opening of piston ring by staggering for 150° ~ 210°.



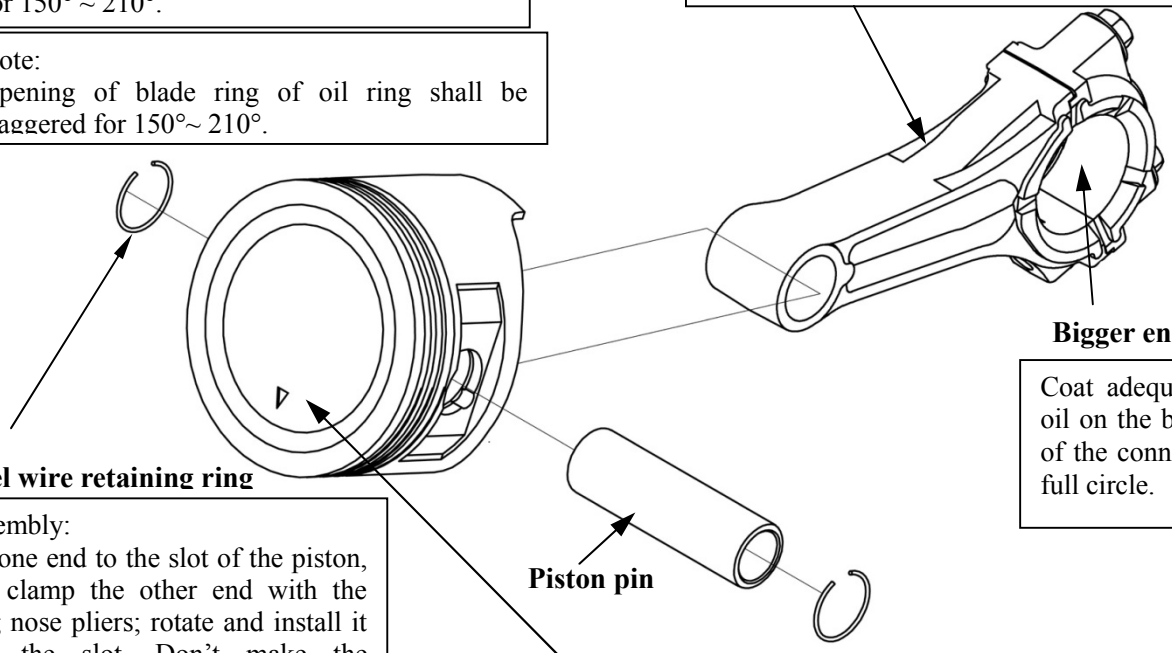


Note:
Openings of rings 1 and 2 shall be staggered for 150° ~ 210°.

Note:
Opening of blade ring of oil ring shall be staggered for 150°~ 210°.

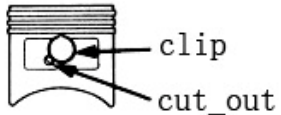
Connecting rod

Assembly: point the "▽" mark of the piston to the same direction of that of the connecting-rod boss during assembly while the other is in the opposite direction.



Coat adequate lubricating oil on the bigger end hole of the connecting rod in a full circle.

Assembly:
Put one end to the slot of the piston, and clamp the other end with the long nose pliers; rotate and install it into the slot. Don't make the opening of the clamp ring face the gap of the piston pin.



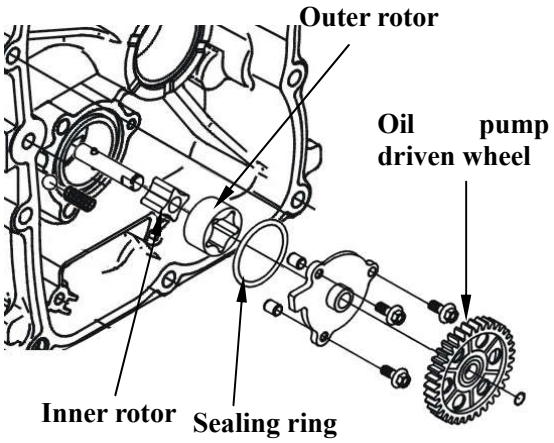
Note: point the "▽" at the top of the piston to the opposite direction of rotation of the crankshaft (seen from the engine output end, the piston arrow of the right cylinder is downward while the piston arrow of the left cylinder is upward).

Check

Installation check of oil pump

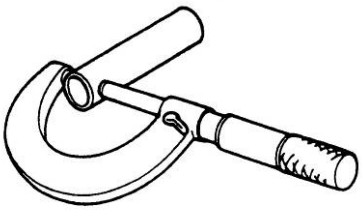
1、Rotational flexibility of rotator: coat lubricating oil onto rotator and axis prior to assembly; manually rotate the rotational axis after assembly to assure no binding in rotation process.

2、Pumping of oil pump: after assembly, add certain engine oil at the filter screen of the oil inlet for the oil pump, manually rotate the gear of oil pump to assure the oil pump can pump oil, otherwise, re-assemble or replace the oil pump.



Outer diameter of piston pin

Standard	Maintenance Limit
16.992-16.998 mm	16.9 mm

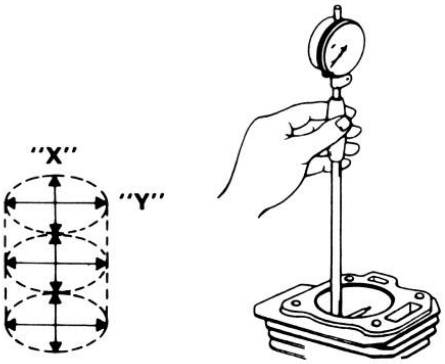


Inner diameter of cylinder

Measure the three points on X and Y axes and record the inner diameter of the cylinder (X axis is perpendicular to crankshaft while Y axis is parallel to crankshaft).

Take the maximum reading as the wear and conical degree of the cylinder.

Standard	Maintenance Limit
80.0-80.01 mm	80.15 mm



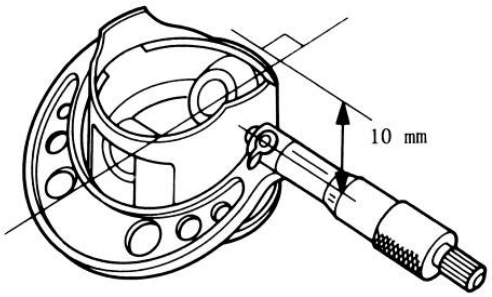
Detection of piston and piston ring

Check the contact between piston and cylinder, defects of ring groove, erosion at the top, crack, etc. It shall be replaced for severe damages (e.g. crack).

Remove carbon deposition

Carbon deposition accumulates at the edge of the top of piston and upper opening of cylinder. Remove carbon deposition prior to detection. Wet the carbon deposition with kerosene, and then remove it with blunt scraper or metallic brush.

Outer diameter of piston skirt



Measure and record the outer diameter of piston skirt at the place 10 mm away from the maximum lower edge of the piston skirt; the measuring direction is perpendicular to the piston pin hole.

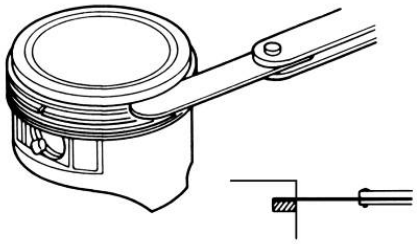
Standard	Maintenance Limit
79.965-79.975 mm	79.755 mm

Clearance between piston and cylinder

The difference between the maximum diameter of cylinder and the diameter of the piston skirt is the clearance between piston and cylinder.

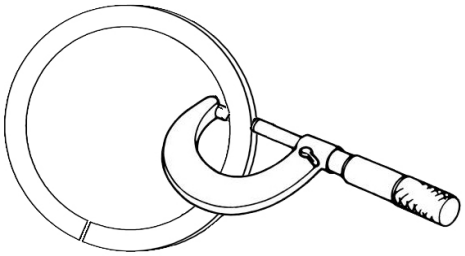
Standard	Maintenance Limit
0.025-0.045 mm	0.255 mm

Clearance to the side of piston ring



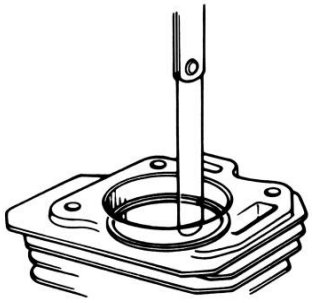
	Standard	Maintenance Limit
Gas ring 1 Gas ring 2	0.02-0.06 mm	0.11 mm
Oil ring	0.03-0.08 mm	0.15 mm

Width of piston ring



	Standard	Maintenance Limit
Gas ring 1	2.9 mm	2.77 mm
Gas ring 2	3.3 mm	3.17 mm
Oil ring	2.6 mm	2.07 mm

Clearance to the end of piston ring

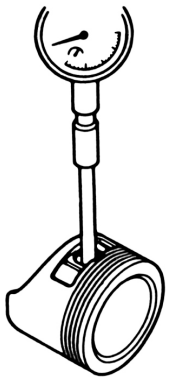


	Standard	Maintenance Limit
Gas ring 1	0.2-0.4 mm	0.7 mm
Gas ring 2	0.3-0.5 mm	0.8 mm
Oil ring	0.2-0.7 mm	1.0 mm

Before measuring the clearance to the end of piston ring, locate the piston ring with the top of the piston to make it not erect in the inner hole of the cylinder.

Inner diameter of piston pin hole

Standard	Maintenance Limit
17.002-17.008 mm	17.12 mm



Clearance between piston pin hole and piston pin

Standard	Maintenance Limit
0.004-0.016 mm	0.029 mm

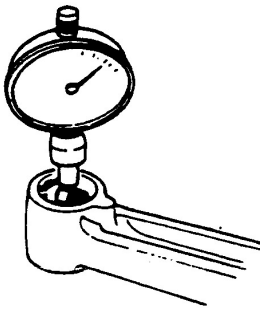
Detection of connecting rod

The connecting rod shall be scrapped to change a new one when it is bent or warped, or there is abnormal wear to the larger end and small end hole or there is crack of one side.

Inner diameter of the small end of connecting rod

Change the connecting rod if the inner diameter is less than the standard or more than the maintenance limit.

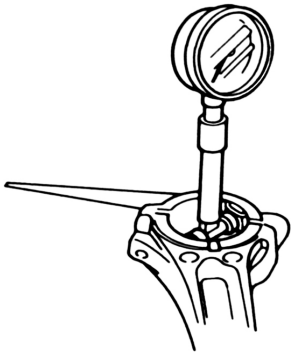
Standard	Maintenance Limit
17.006-17.017 mm	17.05 mm



Inner diameter of the big end of connecting rod

Change the connecting rod if the inner diameter is less than the standard or more than the maintenance limit.

Standard	Maintenance Limit
40.015-40.025 mm	40.065 mm

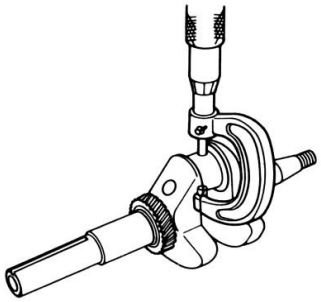


Detection of crankshaft

Conduct 100% inspection to the cleaning condition inside the oil passage prior to the installation of crankshaft and clean the oil passage with blow gun to ensure there are no impurities in the oil passage.

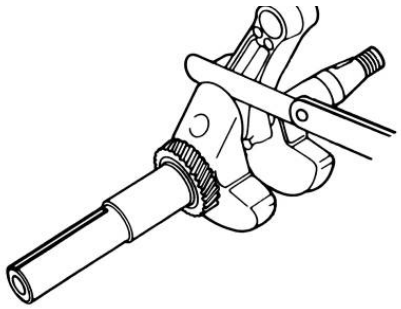
Outer diameter of the crankshaft journal

Standard	Maintenance Limit
39.966-39.991 mm	39.906



Side clearance of the big end of connecting rod

Standard	Maintenance Limit
0.203-0.403 mm	1.0 mm

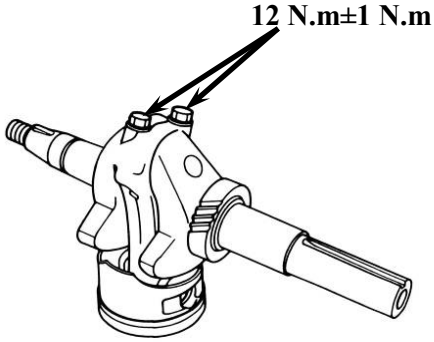


Oil-film clearance of big end of connecting rod (radial direction)

1) Clean the surface of crankshaft journal and the inside oil.

2) Set plastigauge on crank journal then assemble the connecting rod, and fasten the bolt as per the specified torque.

12 N.m±1 N.m



Fastening torque: 12 N.m±1 N.m

⚠ Note

Don't rotate the crankshaft when fastening the connecting-rod bolt. Calibrate with torque wrench in N+1 way and conduct 100% inspection to the crankshaft to see if it rotates flexibly.

3) Disassemble the connecting rod and measure the thickness of plastigauge.

Plastigauge

Standard	Maintenance Limit
0.024-0.059 mm	0.115 mm

4) When the clearance exceeds the maintenance limit, replace the connecting rod and check the clearance again. If the clearance still exceeds the maintenance limit after using new connecting rod, grind the crankshaft journal and use the connecting rod less than the standard value.

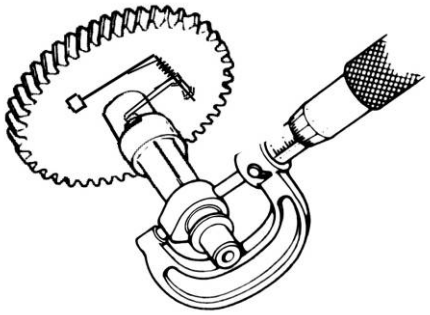
Detection of camshaft

The camshaft is the main engine drive element of valve mechanism of gasoline engine, controlling inlet or exhaust valve to open or close in a regular manner.

For appearance, check whether the cam surface and the height is damaged, whether the camshaft and bearing is loose and worn. If yes, change the whole unit.

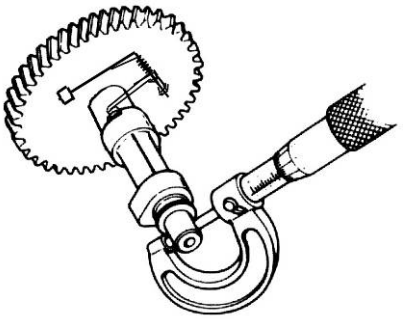
Height of camshaft

	Standard	Maintenance Limit
Inlet	29.95-30.05 mm	29.75 mm
Exhaust	29.95-30.05 mm	29.75 mm



Outer diameter of camshaft

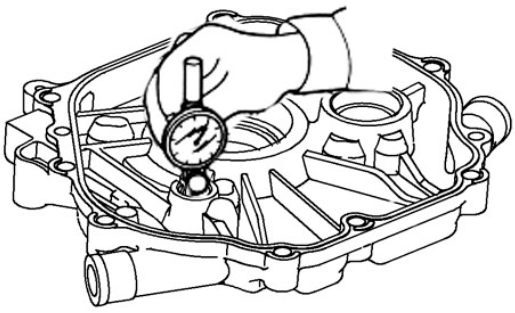
Standard	Maintenance Limit
15.966-15.984 mm	15.916 mm



Note the position of depression mechanism and check to ensure its flexibly.

Inner diameter of camshaft bearing hole

Standard	Maintenance Limit
16.0-16.018 mm	16.068 mm



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