

GENERAL PURPOSE GASOLINE ENGINE

JA154F/P、JA160F/P、JA168FA/P、JA168FB/P、JA170F/P
JA173F/P、JA177F/P、JA188F/P、JA190F/P、JA192F/P



4-stroke
Single cylinder
overhead valve

USER'S MANUAL

PREFACE

Thank you for choosing Ji Ao Brand small type general purpose gasoline engine.

Ji Ao brand general gasoline engine (referred to as engine or gasoline engine) is a single cylinder, four-stroke, overhead valve, forced air-cooled gasoline engine. It has been developed with the advanced technology from both home and abroad. The engine has the advantages of reasonable design, compact structure, reliable performance and simple maintenance. It is a widely-applied power for various machines such as small multi-functional tillage machine, agricultural threshing machine, water pump unit, generator, road cutting machine, gasoline welding machine, vibrator, impact ramming machine, and so on.

We produce various models of engine and this manual only explains the operation and the maintenance method of common gasoline engine. You are required to read and understand the instructions before using the machine, and strictly follow the requirements of the instructions. That will help you to extend the engine life and prevent accidents as well as reduce unnecessary losses.

As we keep improving the products and technology, the contents described in this manual might be slightly different from the actual situation. If you have any questions, please consult the technology department who will answer your questions in details and help you to solve all of the problems.

Please understand that we have the right to modify this specifications at any time without prior notice.

The copyright of this instruction manual belongs to our company , and no unit or individual shall illegally reprint or copy it. Violators much be punished!

The manual describes the operation and maintenance of the following engine models (for both recoil and electrical starting), and the relevant general purpose machines.

The engine models' numbers are as following:

JA154F / P JA160F/P JA168F/P JA170F / P
JA 173F/P JA 177F/P JA 188F/P JA 190F/P JA 192F/P

The manual is written in accordance with the requirements of China National Standard No. GB9969.1-1998- General Instructions for Industrial Products.

This manual should be considered as a permanent part of your engine and should remain with the engine when you sell it.

In the manual , the following warning symbols should be required for special attention and strict compliance. The description of the symbols are as below.



----- Indicate the existed risk factors, Failure to follow the instructions may result property damage.



----- Indicates a hazardous situation which, if not strictly complied with, may result in property damage,serious injury.



----- Indicate the existed risk factors, failure to follow the instructions may result property damage.



----- Explain the helpful information.

Reference to the National Standard: JB / T5135.1-2013,
Reference to the Manufacturer Production Standard: Q/ES01-2017

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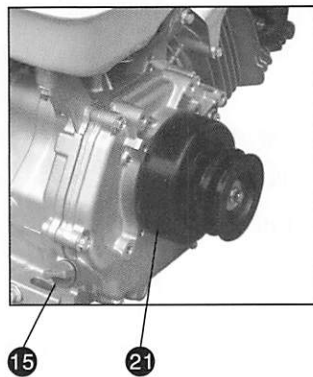
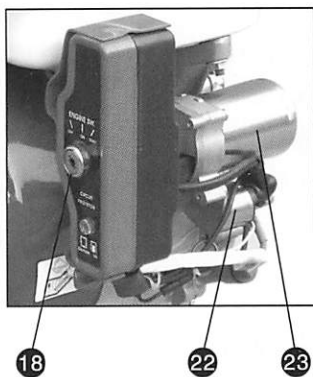
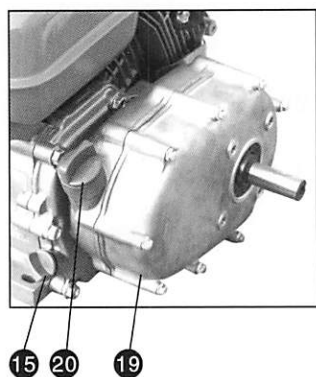
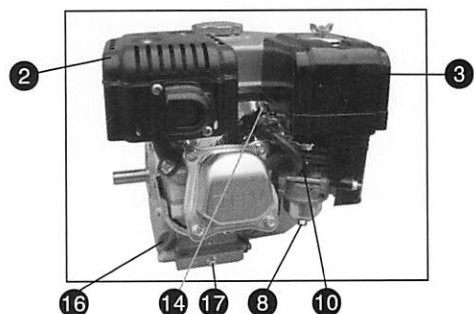
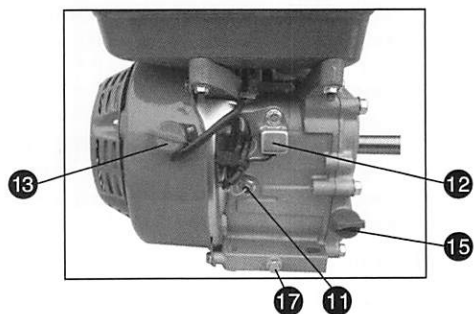
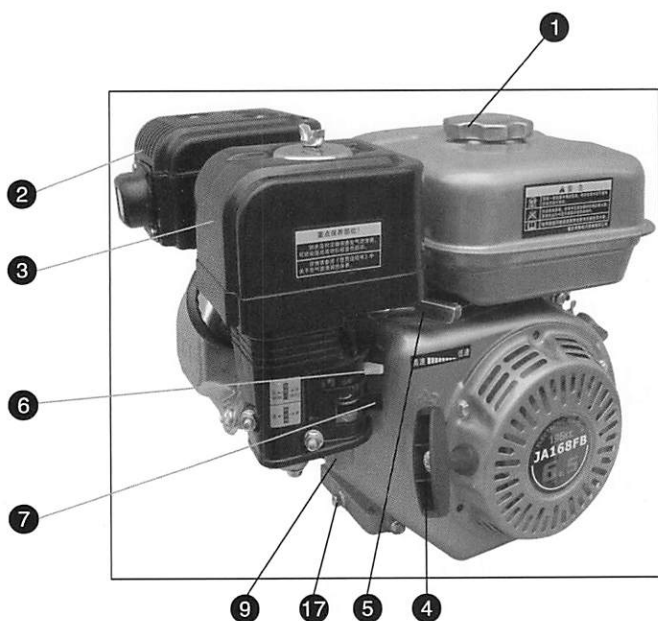
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Main Operation and Control Devices and Characteristic



① Fuel Cap

- Remove the fuel cap to add the fuel.

② Muffler Assy.

- Reduce the exhaust noise and extinguish the exhaust spark.

③ Air Filter Assy.

- Supply clean air to the engine for combustion.

④ Start Handle

- Recoil the handle to rotate the crankshaft and start the engine.

Main Operation and Control Devices and Characteristic

5 Throttle Control

- Control the throttle opening to adjust the engine rotary speed.
- The control handle is placed at the far right end for the lowest speed of the engine (i. e. idle), and the control handle is placed at the far left end for the highest speed of the engine.

6 Choke Control

- Control the carburetor resistance valve opening to adjust the concentration of combustible mixture.
- When the choke handle is placed in the closed position. Can provide a high concentration of fuel can easily start the cold engine.
- After the engine is started, the choke handle must be placed in the open position to provide an appropriate concentration of fuel for the normal operation of the engine.

7 Fuel Switch

- Control the fuel passage between the fuel tank and the carburetor.
- The engine must be operated in the open (ON) position;
- Place it at the off (OFF) position when the engine is not in use. Can prevent fuel leakage or block the carburetor.

8 Carburetor Drain Screw

- Remove the oil release bolt to drain the remaining fuel in the carburetor.

9 Carburetor Settling Cup

- Remove solid particles from the fuel by precipitation filtration to avoid carburetor Blocking.

10 Adjust Bolt, Idle Speed

- Turn the screw clockwise to increase the engine idle speed;
- Turn the screw counterclockwise to reduce the engine idle speed.

11 Oil sensor (optional)

- When the lubricating oil level is too low, the system will automatically stop the engine operation;
- If the engine cannot start, please check the engine lubricating oil level before checking other problems.

12 Oil Alarm Single Conductor (optional)

- The device will delay the shutdown signal from the oil sensor for about 30 seconds.

13 Engine on/off switch

- Engine on-off control.
- When engine starts, set it to ON position;
- Place the engine in the OFF when it needs to be stopped.

14 Spark Plug Cap

15 Oil Level Gauge

- Check the lubrication oil level then refill it if needed.

16 Oil Dipstick

17 Oil Drain Plug

- Turn out the oil release plug to discharge the engine lubricating oil.

18 Electric Start Switch (only for electric start)

- Control the electric start or open and stop of the engine.
- The electric door lock can be placed in the starting position (START) to connect the starting motor to realize the electric starting;
- Need to use the hand to pull the engine or engine operation when the electric door lock in operation (ON);
- The electric door lock is left off when the engine needs to stop running (OFF).

19 R-type Transmission Assy (optional)

- Built-in bath oil centrifugal automatic clutch, while reducing the output speed to 1 / 2 of the crankshaft speed.
- Disconnect the engine power output when the crankshaft speed is below about 1700 RPM;
- Output engine power when the crankshaft speed is above about 1700 rpm.

20 Oil Dipstick, Transmission Assy

- Add or check the transmission lubricating oil accordingly.

21 External Centrifugal Automatic Clutch (optional)

- Disconnect the engine power output when the rotation speed is below about 1700 RPM;
- Output engine power at a speed above about 1700 rpm.

22 Start Relay (electric start only)

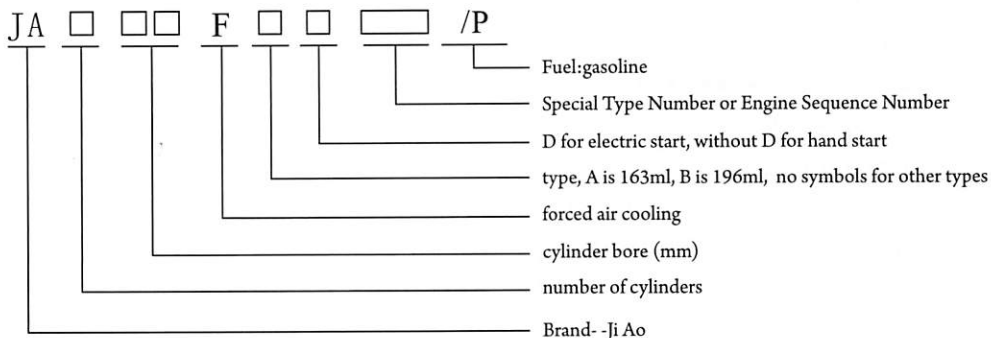
- The small current connected by the electric door lock is used to guide the large current required by starting with the starting motor.

23 Starter motor (electric starter only)

- When starting electrically, the starting motor will drive the engine crankshaft.

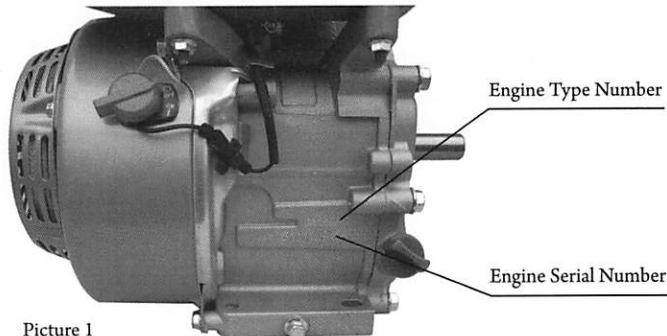
II. Main Technical Specifications

1. Composition and meanings of the engine type numbers



Notice

- The model and serial numbers of the engine are carved on the crankcase (Picture 1)



Picture 1

Main Technical Specifications

- Fill the engine type no and serial number in the guarantee card on page 27. You can use the guarantee card to book spare parts and ask for technology advice.

2. Fuel & Oil specifications and requirements

- ① Fuel: above 90 # unleaded gasoline;
- ② Engine lubricant oil : four-stroke gasoline oil-API classified SE, SF or SAE10W-30 oil equivalent to SG class.
- ③ R-type transmission gearbox lubricating oil: the same as the engine lubricant, the capacity is 0.5L.

3. Battery specifications (electric-starting type only)

- ① 168FAD/P-170FD/P: 12V/9Ah
- ② 173FD/P-192FD/P: 12V/36Ah

4. Spark plug

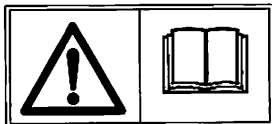
- ① Spark plug electrode clearance: 0.7-0.8mm
- ② Spark plug number
 - JA154F/P: E5TC
 - JA160F/P-JA170F/P: F7TC
 - JA173F/P-JA192F/P: F6RTC

5. Other technical specifications

- Engine type: single cylinder, four-stroke, overhead valve (OHV)
- Lubrication mode: separated splash
- Cooling mode: forced air cooling
- Starting and pressure reduction mode: automatic centrifugal hammer type
- Speed regulation mode: centrifugal mechanical automatic speed regulation
- Start mode: recoiling hand start / recoiling hand start& electric start (optional)
- Starting performance: ≤30 seconds
- Ignition mode: no-contact transistor ignition
- Valve clearance:
Inlet: 0.12±0.02mm Outlet: 0.15±0.02mm
- Clearance between igniter and flywheel: 0.4±0.1mm
- Carburetor type: flat suction type
- Stable speed adjustment rate: 10%, speed fluctuation: ≤3% (general use)
- Engine steering: counterclockwise (face the crankshaft side)
- Ambient temperature range : -5℃ — -40℃
- Altitude: below 1800m (standard carburetor)
- Ambient humidity: below 95%

III. Safety Instructions and Rules

CAUTION

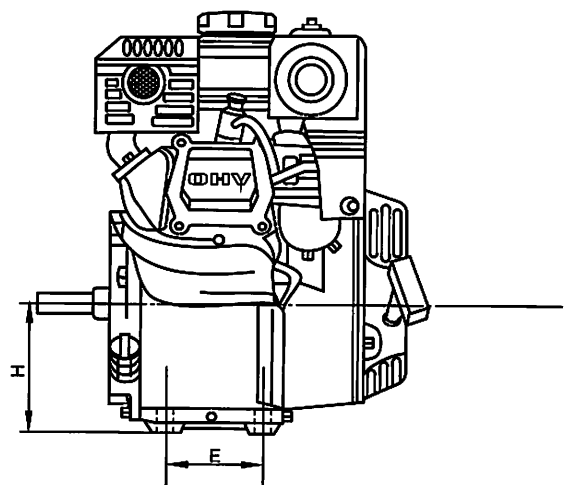


It is important to understand the Manual and operate the equipment properly. Read all of the instruction and precautions carefully before operating the Ji Ao brand equipment. Otherwise the improper operation could cause severe injury, death or machine damage.

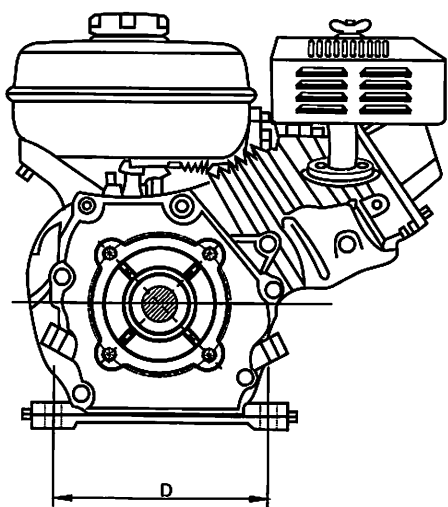
After understanding the instructions, the following safety rules must be strictly followed when operating the machine:

- It is strictly prohibited to run the engine indoors or in poor ventilated places to avoid inhaling toxic carbon monoxide in the exhaust;
- Before starting the engine, always check before operation (see P8) to avoid injury or damage.
- The engine is firmly installed on the horizontal surface, and the tilt angle should not be over than 20° , otherwise it may lead to fuel overflow and abnormal engine performance;
- Avoiding fire and ensure good ventilation, keep away from flammable items and keep the engine from the building or other equipment at least one meter distance.
- Children and pets must be far away from the operating area. Hot parts and rotating parts can cause severe injury.
- Fill the fuel in a well-ventilated place, Disable the engine before refueling. Explosive gasoline can cause fire, explosion and severe burns;
- Do not overfill the fuel tank (see P14), No fuel in the neck of the refueling port, and the fuel cap should be tightened. In case of fuel splashing, it must be completely cleaned before starting the engine.
- No smoking, no open fires or sparks at refueling sites and fuel storage sites;
- Hot parts (such as muffler) can cause severe burns. Do not touch the engine while operating or just after stopping.
- Don' t touch the high temperature lubrication oil of the hot engine.
- Don' t take away the start assy, or touch any rotating parts while operating;
- Don' t touch the clutch and the connected rotating parts on the engine with automatic clutch while operating. No matter the clutch separation and combination.
- Do not run the engine in wet or rainy places;
- Untrained people are not allowed to operate the engine and equipment;
- Do not tamper with governor setting to increase maximum engine speed. Both overspeed and overload are hazardous.
- Without permission, never change the structure or adjust the fixed parts of the engine.

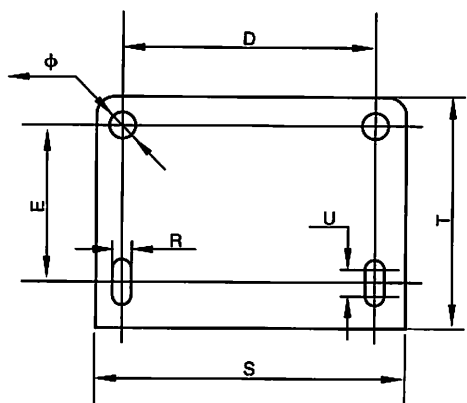
IV. Engine Installation



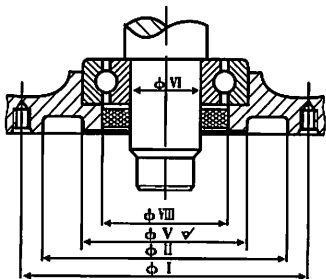
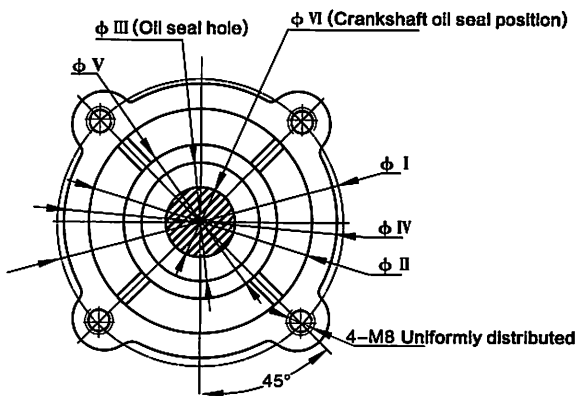
Right view



Front View



Mounting base



Connection Seat, Output

Installation Dimensions (Unit: mm)

Type	Dimension	D	E	H	R	U	φ	φ I	φ II	φ III	φ IV	φ V	φ VI	S	T
JA168FA/P, JA168FB/P JA170F/P		162	80	106	10	5	10	92	73.5	41.25	85	51.5	25	185	104
JA173F/P, JA177F/P		195	90	133.5	11	12.5	10.5	113	87.5	46	100	55	30	220	133
JA182F/P, JA188F/P JA190F/P		195	95	133.5	13.5	17	11	127	110	52	120	60	35	220	144
JA192F/P		215	95	133.5	13.5	17	11	127	110	52	120	60	35	220	144

1. Notes for engine installation

- ① The engine shall be mounted and fixed firm on a horizontal surface . Do not operate this engine exceeding maximum 20°angle of operation; Insufficient lubrication could damage the engine.
- ② If the engine and the applied machinery use direct connection mode, the rotating shaft and engine crankshaft should have the same axially .
- ③ Should let the installed engine run only the output torque, mustn't thrust the crankshaft axially. Meanwhile should minimize the engine crankshaft radial bending force which lead to engine start difficulty, increase useless power and reduce the engine life.
- ④ Keep safe distance between the engine and the applied machinery. Especially the the high-temperature parts of the engine would burn out some parts (such as plastic parts, etc.) and cause fire disaster.

2. Installation of the engine remote control throttle

(1)Throttle Remote Control can be realized by connecting a cable. The self-lock screw nut should be loosen before connecting a cable. (Picture 2)



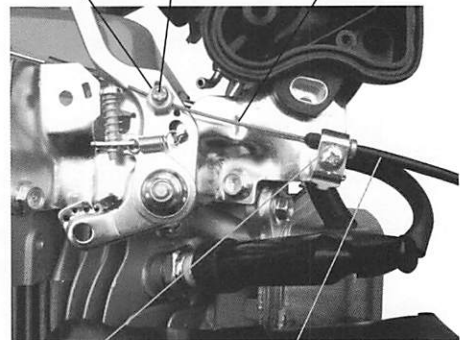
Self-locking nut

Picture 2

(2)Remove the air filter assy.

(3)The throttle cable is composed of two parts: moving cable and fixed hose. In Picture 3, The throttle is at idle speed position when the hose is fixed by the press plate. Lightly pull the moving cable through the post straight, and finally lock it with M4 lock screw. After adjusting the engine idle speed , release the M4 lock screw again to loosen the active cable.

Cable post
M4 self-lock screw nut
Movable cable



Press plate

Fixed hose

Picture 3

V. Engine Operation

DANGEROUS

Do not run the engine indoors or poor ventilated place. Engine exhaust gases contain poisonous carbon monoxide. Carbon monoxide is odorless and colorless, and can cause unconsciousness or death if inhaled.

1. Preparation

Check the engine before running.

(1) Check the appearance condition

- Check the appearance and bottom, for leakage (including fuel and lubricating oil);
- Check whether there is too much the engine, yes remove the engine;
- Check whether the joints of the external bolts are fastened;
- Check whether the shutdown switch action is normal and reliable.

CAUTION

- Incorrect repair or no repair of the problems found before the engine starts, may cause mechanical failure, resulting in serious injury;
- Check and fix the problems found before each start.

(1) Check the engine condition

① Check the engine lubricating oil volume (see P14)

The oil warning system (optional) automatically turns off the engine when the lubricating oil level is below the safety limit. To avoid the inconvenience caused by accidental engine shutdown, check the lubricating oil level before starting. It is recommended to add engine oil to the highest liquid level before starting.

② Check the lubricating oil level of R-type clutch deceleration model gearbox (see P15)

CAUTION

No oil in the new engine crankcase, and no lubricating oil in the gearbox of the R-clutch deceleration model.

If the engine is running at a low oil level, it may be seriously damaged. The failure caused by lubrication oil shortage can not be repaired free under guarantee.

③ Check the air cleaner (see P16)

The dirty air filter core will prevent air from entering the carburetor, causing engine starting difficulties and reducing the power of the engine. It will also increase the fuel consumption. In serious cases, the engine may even be damaged due to overheating and carbon deposition.

CAUTION

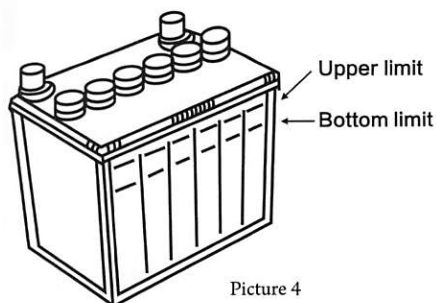
Never run the engine without air filter element as well as element damage and the dirty things enter into the engine. This will speed up engine damage, which can not be guarantee.

④ Check the fuel volume (see P14)

Fully fill the fuel tank and avoid adding during engine operation.

(3) Initial use of the battery (only electric starting type)

Before the first use, fill the electrolyte for each unit of the battery
The electrolyte level of shall be between the upper and lower limits (Picture 4)



Picture 4

⚠ WARNING

The battery electrode is highly corrosive and avoid splashing on skin and clothes

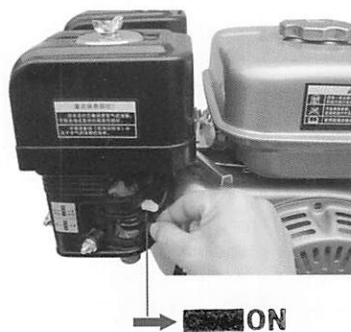
The battery electrode is highly explosive and keep away from any open fire and spark

NOTE

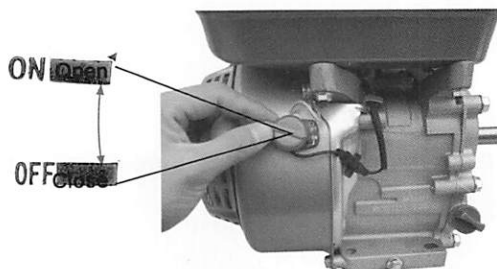
The new battery can be only charged about 70% of the battery just adding electrolyte. To extend the life of the battery, please charge it by electricity for the first engine running. Consult with local dealers for charging method.

2.Engine Start

- ① Move right the throttle to the ON position (Picture 5);
- ② Turn the Engine Switch to the ON position. (Picture 6);



Picture 5



Picture 6

Engine Operation

- ③ Move the throttle control handle to the left position which is about the one fourth of the maximum opening of throttle. For the engine with the auto clutch, the position is about one eighth of the maximum opening of the throttle.



High Speed ← Low Speed

Picture 7

(1) Cold Engine Start

- ① Move the choke to the left and completely close it (Picture 8)



Close ←

Picture 8

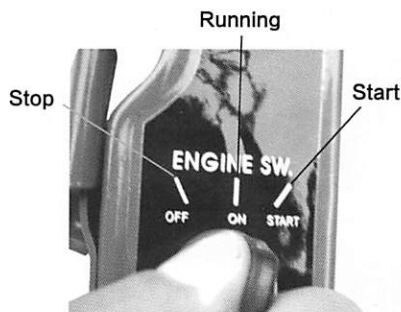
NOTICE

Not all engines need to close the choke for starting. Some high-end engines need not to close the choke before starting. (except in extreme cold weather).

- ② Slowly pull out the starter handle until you feel resistance (Picture 9) then pull it quickly, slowly release the start handle. For the electrical start engine, use the key to start the engine. First turn the key to ON position, then turn it to the starting position (START) for about 3 seconds (Picture 10). The engine will be started electrically and the key should be released after starting. The key will return to the ON position automatically.



Picture 9



Picture 10

The starting motor should not be run for too long time (usually not more than 8 seconds), Otherwise it will be easily damaged.

The good technology engine can be recoiled started within three times (within 5 seconds for electric start engine). If engine can't be started by recoiling when the choke is fully closed, the choke control handle should be half-closed. The choke control handle can be fully opened if necessary. The position of choke control level depends on the different engine models and external temperature.

NOTICE

If the engine could not be started from many times (more than 5 times) when the choke control is fully closed. This may cause too much fuel to enter the cylinder and wet the spark plug. In this case, the spark plug must be fully dried and drain out the fuel from the cylinder, otherwise the engine can not be started.

③ After the engine starts, the choke should be opened immediately (Picture 11)

(2) Warm engine starts

Start the warm engine and the control choke can be close about 1 / 3, Besides, The starting method of warm engine is as same as that of the cold engine.



→ Open Picture 11

3. Operation after Engine Start

(1) Open the Control Choke Level

The Control Choke Level should be fully opened as soon as engine starts.

When starting a cold gasoline engine in a cold place, the choke level should be delayed to open slowly. The delay time should be reasonably decided according to the operation condition. The choke should be half-closed or 1/3 closed. (Some high-end engines do not need this operation) The larger the displacement, the longer the engine needs preheating time. But the preheating time is generally not more than 15 seconds, otherwise the engine will stop because of the high fuel concentration for a long time.

(2) Engine Warming up

After cold start, the throttle should not be opened quickly or put the load on the engine. The engine should be run at the idle speed for 3~5 minutes before opening the throttle quickly and put on the load. The first start new engine should be run for 15 minutes above at the medium speed without load.

(3) Engine Rotary Speed Adjustment

Adjust the position of the throttle handle according to the load to obtain the desired speed.

The model equipped with an automatic clutch should not keep its speed at the clutch separation critical point for a long time, otherwise the clutch may be burned out.

VI. ENGINE STOP

CAUTION

- In case of emergency shutdown, just turn off the shutdown switch.
- Unless in an emergency, it is strictly prohibited to stop quickly at high speed or under load to avoid engine damage!

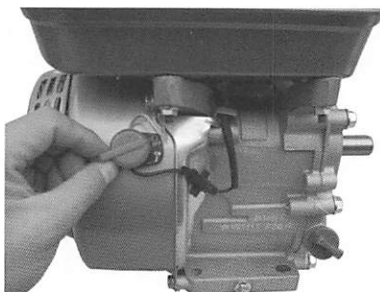
1. The throttle control handle slowly closes the throttle (commonly known as throttle) to the idle state (Picture 12);
2. Run the engine without load for about 5 minutes, then turn off the engine switch to the OFF position (Picture 13);

For electric starting type, put the switch key on the OFF position (OFF) (Picture 14);

3. Move the fuel switch to the OFF position (Picture 15).



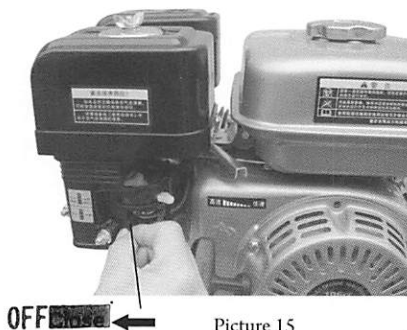
Picture 12



Picture 13



Picture 14



Picture 15

VII. MAINTENANCE

1. Maintenance Importance

Good maintenance is the basis of safe, economical and comfortable operation of the engine, It can reduce fuel consumption and reduce air pollution

CAUTION

Without proper maintenance or repairing the existing failures, This will lead to the serious mechanical problems.

The maintenance described in this chapter only includes routine inspection and maintenance with general tools, and the complicated maintenance should be done by the professionals.

The maintenance cycle described in this chapter are only applicable to normally operating engines. If the engine is used in abnormal conditions, such as high ambient temperature and used in wet or dusty areas, the maintenance period should be shortened.

In order to ensure the best performance of the engine, if you need to replace the vulnerable parts or other parts during the maintenance process, it is best to use the genuine parts or the same quality ones provided by the manufacturer or the authorized distributors or dealers..

2 . Maintenance Intervals

Period Maintenance Items	Each Use	The first month or the 50h	The third month Or 150h	The Sixth month or 500h	The First year or 1000h	Fixed Period
Engine lubricating oil ★	I	R				R/100h
Fastening of the bolts and nuts	I				I	
Air filter △	I	C		C	C	
Fuel tank					C	
Spark plug		I	I	I	I	
Oil Hose	I					R/年
Muffler				I		C/500h
Engine rotary speed ※						A/500h
Engine idle speed						A/500h
Inlet and Outlet Valves Cleaning ※						I/500h
Combustion Chamber Cleaning						I/500h
Settling Cup				C	C	
Valve Clearance ※			I		I	
Battery						1/月

Symbol definition in the table:

1. check, clean, adjust, tighten, supplement or replace; C cleaning; R replace; A adjustment.

※ Maintenance should be operated by the professionals from the authorized service center of Ji Ao brand engines.

△ More frequently check and clean in the dusty environment.

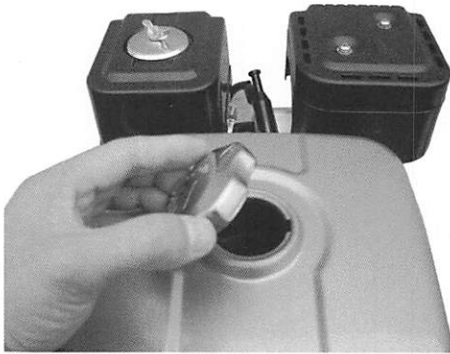
★ When used in a heavy dusty environment (such as road cutting machine, etc.), replace the lubricating oil after the first 20 hours and replace the lubricating oil every 50 hours later.

3. Fuel oil filling

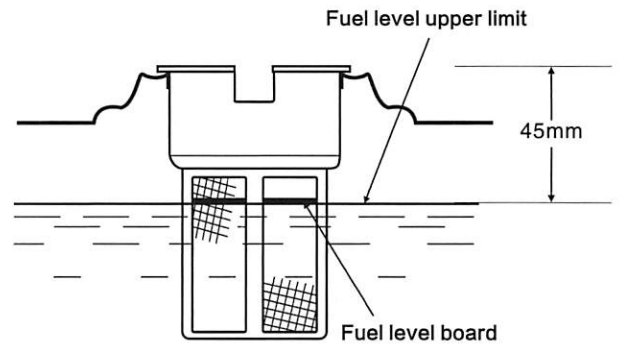
Stop the engine before refueling make sure the engine is cooled before operating. Open the tank cap (Picture 16) Refuel through fuel tank from the refueling port. The upper oil level limit shall not exceed the red limit of the fuel tank filter screen.(Picture 17) Fuel level upper limit of the model without filter screen. It shall be 45mm below the top of the oil tank port.

⚠ DANGEROUS

- Gasoline is flammable and explosive, and may be burned when handling it;
- Shut down the engine, stay away from the heat source, fire source, etc.;
- Refueling in outdoor ventilated place;
- Wipe the spilled fuel clean immediately.



Picture 16



Picture 17

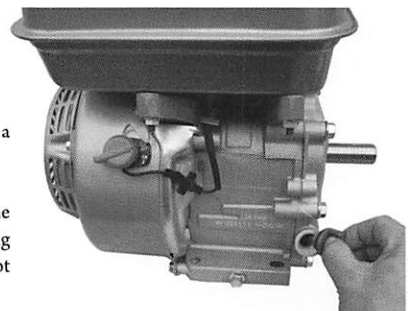
PAY ATTENTION TO

- Oil can corrode paint and rubber, and try not to splash out when refueling. Damage caused by fuel splash is not under warranty
- It is best not to use alcohol fuel (see P23).

4. Treatment of the engine lubricating oil

(1) Inspection of the lubricating oil

- Before checking the engine lubricating oil level, first shut down the engine in a horizontal position. Remove the oil gauge (Picture 18) and dry it;
- Insert the oil gauge into the gas tank, but don't screw it. Read the lubrication from the tropstick Oil level. If the oil level is near the lower limit, add the qualified lubricating oil to the upper limit of the oil port (With the engine horizontal placement does not overflow)(Picture 19)
- Tighten the engine oil gauge.



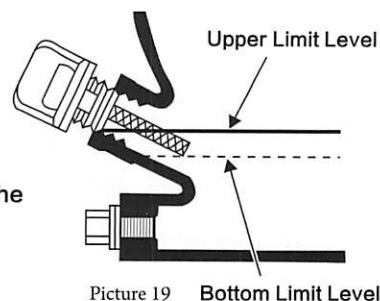
Picture 18

NOTICE

- Frequently check the engine lubricating oil level.
- Engine operation under the lubrication oil shortage will lead to the serious damage.

(2) Lubrication Oil Replacement

- Recommend : SAE10W-30 gasoline engine oil
- Drain the oil just after the engine stop. The engine oil is warm and it can be drained easily and it can clean the inside of engine. This can both speed up the speed of oil release, draining out the warm oil can clean the inside engine.

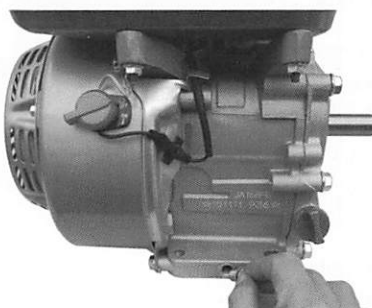


Picture 19 Bottom Limit Level

⚠ CAUTION

The temperature of Lubrication Oil of hot engine is very high and it will burn. Keep away from the hot lubrication oil.

- First tilt the engine slightly toward the oil releasing direction, and then spin out the oil release plug; (Picture 20)
- Replace the aluminum pad and oil release plug and tighten it until there is no any more oil coming out.
- Put the engine horizontally and refuel fresh lubricating oil to the upper limit of the oil port.



Picture 20

5 . Handling of transmission oil ("R" clutch reducer only)

(1) Check the transmission oil

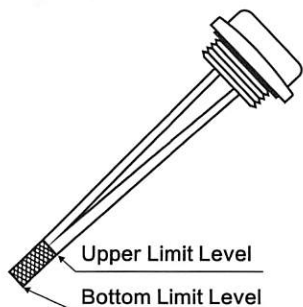
- Put the engine horizontally when shutdown, unscrew the transmission oil gauge and wipe Dry it (Picture 21)
- Insert the oil ruler into the refueling port, do not screw it;
- Take out the oil gauge and read out the liquid level of the lubricating oil. The correct liquid level should be between the upper and lower cutting lines of the oil gauge (Picture 22). If the oil level is near the lower limit, add it to the upper oil gauge level.



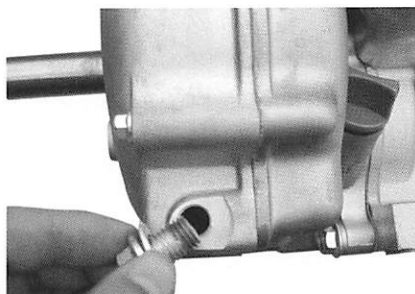
Picture 21

(2) Replacement of the transmission oil

- The recommended lubricating oil grade is SAE 10W-30. Position the engine horizontally, screw out the oil drain plug; (Picture 23)
- Wait for a while until there is no any oil coming out. Then put the aluminum gasket and tighten the plug.
- Add the fresh lubrication oil to the upper limit level.(Picture 22)



Picture 22



Picture 23

6 . Air Filter Assy. Maintenance

The air filter absorbs a lot of dust after period of time. Too much dust will lead to engine power decline, fuel consumption increase and start difficult. The air filter element should be replaced more frequently especially in the heavy dusty environment.

Maintenance of the semi-dry air filter

(1) Loosen the butterfly nut of the air filter cover. Loosen the butterfly nut of the air filter element. Take out the element assembly. Add the fresh lubrication oil to the upper limit level. (Picture 22)

(2) Take out the element from the air filter assembly. Check both the paper and foam element and replace them if there is any damage.

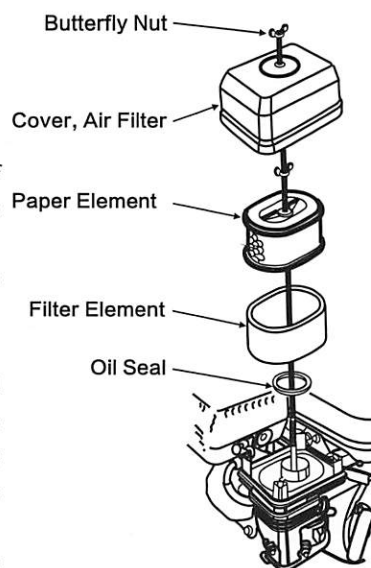
(3) If there is no any damage, just clean them.

① Wash the foam filter element with a solvent mixed with detergent, clean and dry it completely. Put a few drops of clean engine oil on the dry foam filter element and squeeze it evenly. A small amount of oil adsorbed on the foam filter element can adsorb dust in the air. But the amount of engine oil can not be too much, otherwise it may cause the air filter blocking.

② Gently tap the paper filter element to remove the dust on it. If possible, it is better to use compressed air to blow off the dust from the paper filter element. Never use a brush or water to clean the paper filter element. Paper filter element is a disposable consumable. If it is too dirty to be cleaned, just replace it.

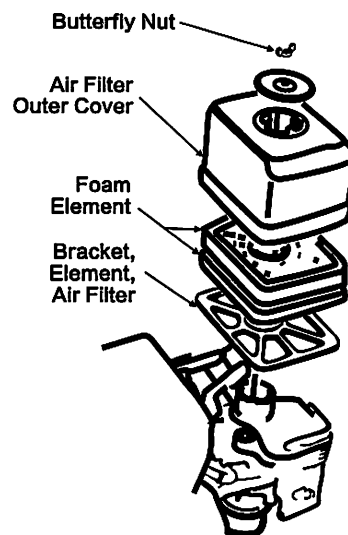
(4) Clean the bottom of the air filter and the air channel with a wet cloth, and pay attention not to let the dust enter the air channel when cleaning.

(5) Put the foam filter element outside the paper filter element and reinstall the empty filter. Ensure put the seal washer under the air filter element during assembly. Screw the butterfly nut on the air filter assembly then put the cover back. The last step is to screw the butterfly nut on the air filter cover.



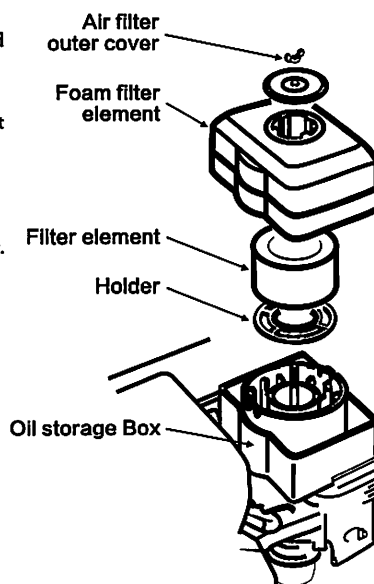
Maintenance of the Full-wet Air Filter

- (1) Loosen the butterfly nut and remove the air filter cover. Remove the bracket and take out the two-layer element.
- (2) Wash two-layer foam filter element with a solvent mixed with detergent, then clean and dry it completely.
- (3) Put a few drops of clean engine oil on the dry foam filter element and squeeze it evenly.
- (4) Wipe the outer cover and air duct with a clean and wet mop.
- (5) Replace the foam element, bracket and outer cover. Then tighten the butterfly screw on the cover.



Maintenance of the oil bath type air filter

- (1) Loosen the butterfly nut and remove the air filter cover. Pull the foam filter element from the air filter cover.
- (2) Wash the foam filter element with a solvent mixed with detergent, then clean and dry it completely.
- (3) Put a few drops of clean engine oil on the dry foam filter element and squeeze it evenly.
- (4) Wipe the outer cover and air duct with a clean and wet mop.
- (5) Dump the dirty oil in the oil storage box and clean it with the inflammable solvent. Then dry it completely.
- (6) Add clean engine oil in to the storage box to the oil level mark.
- (7) Replace the foam element into the cover, install the bracket on the oil storage box.
- (8) Then tighten the butterfly screw on the cover.



7. Maintenance of spark plugs

Recommended spark plug trademark and model no. (see P4)

NOTICE

- Do not remove the spark plug of the hot engine
- Wrong spark plug may damage the engine

- Failure to tighten the spark plug may cause the engine overheating and damage.

- ① Carefully pull off the spark plug cap (Picture 24), and unscrew the spark plug with the spark plug sleeve (Picture 25);



Picture 24



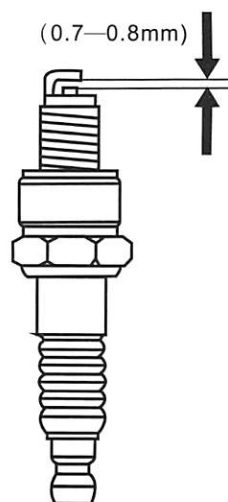
Picture 25

- ② Check the spark plug, if there is obvious erosion or insulation damage then replace it. If it is workable, you can use a wire brush to remove the carbon accumulation on the surface.
- ③

Check the spark plug electrode clearance with a thick and thin gauge. If the gap is incorrect, adjust the bent side electrodes. The correct clearance shall be between 0.7-

- ④ 0.8mm (Picture 26).

In order to prevent the thread and tooth extraction, the spark plug should be carefully inserted by hand, then tightened with the spark plug sleeve.

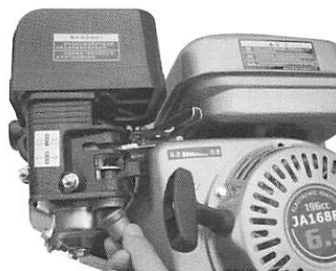


Picture 26

8. Maintenance of the Carburetor Settling Cup(Engines above the 242ml displacement model do not have the cup)

Too much dirt deposited in the settling cup will block the oil circuit or carburetor and it will result in engine start difficulties or abnormal performance.

- ① Turn off the fuel switch and remove the settling cup and O-ring (Picture 27);
- ② Wash the settling cup and O-rings with a non-flammable solvent and then dry them thoroughly.
- ③ Put back the O-ring and settling cup;
- ④ Tighten the settling cup.
- ⑤ Open the fuel switch and observe if there is a leakage. If yes, replace the O-ring.



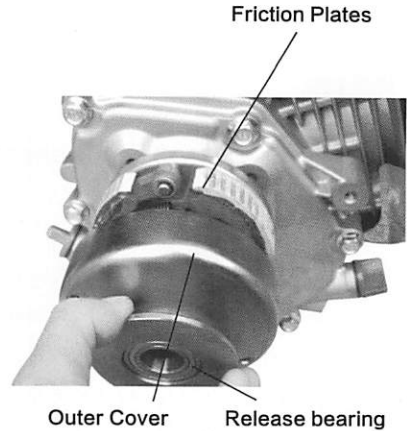
Picture 27

9. Maintenance of External dry automatic clutch (optional)

The machine should be maintained regularly.

- ① Remove the clutch pressing bolts and remove the clutch cover (Picture 28).
- ② Check the bonding part of the friction plate and spring. If loose or corrosive, replace immediately.
- ③ Check the surface of the friction plate for serious ablation or carbonation. If yes, replace it.
- ④ Brush the dust and carbide of the friction plate's surface. Clean the friction plates and internal round surface of clutch with a dry mop.

Refill grease after cleaning the detached bearing.



Picture 28

10. Engine Idle Speed Adjustment

Idle speed is the minimum rotary speed which engine can run stable. The idle speed of Ji Ao brand gasoline engine is at 1440 ± 50 rpm (crankshaft speed). Check and adjust the engine idle speed otherwise the engine start performance can be influenced.

- (1) After engine warming up, move the throttle level to the right end.
- (2) Adjust the engine speed to the idle speed with a cross screw driver (Picture 29) Without the tachometer, the engine idle speed can be judged according to experience. The engine equipped with the automatic clutch can be adjusted until the clutch can be completely separated.



Picture 29

11. Battery Maintenance

- ① The electric starting engine can charge the battery itself. The electrolyte level of each cell should be checked frequently (See Page 9), and distilled water should be added in time if there is a shortage.
- ② When the engine is not used for a long time, the battery should be recharged every month. Otherwise, the battery will be damaged due to serious power loss.

12. Check Warning Signs

Various safety warning labels should be frequently checked for integrity and clarity. If the label falls off or the words are fuzzy, contact the local distributor or dealer to replace a new ones.

VIII. Storage and transportation

1. Cleaning

The engine shall be cleaned before storage.

- The engine must be disabled and cooling down before cleaning because the engine in operation or just stopped may shrink sharply and deform when suddenly touching cold water.
- It is best to wipe it carefully with a very dry, squeezed towel. Never water the electrical parts nor rinse it with pressure water. Otherwise it will damage both the electrical parts and air filter.

Storage and Transportation

It will damage some electrical parts and air filters, and the engine would be seriously damaged if water enters into the cylinder.

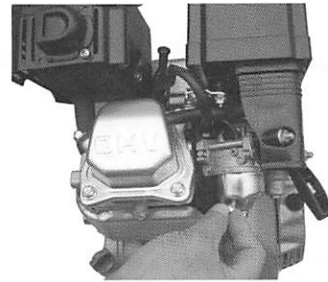
NOTICE

- The failures caused by the wrong methods of cleaning are not be guaranteed.

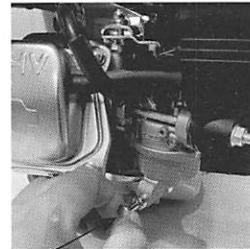
2. Storage

If the engine is not used for a long time, it must be handled before storage. Otherwise, it will be difficult to start when use it again. It may also cause damage to the carburetor due to fuel cementation.

- ① Close the Fuel switch, drain the fuel in the carburetor by loosening screw bolts (Picture 30), Draining out fuel of the carburetor with a rapid fuel draining kit, Close the fuel valve, then pull out the fuel needle valve (See Picture 31) and rotate it of 90° clockwise. Keep the needle valve in fuel draining position until fuel are totally discharged. Rotate the needle valve of 90° counterclockwise to reset it in close position. The fuel switch must be kept shutting during storage.
- ② Remove the spark plug, inject 8-10 drops of clean oil into the hole, put back the spark plug and tighten it. Recoil the handle more than 5 times then stop until feel the maximum resistance. At this time, the piston should be at the top end and the inlet and exhaust valves are closed completely.



Picture 30



Pull out the needle fuel valve to drain out the fuel

Picture 31

NOTICE

- The above operation can prevent cylinder, piston ring, and valve parts from corrosion due to lack of lubricating oil. It can also prevent the cylinder parts from corrosion caused by the humid air entering into the cylinder.
 - It is normal that the blue smoke exhausted when start engine again because there is some lubrication oil remained in the cylinder head.
- ③ Package it in a carton and place it in a dry and ventilated place.

NOTICE

It is not suggested to pack the engine in a plastic bag for a loght time because the airtight plastic bag will rust the engine by humiidty.

3. Transportation

Before transporting the engine from a distance, both the remained fuel and oil must be drained completely. For short distance transportation, the switch should be closed. It is strictly prohibited to overtill or reverse the engine too much, otherwise it may cause fuel spill, and oil may enter into the combustion chamber and cause the engine start difficulty.

IX. Common Failures and Troubleshooting Methods

1. Engine Start Fails

Check Steps	Causes	Solution
Check Engine Switches	The fuel Switch is not opened	Turn on the fuel switch (ON)
	The choke is not closed	Turn off the fuel switch (CLOSED)
	The Engine switch is off (OFF position)	Turn on the engine switch (ON)
Check the fuel	Fuel is ran out	Refill the fuel
	Fuel deterioration	Drain the deteriorated gasoline from the tank and carburetor then refuel the fresh fuel
Check the oil	Shortage of oil	Add enough engine oil (P14)
Check the spark plug	Spark plug broken, dirty or Incorrect gap	Clean, adjust the spark plug gap, or replace the spark plugs
	Spark plugs are wet with fuel oil	Fully dry the spark plug before putting it back
Check the air filter	The air filter element is dirty or wet by the lubricating oil	Clean and dry the air filter element
Send the failed engine to the distributor or dealer	Ignition system, carburetor, fuel supply system, no compression pressure in the cylinder	Repair or replace the failed parts as needed

2. Insufficient Engine Output Power

Check Steps	Check Steps	Solution
Check the air filter	The filter element is dirty or wet with lubricating oil	Clean and dry the air filter element
Check the fuel	Fuel deterioration	Drain the deteriorated gasoline from the tank and carburetor and refuel the fresh fuel
	Carburetor failure, parts abrasion, ignition system failure, combustion chamber leakage	Repair or replace the failed parts as needed

3. Engine Exhausts Black Smoke

Check Steps	Check Steps	Solution
Check the air filter	The air filter element is dirty or wet by the lubricating oil	Clean and fully dry the air filter element
Check the spark plug	Spark plug broken, dirty or improper spark plug gap	Clean, adjust the spark plug gap, or replace spark plug
Send the failed engine to the distributor or deale	Send the failed engine to the distributor or dealer	Repair or replace the failed parts as needed

Common Failures and Troubleshooting Methods

4. Engine Exhausts Blue Smoke

Check Steps	Causes	Solution
Check lubrication oil level	Too much lubricating oil	Drain the excessive oil
Check the engine mounting level	The engine tilt angle is too large	Put the engine horizontally
Unscrew out the spark plug to check the combustion chamber	The engine has once been put upside down and it causes the lubricating oil to run into the combustion chamber	Clean the combustion chamber and the spark plug, and drain the remaining oil in the carburetor
Send the failed engine to the distributor or dealer	Piston, piston ring, cylinder wear seriously Inlet and Outlet valves oil seal failure	Repair or replace the failed parts as needed

5. Unstable or Failed Engine Speed Adjustment

Check Steps	Causes	Solution
Check the control spring and reset pull spring	Speed adjustment spring and reset pull spring are stuck or fallen off	Reinstall the speed regulating spring and reset the pull spring
Check the Carburetor Throttle	The throttle is stuck or not closed tightly	Repair the carburetor
Send the failed engine to the distributor or dealer	The sleeve is off, the gear is damaged, the arm is loose and the carburetor is blocked	Repair or replace the failed parts as needed

6. Engine Electric Start Failed

Check Steps	Causes	Solution
Check the battery	Battery electricity is too weak	Charge the battery again
	The battery is damaged	Replace the battery
Check the connections	Joint is rusty or loose	Clean the rusty places and reconnect
Send the failed engine to the distributor or dealer	Relay is damaged, starting motor failed, and electric door lock is in poor contact	Repair or replace the failed parts as needed

7. Clutch Release Failed

Check Steps	Causes	Solution
Check the engine idle speed	The idle speed is too high	Turn down the engine idle speed
Check the friction plate reset spring	The friction plate reset spring falls off or stuck	Reinstall the reset spring correctly
Check the release bearings	Release bearings fail or damage	Clean and lubricate the release bearings or replace them

X. Other Technical Specifications

1. Carburetor Main Jet should be adjusted to suit the plateau area

In the plateau area, if we use the standard carburetor kit, the air-fuel ratio will be too high to decrease the engine performance meanwhile increase the fuel consumption. Furthermore, heavy carbon deposition will happen in the combustion chamber shortly. The dirty spark plug can lead to engine start difficulty and high temperature.

Operating this engine at 1800m altitude or above, the carburetor main jet should be adjusted to suit for the atmospheric pressure in plateau area.

Though the carburetor main jet is adjusted, the engine power would still decrease by 3% for every 300 meters increase of altitude.

Without any adjustment, the engine power decrease will much more than this.

NOTICE

- High altitude carburetor kit should be replaced to the standard one which suits for the plain area below 1800 altitude. Otherwise the air-fuel mixture is too low to make the engine overheat and damage the engine.
- The adjustment of carburetor kit can only be operated by professionals in the technical department of manufacturer called Yu Rui Company. The adjustment can be checked and inspected with the special equipment.

2. Alcohol Fuel

Alcohol Fuel indicates the gasoline mixed with ethanol and the pure ethanol fuel.

- ① All of the parameters of JI AO brand gasoline engine such as compression ratio, ignition time, valves timing, carburetor flow, air-fuel ratio are designed only for gasoline fuel.
- ② The corrosion of alcohol fuel to the oil hose, rubber parts of carburetors and some metal parts has not been tested by experiments.
- ③ Therefore, the long-term use of alcohol fuel may adversely affect the engine performance and accelerate the engine damage.

NOTICE

The engine failure caused by the alcohol fuel can not be warranted. The manufacturer Yu Rui company can not guarantee the engine damaged by the ethanol fuel.

3. Special Application Engines

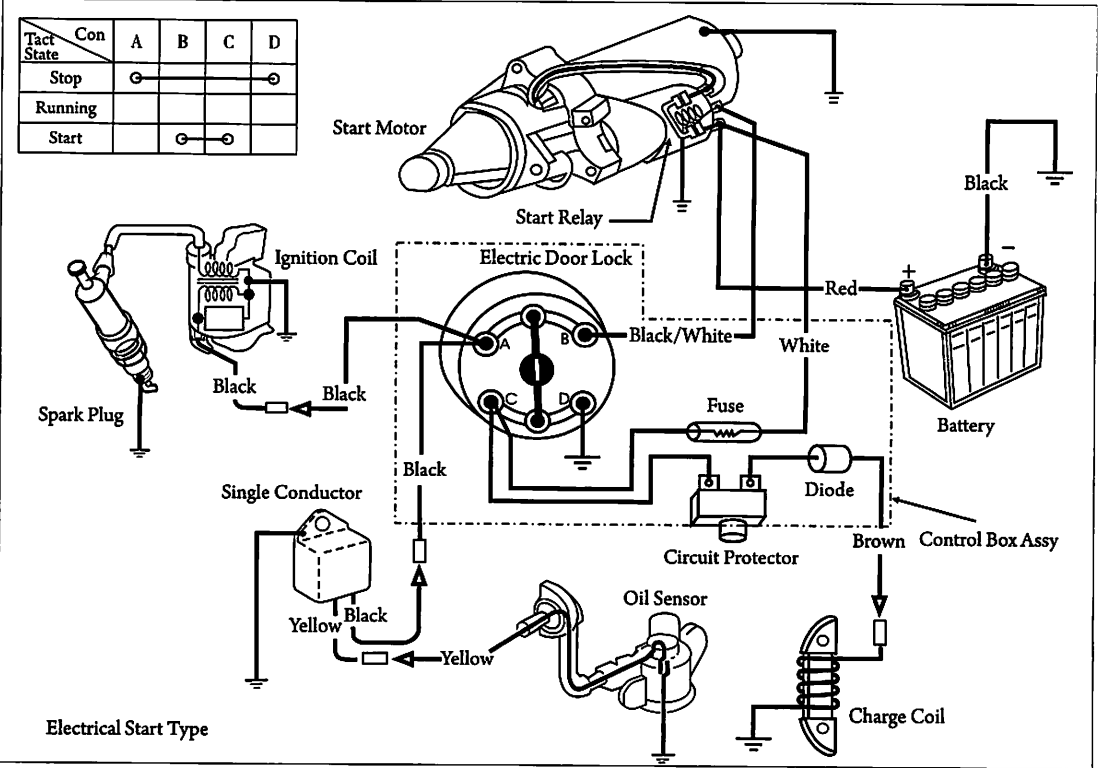
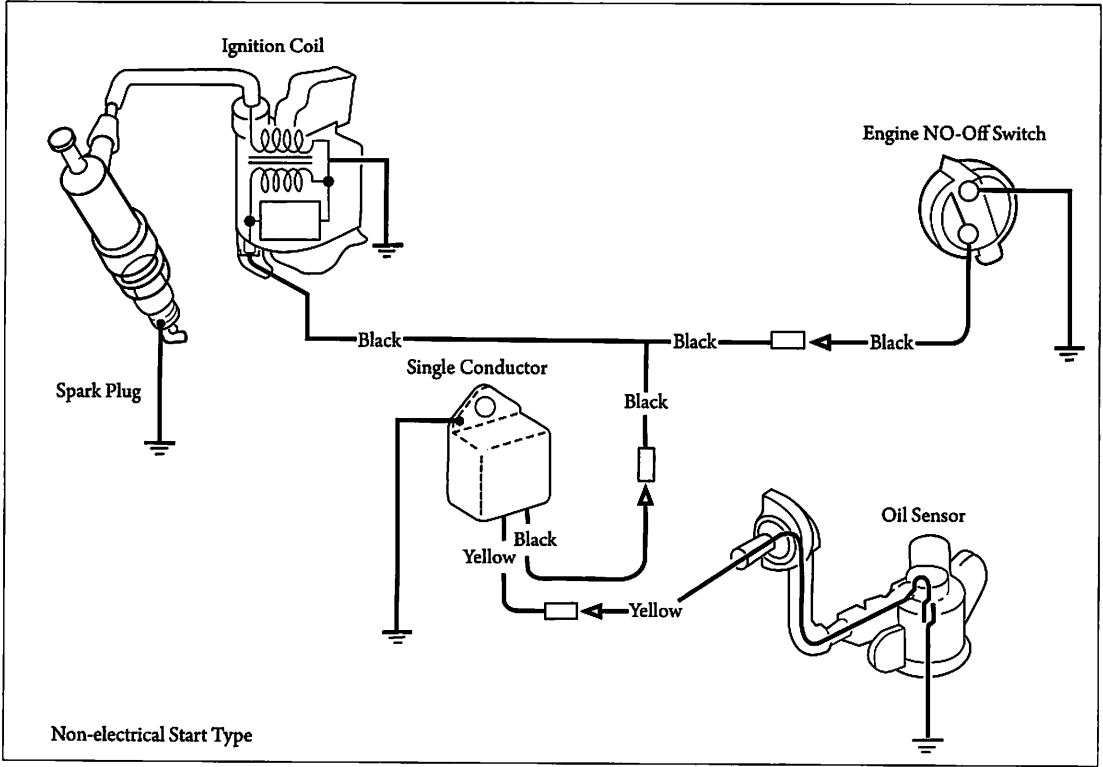
The content of this manual is only for the general applied engines. For special application engines such as that for generators, the performance testing methods and the appearances have some differences.

Appendix I Engine Performance Parameters

Model No Item	JA154F/P	JA160F/P	JA168FA/P	JA168FB/P	JA170F/P
Bore* Stroke (mm)	54 × 38	60 × 42	68 × 45	68 × 54	70 × 54
Displacement (ml)	87	118	163	196	208
Oil Capacity (L)	0.35	0.6			
Fuel capacity (L)	2.5	3.1			
Maximum no-load rotation speed(rpm)	4050				
Rated Power Kw / 3600rpm	1.8	2.4	3.0	3.8	4.3
Maximum Power Kw / 3600rpm	1.9	2.6	3.3	4.2	4.6
Lubricating oil consumption rate: g / kw.h	≤ 6.5				
Idle Speed (rpm)	1450 ± 150				
Overall Dimension (mm) (Length, width and height)	320x250x300	341x350x318	360x279x328	362 × 293 × 328	
Net Weight (Kg)	11	13	15.5	16	

Item \ Model No	JA173F/P	JA177F/P	JA188F/P	JA190F/P	JA192F/P
Bore* Stroke (mm)	73 × 58	77 × 58	88 × 64	90 × 66	92 × 68.5
Displacement (ml)	242	270	389	420	455
Oil Capacity (L)	1.1				
Fuel capacity (L)	5.6				
Maximum no-load rotation speed(rpm)	3850				
Rated Power Kw / 3600rpm	4.9	5.3	7.8	8.5	9.0
Maximum Power Kw / 3600rpm	5.2	5.8	8.5	9.3	10.3
Lubricating oil consumption rate: g / kw.h	≤ 6.5				
Idle Speed (rpm)	1450 ± 150				
Overall Dimension (mm) (Length, width and height)	420 × 315 × 425		455 × 361 × 431		458x361x435
Net Weight (Kg)	25		31.5		32

Appendix II Electrical Schematics



Warranty

If the gasoline engine you purchased is unqualified in manufacturing, the company will provide the warranty according to this Warranty Details as described below.

I. Warranty Content

If the Ji Ao brand products you have bought were unqualified in both materials or manufacturing procedures, we will repair the machines free of charge. (hereinafter free repair is called warranty), which means that the parts can be replaced or repaired free.

II. Warranty Period

The period of warranty is within one year from the date of purchase, or 1000 hours of cumulative running time (whenever comes first)

III. Other warranty issue

The components and parts quality can be guaranteed by the manufacturers' policy.

IV. Machine Failures can not be guranteed;

Any failures caused by:

1. Operation and maintenance are not carried out in strict accordance with the requirements and instructions of the manual;
2. Failure to carry out regular inspection and maintenance according to the requirements of the instructions or continue to run the gasoline engine with hidden quality hazards;
3. Exceed the maximum working load of the product;
4. Reform the product or adjust the important parts without permission
5. Unqualified parts and lubrication oils are used to the machines.
6. Failures caused by careless operation;
7. The aging phenomenon (the appearance of baking paint, metal coating and other surface surface) after a period of using.
8. Uncomfortable feelings (sound, vibration, oil taste, etc.) have no influence on engine performance.
9. Problems caused by force majeure

V. The following expenses are not covered during the warranty period

1. Consumables (air filter element, gasket, friction plate, piston ring, etc. and so on) and oil;
2. Vulnerable parts (spark plug, recoil starting rope, starter wheel, oil seal, etc.);
3. Repair in places other than manufacturer's dealers or after-sales service department;
4. Cost of inspection, cleaning, adjustment and regular overhaul and maintenance;
5. Inconvenience or loss caused by the inability to use the machine (such as loss of business suspension or commercial loss, etc.);
6. Compensation for expenses other than the conditions specified in this Warranty Issues, etc.

VI. Warranty Area and Products

1. Warranty is only applicable to the Ji Ao brand products used in China;
2. The warranty is not applicable to the Ji Ao brand products which are purchased privately in China and smuggled abroad.

VII. Warranty Procedures

When the warranty is required, please bring the product and warranty certificate to the dealer or a after-sales service department for repair. It will not be repaired without the warranty certificate.

VIII. Warranty coming into effective

The warranty comes into effective from the date that the users buy the engine and get the signed and sealed warranty certificate from the distributors or dealers of manufacturer.



Chongqing Yi Rui Engine Company Ltd.

Warranty Certificate ---- Ji Ao Brand Gasoline Engine

Type No		Engine Identification Number	
Date of Sale		Sales Invoice	
Customer Details	Name	Sex	Age
	Address	Telephone Number	
	Application		
Distributor or Dealer	Company Name	Contact	
	Address		
	Telephone Number		
Remarks	This certificate will be used as an important evidence for warranty, please send the first copy back to Chongqing Yu Rui Engine Co., Ltd.; the second copy to distributor; the third copy is kept by the user.		

The First Copy To the end user

Please confirm and tick(√) the following items when delivery.
You need to check the items one by one and confirm by √ as well as sign your name and date in the bottom line.

Item	Details	Confirmation
1	User's Manual	
2	Parts Specifications and operation	
3	Check items before operation	
4	Engine Starting Steps	
5	Engine Stopping Steps	
6	Mandatory Period Maintenance	
7	Engine Operation Methods	
8	Methods of Transportation and Storage	
9	Normal trial operation of engine	

I hereby understand and accept the above contents of each item.

Signature	Date
-----------	------

Warranty Certificate ---- Ji Ao Brand Gasoline Engine

Type No		Engine Identification Number	
Date of Sale		Sales Invoice	
Customer Details	Name	Sex	Age
	Address	Telephone Number	
	Application		
Distributor or Dealer	Company Name	Contact	
	Address		
	Telephone Number		
Remarks	This certificate will be used as an important evidence for warranty, please send the first copy back to Chongqing Yu Rui Engine Co., Ltd.; the second copy to distributor; the third copy is kept by the user.		

The Second Copy To the end user

Please confirm and tick(√) the following items when delivery.
You need to check the items one by one and confirm by √ as well as sign your name and date in the bottom line.

Item	Details	Confirmation
1	User's Manual	
2	Parts Specifications and operation	
3	Check items before operation	
4	Engine Starting Steps	
5	Engine Stopping Steps	
6	Mandatory Period Maintenance	
7	Engine Operation Methods	
8	Methods of Transportation and Storage	
9	Normal trial operation of engine	

I hereby understand and accept the above contents of each item.

Signature	Date
-----------	------

Warranty Certificate ---- Ji Ao Brand Gasoline Engine

Type No		Engine Identification Number	
Date of Sale		Sales Invoice	
Customer Details	Name	Sex	Age
	Address	Telephone Number	
	Application		
Distributor or Dealer	Company Name	Contact	
	Address		
	Telephone Number		
Remarks	This certificate will be used as an important evidence for warranty, please send the first copy back to Chongqing Yu Rui Engine Co., Ltd.; the second copy to distributor; the third copy is kept by the user.		

The Third Copy To the end user

Please confirm and tick(√) the following items when delivery.
You need to check the items one by one and confirm by √ as well as sign your name and date in the bottom line.

Item	Details	Confirmation
1	User's Manual	
2	Parts Specifications and operation	
3	Check items before operation	
4	Engine Starting Steps	
5	Engine Stopping Steps	
6	Mandatory Period Maintenance	
7	Engine Operation Methods	
8	Methods of Transportation and Storage	
9	Normal trial operation of engine	

I hereby understand and accept the above contents of each item.

Signature	Date
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