

CRAFTOP®



Owner's Manual

Gasoline Engine

GE160, GE200, GE210



EXPERTS
IN EQUIPMENTS OF
GARDENING AND AGRICULTURE

ENGLISH
VERSION: 00-202110

We thank you for buying CRAFTOP Gasoline Engine

This gasoline engine provides advanced technology and powerful energy in incorporating many convenient features for you to perform your daily work.

Before attempting to use this gasoline engine, please read this manual carefully until you completely understand and can follow all safety rules, precautions, operating and maintenance instructions. It will help you both to become more familiar with this gasoline engine and to recognize and avoid situations that could endanger you and others. **Careless or improper use may cause serious or even fatal injury!**

If you have any question about your gasoline engine and this manual, please contact your local authorized dealer or service center. They always welcome your questions, suggestions, and constructive criticism.

We hope you enjoy this gasoline engine and wish you many years of safe and enjoyable work with it.

CRAFTOP CANADA LTD.

Table of contents

Guide to use this manual	1
Product overview.....	3
Technical specification	6
Safety precautions and instructions	7
Assembly.....	11
Engine oil.....	11
Fuel and fueling.....	12
Gearbox lubrication	13
Air filter	14
Preparation.....	14
Start and stop the engine	15
Operation.....	16
Exhaust control system	17
Maintenance and care.....	18
Repair.....	22
Storage.....	22
Disposal.....	24
Troubleshooting guide.....	25
Electrical diagram.....	30

Guide to use this manual

This Owner's Manual refers to a CRAFTOP gasoline engine, also called a machine and/or product in this Owner's Manual.

All information, specifications, descriptions and illustrations in this manual are as accurate as known at the time of publication, but are subject to change without notice. Due to ongoing product development, there may be difference between your machine and the information in this manual. No legal obligations or commitments can be delivered from the information, specifications, descriptions, or illustrations in this manual.

Illustrations are only for orientation and are merely used to help explain the text descriptions and instructions. Illustrations may include optional equipment and accessories, and may not include all standard equipment.

Some signs or symbols on the machine may be a little different refer to special certification requirements for certain markets.

Any technical modifications to the machine that were introduced after the editorial deadline please consult your local dealer for more supplementary information.

All safety precautions and instructions described in this manual should be observed during operation of the gasoline engine, and all applicable federal, state and local safety regulations, standards, and ordinances should be observed as well.

Do not sell, lend or rent the machine without this owner's manual. Always be sure to include this owner's manual together with this machine, and make sure that

anyone using it understands the information contained in this manual.

Signs and symbols in this manual

DANGER

Texts with this symbol contain information regarding hazardous situations which will cause death or severe injures if not avoided.

WARNING

Texts with this symbol contain information regarding hazardous situations which could cause death or severe injures if not avoided.

CAUTION

Texts with this symbol contain information regarding hazardous situations which could cause minor or moderate injures if not avoided.

NOTICE

Texts with this symbol information regarding situation which could cause gasoline engine damage if not avoided.

information

Texts with this symbol contain supplementary information.



Warning or Alert!

Special safety precautions must be observed when working with this machine because it has high speed rotation parts, uses flammable fuel, and exhausts poisonous fumes.



Read and understand the Owner's Manual.

Read this Owner's Manual carefully, make sure that you completely understand and can follow all safety rules, precautions, operating and maintenance instructions before attempting to use this machine, failure to do so may cause serious or even fatal injury!



Wear proper clothing.



Eye and ear protection required.

Always wear appropriate safety goggles or safety glasses with side shields, and ear plugs or ear muffers as well when operating this machine.



Hair protection required.

Operator who has long hair should tie up and confine long hair with a hair net, cap, or hard hat for instance.



Respiratory protection required.

Wear proper respiratory protection to protect you from chemical solvents, aerosols, oils, mold, and other more harmful airborne particles or allergens that may go unseen.



Hands protection.

Always wear appropriate gloves when you handle chemical detergent or operate gasoline engine.



Foot protection required.

Wear shoes or boots with anti-slip soles in your working area.



Fire hazard.

Risk of fire.
Flammable material or their fumes may catch fire easily if near heat, flames or sparks.



No smoking.

Do not smoke in this area.



Toxic Fumes.

Chemicals contained in the engine exhausts can cause cancer and birth defects and other reproductive harm.



Poisonous.

The skull and crossbones symbol means the product is poisonous or has/produce poisonous material. Licking, eating, drinking, or smelling a substance marked with this symbol can make you very sick or even cause death.



Risk of Asphyxiation.

This engine exhausts carbon monoxide, an odorless, colorless poison gas. Breathing carbon monoxide can cause nausea, fainting or even death. Only use this machine in a well ventilated outside area.

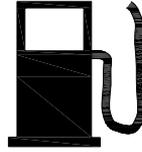


Warning of hot surface.

Contact may cause burn.
Do not touch!

Signs and symbols on the machine

For the purpose of safety operation and maintenance, the meanings of signs and symbols may be attached to or embossed on the machine.



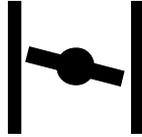
The port to top up fuel.

Position: Fuel cap



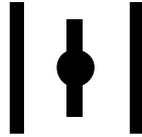
The port to top up engine oil.

Position: Oil cap



Choke control.

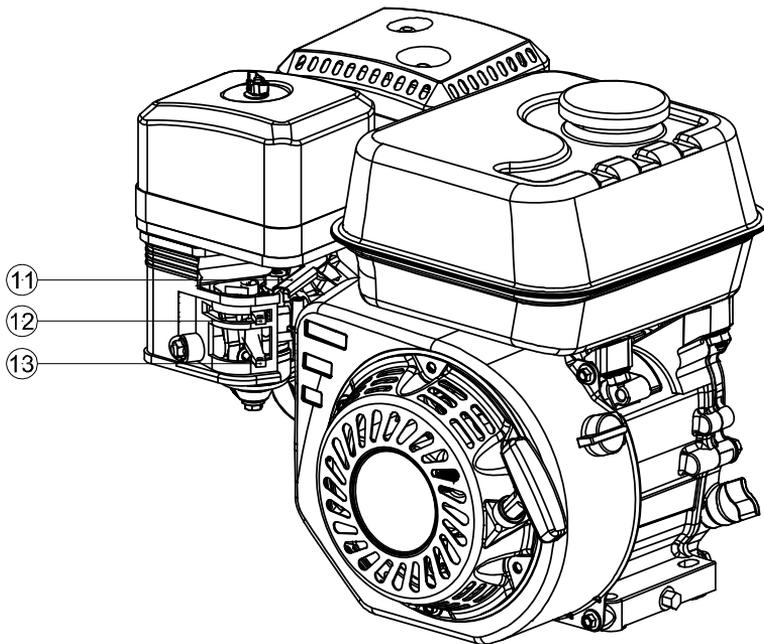
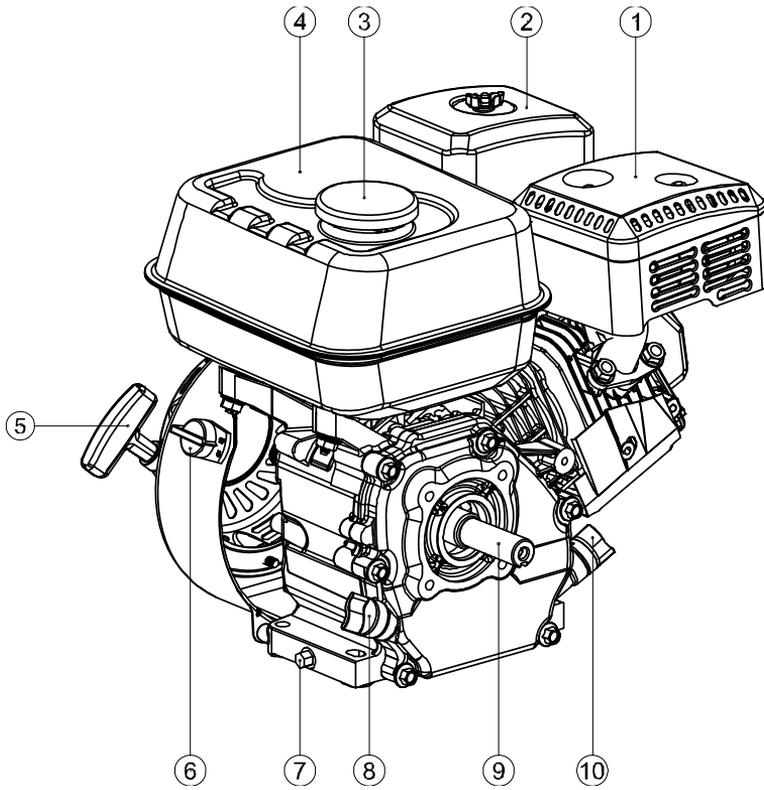
Choke closed.
“Cold start” position.

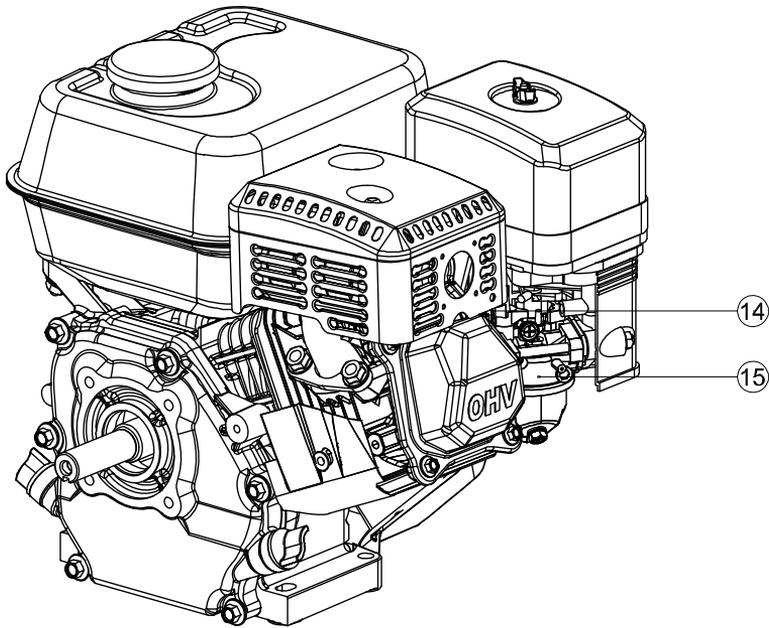


Choke control.

Choke open.
“Run” position.

Product overview





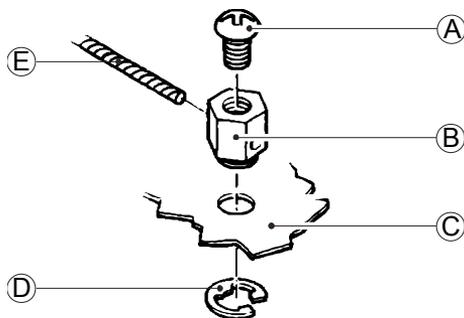
- | | | | | | |
|---|-----------------------|----|------------------------|----|----------------|
| 1 | Muffler | 6 | Engine switch | 11 | Throttle lever |
| 2 | Air filter | 7 | Engine oil drain plug | 12 | Choke lever |
| 3 | Fuel tank cap | 8 | Engine oil cap | 13 | Fuel valve |
| 4 | Fuel tank | 9 | Power takeoff shaft | 14 | Spark plug |
| 5 | Recoil starter handle | 10 | Reduction gear oil cap | 15 | Carburetor |

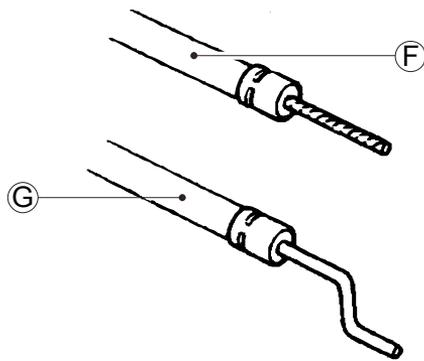
Control connection of remote distance (option)

The holes in levers of both the choke and throttle valve are used for mounting optioned steel wires, the illustrations below show how to mount a solid steel wire and a meshed steel wire. If choosing a meshed steel wire, a return spring is needed.

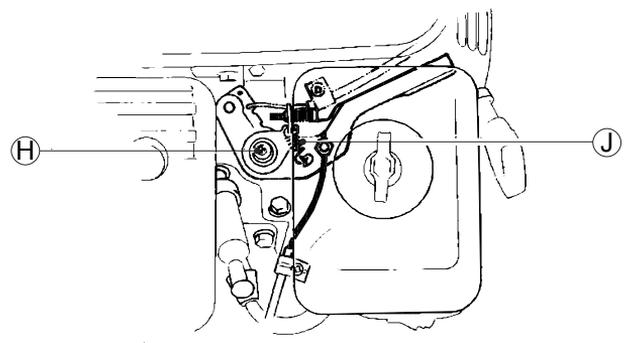
If necessary you may unscrew damping nut on the throttle valve lever slightly when controlling the throttle valve by a remote-controlled steel wire.

Accessory Options:

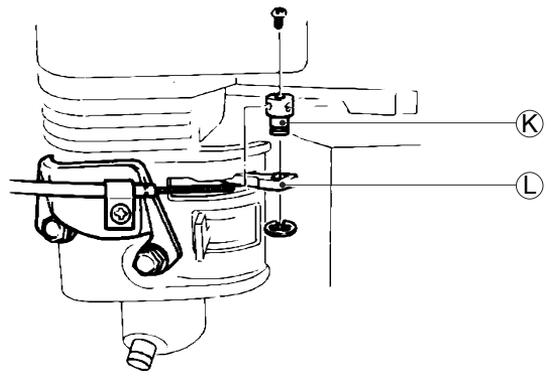




Remote-Controlled Throttle:



Remote-Controlled Choke:



- | | | |
|-------------------|--------------------------------|--------------------------------|
| A. 4mm screw | E. Wire | J. Throttle lever friction nut |
| B. Wire holder | F. Flexible wire core mounting | K. Wire holder |
| C. Throttle lever | G. Solid wire core mounting | L. Choke lever |
| D. 5mm clip ring | H. Return spring | |

Technical specification

Model		GE160	GE200	GE210
Description	Unit	Specification		
Product dimension	mm	365x320x330	365x320x330	365x320x330
Package dimension	mm	390x330x380	390x330x380	390x330x380
Net weight	kg	15	15	15
Gross weight	kg	16	17	17
Application temperature	°C	-5°C to 45°C	-5°C to 45°C	-5°C to 45°C
Engine type		single cylinder, forced air cooling, 4-stroke, OHV gasoline engine		
Rated Power (output)	kW/rpm	3.1/3600	3.8/3600	4.2/3600
Maximum torque	Nm/rpm	8.8/2500	11/2500	12/2500
Fuel consumption	g/kW.h	≤395	≤395	≤395
Oil consumption	g/kW.h	≤6.5	≤6.5	≤6.5
Lowest idling speed	rpm	1600±100		
Noise	dB(A)	105	105	105
Cylinder diameter	mm	68	68	70
Piston journey	mm	45	54	55
Displacement	cc	163	196	212
Fuel Tank Capacity	L	3.6	3.6	3.6
Oil Capacity	L	0.6	0.6	0.6
Compress ratio		8.5:1		
Lubrication mode		Force Splash		
Start mode		Recoil start		
Oil specification		SAE10W-30		
Fuel specification		Unleaded Gasoline		
Ignition system		Transistorized Magneto Ignition (T.C.I)		
Output direction of power shaft		Counterclockwise		
Spark plug type		F7TC		

This engine is equipped with a low oil level sensor that shuts down the engine automatically when the oil level drops below a specified level. If the engine shuts down by itself and the fuel tank has enough gasoline, check engine oil level.

information

Technical data vary with type of engine. Specifications, descriptions and illustrations in this manual are as accurate as known at the time of publication, but are subject to change without notice.

Safety precautions and instructions



Special safety precautions must be observed when working with this machine because it has high speed rotation parts, uses flammable fuel, produces high pressure water, and exhausts poisonous fumes.



Before attempting to use this gasoline engine, please read this manual carefully until you completely understand and can follow all safety rules, precautions, operating and maintenance instructions. Careless or improper use may damage the machine and may cause serious or even fatal injury!

Safety precautions

DANGER

- Because this gasoline engine has high speed rotation parts, uses flammable fuel and exhausts poisonous fumes, some special precautions must be observed to reduce the risk of accident and personal injury. Careless or improper use may cause serious or even fatal injury.
- Rotating parts can entangle hair, hands, clothing, feet and/or accessories. Traumatic amputation or severe laceration can result.
- Gasoline is an extremely flammable fuel. If spilled and ignited by a spark or other ignition source, it can cause fire and serious burn injury or property damage. Use extreme caution when handling gasoline. Combustible fuel vapor may escape from the fuel system or container during fueling operations. Do not smoke or bring any fire or flame near the fuel or the machine.
- Do not operate this machine indoors or in inadequately ventilated areas. DO not allow exhaust fumes to enter a confined area through windows, doors, vents or other openings. Engine exhaust contains poisonous emissions and can cause serious injury or death.

WARNING

- Observe all applicable local safety regulations, standards and ordinances.
- Running engines produce heat. Severe burns can occur on contact. Combustible material can catch fire on contact.
- The noise emitted from this machine may be restricted to certain times by national or local regulations.
- Minors should never be allowed to use this gasoline engine. Do not allow other persons near the gasoline engine when starting or operating. Keep bystanders, especially children, and animals out of the work area and keep a safe distance. Close supervision of children is necessary to ensure that they do not enter the work area or play with the machine.
- Never let your gasoline engine run unattended. When it is not in use (e.g., during a work break), shut it off

and make sure that unauthorized persons do not use it.

- The person who use this gasoline engine must be in good physical condition and mental health, and not under the influence of alcohol and drugs. Never use this gasoline engine when you are fatigued, sick, or upset. If you feel tired, take a break.
- The components of this machine may generate an electromagnetic field during operation, which may interfere with some pacemakers. To reduce the risk of serious or fatal injury, persons with pacemakers should consult with their physician and the pacemaker manufacturer before operating this machine. In the absence of such information, CRAFTOP does not recommend the use of this machine by anyone who has a pacemaker.
- The owner of this machine is responsible for avoiding injury to third parties or damage to their property.

CAUTION

Prolonged exposure to cold and/or vibration may result in injury. Read and follow all safety and operation instructions to minimize risk of injury. Failure to follow instructions may result in painful wrist/hand/arm injuries.

Raynaud's Phenomenon may affect the fingers of certain individual if a person is exposed to vibration and cold. Exposure to vibration and cold may cause tingling and burning sensations, followed by loss of color and numbness in the fingers. The following precautions are strongly recommended:

- Keep your body warm, especially the head, neck, hands, wrists, ankles and feet, ,
- Maintain good blood circulation by performing vigorous arm exercises during frequent work breaks.
- Limit the hours of operation, have a rest when you feel tired or fatigued.
- If you experience discomfort, redness, and swelling of the fingers followed by whitening and loss of feeling, consult your physician before continuing exposing yourself to cold and vibration.

Overusing the muscles and tendons of the fingers, hands, arms, and shoulders may cause soreness, swelling, numbness, weakness, and extreme pain in those areas.

- Avoid using your wrist in a bent, extended, or twisted posture. Instead, try to maintain a straight wrist position. Also, when grasping, use your whole hand, not just the thumb and index finger.
- Take periodic breaks to minimize repetition and let your hands have a rest.
- Reduce the speed and force with which you do the repetitive movement.
- Do exercise to strengthen your hands and arm muscles.
- Immediately stop using the machine and other power tools, and consult a doctor if you feel tingling, numbness, or pain in the fingers, hands, wrists, or arms.

Clothing and PPE



WARNING

You must wear proper clothing and approved personal protective equipments (PPE) whenever you use a gasoline engine.



Eye and ear protection required.

Always wear appropriate safety goggles or safety glasses with side shields, and ear plugs or ear muffers as well when operating this machine.



Respiratory protection required.

Wear proper respiratory protection to protect you from chemical solvents, aerosols, oils, mold, and other more harmful airborne particles or allergens that may go unseen.



Hair protection required.

Operator who has long hair should tie up tie up and confine long hair with a hair net, cap, or hard hat for instance.



Hands protection.

Always wear appropriate gloves when you operate gasoline engine.



Proper clothing.

Clothing must be snug-fitting but allow complete freedom of your movements.

Do not wear loose clothing, jewelry, scarf, necktie, or anything that could get caught in moving parts of the machine.



Foot protection.

Wear shoes or boots with anti-slip soles in your working area.

Personal protective equipments can not eliminate the risk of injury, but it will reduce the degree of injury if an accident does happen. Ask your local dealer for help in choosing the right equipments.

Long-time or continuous exposure to high noise levels may cause permanent hearing impairment. Always wear approved hearing protection when operating a gasoline engine.

Handle your gasoline engine safely



WARNING

This gasoline engine is to be used only by qualified operators. Minors and untrained persons should never be allowed to use this machine.

Under any circumstance, you should not modify the original design of the gasoline engine without approval from the manufacturer. Always use genuine spare parts. Unauthorized modifications or accessories may lead to serious or even fatal injury.

Under any circumstance, you should not operate your gasoline engine if it is damaged, improperly adjusted or maintained, or not completely or securely assembled. Always inspect the gasoline engine before each use, and replace the parts immediately if it is worn, loose, leaking, damaged or missing.

- Always disconnect spark plug wire and place wire where it can not contact spark plug to prevent accidental starting when setting up, transporting, adjusting or making repairs except carburetor adjustments.
- Never operate the machine in an explosive atmosphere. Only operate the gasoline engine only in a well-ventilated outdoor area and far away from windows, doors, and vents.. Never start or run the engine inside a closed room or building. Engine exhaust contains poisonous emissions and can cause serious injury or death. DO not allow exhaust fumes to enter a confined area through windows, doors, vents or other openings.
- During operation, the machine should keep at least one meter away from building walls or other equipments, keep away from inflammables such as gasoline, matches and so on to avoid possibility of fire.
- Never operate the machine at any times when your field of vision might be limited and it would be difficult to maintain a clear view of the working area.
- During rain, storms at times of strong or gale-force winds, or at any other times when weather conditions might make it unsafe to use this machine.
- Do not allow any material to block the cooling slots.
- Locate the engine on a level-working platform to avoid fuel's spilling out.
- Maintain footing and balance at all times. Do not stand on slippery, uneven or unstable surfaces. Do not operate the gasoline engine in odd position or on a ladder or ladders.
- Keep exhaust area clear of flammable debris. Avoid contact hot surfaces during and immediately after operation.
- Do not use a high pressure washer to clean gasoline engine. The solid jet of high pressure water may damage parts of the machine.

Maintain in good work order



CAUTION

All gasoline engine service, other than the items listed in the maintenance section of this manual, should be performed by authorized service dealer or competent gasoline engine service personnel.



WARNING

Only use high-quality replacement parts in order to avoid the risk of accidents and damage to the power tool. If you have any questions in this respect, consult an authorized dealer or service center. CRAFTOP

recommends the use of genuine spare parts. They are specifically designed to match your model and meet your performance requirements.

- To reduce the risk of injury, always shut off the engine before carrying out any maintenance or repairs or cleaning the machine, only excepts carburetor and idle speed adjustments.
- Check the machine for loose/missing nuts, bolts, and screws. Tighten and/or replace as needed.
- Do not turn the engine over on the starter with the spark plug boot or spark plug removed since there is otherwise a risk of fire from uncontained sparking.
- Check fuel system for leaks due to fuel tank damage, especially if the machine is dropped accidentally. If damages or leaks are found, do not use the machine any more, otherwise serious personal injury or property damage may occur. Have your machine repaired by an authorized dealer or service center before using.
- Check the fuel filler cap for leaks at regular intervals.
- Check the engine oil level is located at the proper position.
- To reduce the risk of fire, do not service or store your machine near open flames.
- Use only a spark plug type which is approved by CRAFTOP and make sure it is in good condition.
- Inspect the ignition lead (insulation in good condition, secure connection).
- Check the condition of the muffler. To reduce the risk of fire and damage to hearing, do not operate your machine if the muffler is damaged or missing.
- Do not touch the muffler, spark plug, or other metallic parts of the engine while the engine is running or immediately shutting down, otherwise burn injury will result.

Transporting your gasoline engine

Avoid accidental starting. Transport or move the machine only with empty fuel tank. To avoid getting burns or fire, be sure the engine is shut off and cool down completely before transporting the machine.

When transporting your gasoline engine in a vehicle, properly secure the machine to avoid turnover, fuel spillage and damage.



WARNING

Do not incline the engine so as to avoid spilling fuel. Spilled fuel or fuel vapor may ignite to cause fire.

Handle fuel with caution

You gasoline engine use a unleaded gasoline for fuel.



WARNING

Gasoline is an extremely flammable fuel. Pay high attention when fueling, storing or handling, otherwise serious personal injury may result.



If spilled and ignited by a spark or other ignition source, gasoline can cause fire and serious burn injury or property damage.



Do not smoke or bring any fire or flame while handling fuel or while operating the gasoline engine. Note that combustible fuel vapor may escape from the fuel system.

- Fuel used in this gasoline engine is poisonous. Always wear approved breathing protection when decanting fuel.
- Handle fuel and refuel in a well ventilated outdoor area on bare ground; store fuel in a cool, dry well ventilated place; and use an approved, marked container for all fuel purposes. Wipe up all fuel spills before starting the machine.
- Eliminate all sources of sparks or flame(i.e. smoking, open flames, or work that can cause sparks) in the areas where fuel is mixed, poured, or stored. Always shut off the engine and allow it to cool down before refueling.
- Always use with caution when handling fuel. Wipe up all spills and then move the gasoline engine at least 10feet (3 meters) from the fueling point before starting the engine.
- Always shut off the engine before refueling, let the machine cool in a non-combustible area, not on dry leaves, straw, paper, etc. Do not fuel a hot engine – fuel may spill and cause a fire.
- Loose a bit of the fuel cap carefully so as to allow any pressure build-up in the fuel tank to release slowly and avoid fuel spillage.. Never remove the fuel cap when engine is running!
- Fuel your machine only in well ventilated areas. If you spill fuel, wipe the machine immediately. If fuel spills on your clothing, change it immediately.
- Tight the fuel cap securely to the proper position, make sure it does not loosen or come off due to the machine vibrations.
- To reduce the risk of serious or fatal burn injuries, check for fuel leakage. If fuel leakage is found, do not start or run the engine until leak is fixed.
- Do not inhale fuel fumes as they are toxic.
- Store the machine and fuel in an area where fuel vapors cannot reach sparks or open flames from water heaters, electric motors or switches, furnaces, etc.

Before starting the engine

A area within a minimum radius of 50feet (15m) from the using the machine should be considered as a hazardous area, into which on one should enter. If necessary, yellow warning rope and warning signs should be placed around the perimeter of the area. When work is to be performed simultaneously by two or more persons, special care should also be taken to constantly look around or otherwise check for the presence and locations of other people working, so as to maintain sufficient safety distance between each person.

Before starting the engine, check that your machine is properly assembled and in good condition:

- The machine may only be used when all parts are in proper working order. Never operate your gasoline engine if it is modified, damaged, improperly adjusted or maintained, or not completely or securely assembled. Never run the gasoline engine with a modified or disconnected governor. Never attempt to modify the controls or safety devices in any way.
- Check the fuel system for leaks, paying high attention to visible parts such as the fuel tank cap, fuel line and drain plug. If there are any leaks or other sign of damage, do not start the engine because of potential risk. Have your machine repaired by an authorized dealer or service center before using it again.
- Check that the spark plug boot is securely mounted on the spark plug. If a loose boot may cause arcing which could ignite combustible fumes and cause a fire.
- Check the engine switch, choke lever and throttle lever for proper function.
- Keep all switch and lever dry and clean, free from oil and dirt – for safe control of the machine.

When starting the engine

WARNING

Your gasoline engine is designed to be operated by one person only. Do not allow other persons in the work area even when starting.

- Do not operate this gasoline engine in temperatures below 5°C. Operating gasoline engine under the temperature of 5°C may cause damage engine parts. Damage to gasoline engine by user misuse is not covered under warranty.
- Start the engine at least 10feet (3m) from the fueling point, at a well-ventilated area, outdoors only.
- Keep bystanders, especially children and animals at least 50feet (15m) from the operating point. If you are approached, immediately stop the engine and engage the trigger locking latch on the spray gun.
- Place the machine on firm ground in an open and well ventilated area. Make sure you have good balance and secure footing.
- When you pull the starter rope handle, do not wrap the starter rope around your hand. Do not allow the rope to snap back by itself, but guide the starter rope slowly back to permit the rope to rewind properly. Failure to follow this procedure may result in injuries to your hand or fingers and may damage the starter mechanism.

information

When a new machine is first operated, in the first few minutes grease may come out of the gear case. But, since this is excessive grease, there is no cause of alarm. Just wipe it off with the engine stopped for next use

During operation

WARNING

Moving parts can amputate fingers or cause severe injuries. Keep hands, clothing and loose objects away from all moving parts. Always stop engine, disconnect spark plug, and make sure all moving parts have come to a complete stop before removing obstructions, clearing debris, or servicing unit.



To reduce the risk of fire resulting in serious or fatal injury or property damage, never spray flammable or combustible liquids.



In the event of impending danger or in an emergency, switch off the engine immediately by pressing the engine stop switch backward to STOP position, and engage the trigger locking latch.

- Always carry related tools, equipments, spare parts, and consumables with you:
 - Attached tools in the product package.
 - Personal protective equipments.
 - Properly reserved fuel
 - Spare parts.
 - Things to notify your working are (rope, warning signs, etc.).
 - Whistle (for collaboration or emergency).
- Keep proper footing and balance at all times. Special care must be taken in slippery conditions and when working on slopes or uneven ground.
- To reduce the risk of stumbling and loss of control, do not walk backward while operating the gasoline engine.
- To reduce the risk of injury from loss of control, never operate the gasoline engine while standing on a ladder or on any other unstable support.
- Check that there are no bystanders, children, and animals in the general work area. If someone comes:
 - Guard against hazardous situations at all times. Warn adults to keep children and pets away from your working area. Be careful if you are approached. Injury may result from high pressure sprays.
 - If someone calls out or otherwise interrupts you while working, always be sure to shut off the spray gun and the engine before turning around. Avoid operating which people, especially children are nearby.
- Always be aware of surroundings and stay alert for possible hazards that you may not hear due to the noise of the machine.
- Make sure you always have good balance and secure footing. Place your feet slightly apart (slightly further apart than the width of your shoulders), so that your weight is distributed evenly across both legs, and always be sure to maintain a steady, even posture while working.
- Take special care in slippery conditions (wet ground), on slopes or uneven ground.

- Watch out for obstacles (hose, plants, bricks, etc.) which could cause you to trip or stumble.
- Be particularly alert and cautious when wearing hearing protection because your ability to hear warnings (shouts, alarms, etc.) is restricted.
- To reduce the risk of accidents, take sufficient break in good time to avoid tiredness or exhaustion.
- Work calmly and carefully in daylight conditions and only when visibility is good. Stay alert so as not to endanger others.
- To reduce the risk of serious or fatal injury from breathing toxic fumes, ensure proper ventilation when working in trenches, hollows or other confined locations.
- To reduce the risk of accidents, stop work immediately in the event of nausea, headache, visual disturbances (e.g. reduced field of vision), problems with hearing, dizziness, deterioration in ability to concentrate. Apart from other possibilities, these symptoms may be caused by an excessively high concentration of exhaust gases in the work area.
- Operate your machine so that it produces a minimum of noise and emissions. Do not run the engine unnecessarily, accelerate the engine only when working. To avoid noise complaints, in general operate the machine between 8AM and 5PM on weekdays, and 9AM to 5PM on weekends, detail please refer to your local regulations.
- Do not operate your machine in the starting throttle position because engine speed cannot be controlled in this position.
- To reduce the risk of fire, do not smoke while operating or standing near your machine. Note that combustible fuel vapor may escape from the fuel system. Always clean plant residue, chips, debris, leaves and excess lubricant off the engine and muffler. Note that stop the engine before you perform the cleaning work.
- Check the fuel system in particular for leaks and make sure the safety devices are working properly. Do not continue operating your machine if it is damaged. In case of doubt, consult your local authorized deal or service center.
- The muffler and other parts of the engine (gear box, fins of the cylinder, spark plug) become hot during operation and remain hot for a while after stopping the engine. To reduce risk of burns, do not touch the muffler and other parts while they are hot. Keep the area around the muffler clean.
- Before leaving the machine unattended: Shut off the engine.

After finishing your work

- Shut off the engine after finishing work.
- After the engine cool down, wipe away water with dry cloth, always clean dust and dirt off the machine. Do not use any grease solvents for this purpose.
- Do not use a pressure washer to clean gasoline engine. The solid jet of high pressure water may damage parts of the machine.

Assembly

This model is factory assembled.

This machine ships from our factory without engine oil. It must be properly serviced with fuel and oil before operation. If you have any questions regarding the gasoline engine, please contact local authorized dealer or service center.

Proper PPE are required when you unpack the box.

Engine oil

! NOTICE

New gasoline engine has no engine oil in crankcase when they are delivered out of factory.

Do not attempt to crank or start the engine before it has been properly filled with the recommended type and amount of engine oil, otherwise damage to the gasoline engine may result.

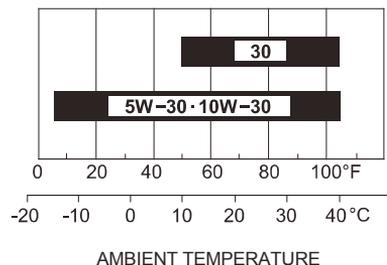
Always check the engine oil level before starting the engine, on a level surface.

! NOTICE

Engine oil is a key factor in deciding the engine's performance. Do not apply engine oil with additives or 2-stroke gasoline oil, as they haven't enough lubrication, which may shorten the engine's service life.

The recommended engine oil type is SAE 10W-30, oil crankcase capacity is 0.6L.

As viscosity varies with regions and temperatures, so the lubricant has to be selected in accordance with our recommendation.

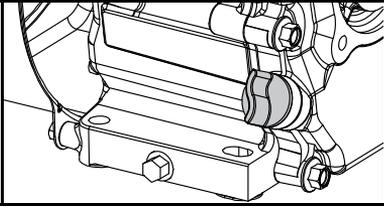


! NOTICE

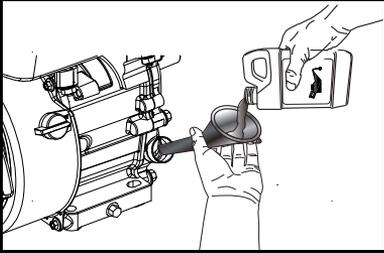
Weather will affect engine oil and engine performance. Contact your authorized dealer or service center to change the type of engine oil used based on local weather conditions to suit the engine needs.

Add engine oil

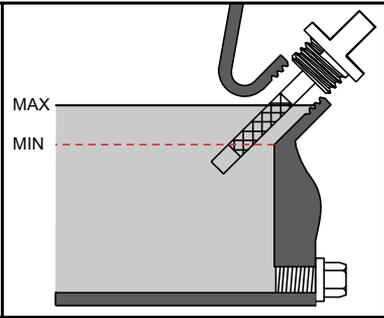
1. Place the gasoline engine on a flat level surface. Make sure the engine is turned off.
2. Clean the oil gauge dipstick/cap and the area around it to ensure that no dirt falls into the crankcase.



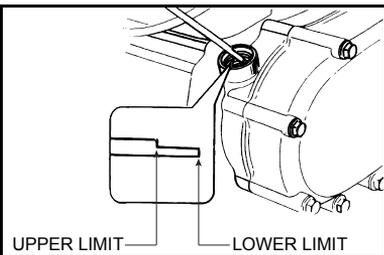
3. Turn the oil gauge dipstick/cap counterclockwise, remove it and clean it with a clean cloth.
4. Add engine oil into the crankcase through the oil gauge dipstick/cap installation port (a fuel funnel may be needed here). Do not overfill.



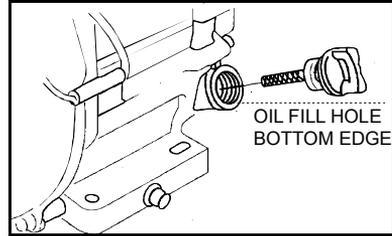
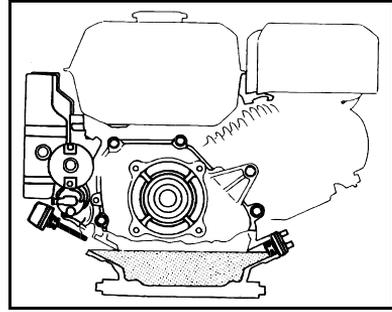
5. Fully reinsert the oil gauge dipstick without screwing in and pull it out to check the oil level.



6. If the oil level is just at MIN marker or below, refill SAE 10W-30 oil through the dipstick hole until the oil level is between MIN and MAX marker.



7. Reinstall the oil gauge dipstick and securely tighten it by turning clockwise.



NOTICE

Run with insufficient engine oil may damage the engine severely.

Fuel and fueling

NOTICE

New gasoline engine has no engine oil in crankcase when they are delivered out of factory.

Do not attempt to crank or start the engine before it has been properly filled with the recommended type and amount of engine oil, otherwise damage to the gasoline engine may result.

Always check the engine oil level before starting the engine, on a level surface.

Fuel

WARNING

Gasoline is very flammable. Avoid smoking or bringing any flame or sparks near fuel. Make sure to stop the engine and allow it cool down before refueling the machine. Select outdoor bare ground for fueling and move at least 3 m (10 ft) away from the fuming point before starting the engine.

The recommended fuel type is unleaded gasoline with a minimum octane rating of 86 and an ethanol content of less than 10% by volume.

Using unleaded gasoline will decrease the possibility of producing carbon deposit and prolong the engine's service life.

This is a 4-cycle engine and does not require a gas/oil mixture. There is a separate reservoir for gas and a separate reservoir for oil.

NOTICE

Do not use mixed oil with gasoline for this machine.

- Exhaust emission are controlled by the fundamental engine parameters and components (for example, carburetion, ignition timing and port timing) without addition of any major hardware or the introduction of an inert material during combustion.
- If you use a gasoline of a lower octane value than prescribed, there is a danger that the engine temperature may rise and an engine problem such as piston seizing may consequently occur.
- Unleaded gasoline is recommended to reduce the contamination of the air for the sake of your health and the environment.
- Poor quality gasoline or oil may damage sealing rings, fuel lines or fuel tank of the engine.
- Take care when handling gasoline. Avoid direct contact with the skin and avoid inhaling fuel vapor.

! NOTICE
 Never use used or polluted gasoline or a mixture of gasoline and engine oil. Make sure the fuel is free of dirt and water.

Gasoline containing alcohol

If you decide to use a gasoline containing alcohol (fuel blend), be sure its octane rating is at least as high as that recommended by the company. There are two types of "gasohol". One contains ethanol, and the other contains methanol. Neither gasoline containing more than 10% ethanol nor 5% methanol is allowed to be used. If methanol content in the fuel blend exceeds 5%, it may bring bad effect on the engine performance, besides, it may damage metals, rubber and plastic parts.

! NOTICE

- Handle fuel with care because it can damage plastic and painted surfaces.
- It is normal when you hear occasionally light spark knock or pinking with the engine running under heavy load.
- If you hear spark knock or pinking at a steady speed under normal load, change brand of gasoline; if such phenomenon still happens, consult your dealer for help, otherwise, the engine may be damaged.

Fuel tank

Remove the fuel filler cap and check fuel level.

If the fuel level is too low, refuel the tank. Remember adding fuel not over the fuel filter shoulder.

! WARNING
 Gasoline is extremely flammable and is explosive under certain conditions. Refueling in a well-ventilation area with the engine stopped. Do not smoke and allow flames or sparks in the area where gasoline is stored or where the fuel tank is refueled.

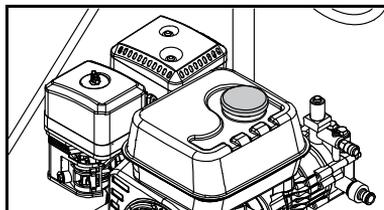
- Do not overfill the tank (there should be no fuel in the filler neck). After refueling, make sure the fuel tank cap is set back securely.
- Be careful not to spill fuel when refueling. Spilled fuel or fuel vapor may ignite. If any fuel is spilled, make

sure the area is dry enough before starting the engine.

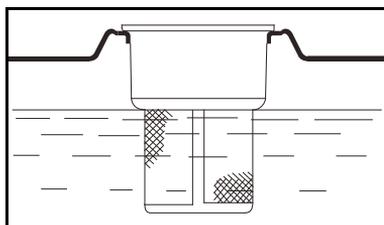
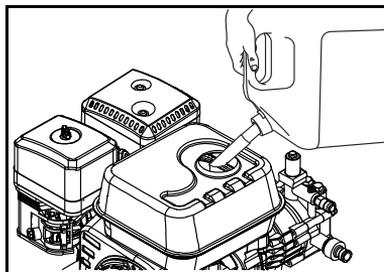
- Avoid repeated or prolonged contact with skin or breathing of fuel vapor.
- Keep out of reach of children.

Fueling

1. Before fueling, clean the filler cap and the area around it to ensure that no dirt falls into the fuel tank.



2. Turn the fuel cap by turning it counterclockwise, loose a bit of the fuel cap carefully so as to allow any pressure build-up in the fuel tank to release slowly. Never remove the fuel cap when engine is running!
3. Use clean, fresh, regular unleaded fuel with a minimum octane rating of 87 and an ethanol content of less than 10% by volume.
4. Slowly add fuel to the tank. Do not overfill. Fuel can be forced out of the tank as a result of expansion if it is overfilled, and can affect the stable running condition of the machine. When filling the tank, it is recommended to leave enough space for the fuel to expand. Remember adding fuel not over the fuel filter shoulder.



5. Tighten the fuel cap clockwise securely after fuelling.
6. Wipe away any spilled fuel.

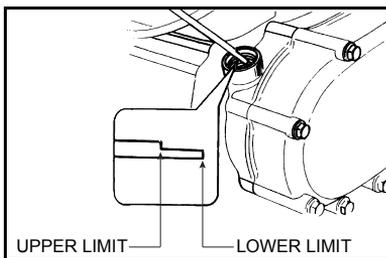
Gearbox lubrication

i information

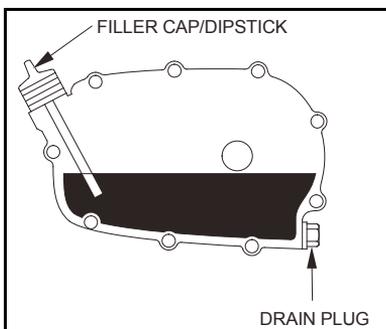
This session is only for the model equipped 1/2 reduction gearbox with an auto-centrifugal clutch.

The oil in the reduction gearbox is same as the engine oil used for this machine.

1. Place the gasoline engine on a flat level surface. Make sure the engine is turned off.
2. Clean the oil gauge dipstick/cap and the area around it to ensure that no dirt falls into the reduction gearbox.
3. Turn the oil gauge dipstick/cap counterclockwise, remove it and clean it with a clean cloth.
4. Add engine oil into the gearbox through the oil gauge dipstick/cap installation port (a fuel funnel may be needed here). Do not overfill.
5. Fully reinsert the oil gauge dipstick without screwing in and pull it out to check the oil level.
6. If the oil level is just at under the upper level mark, refill engine oil through the dipstick hole until the oil level reaches the upper level mark.



7. Reinstall the oil gauge dipstick and securely tighten it by turning clockwise.

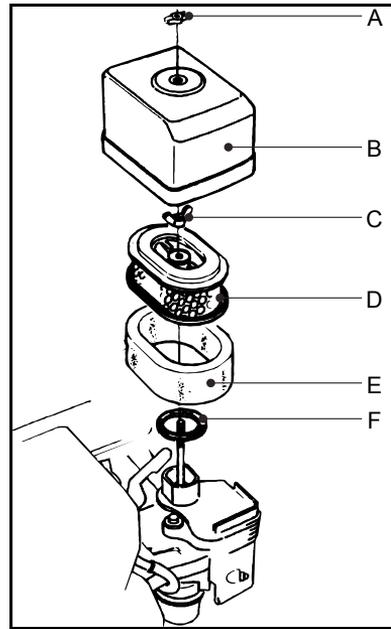


Air filter

i information

This machine is equipped with a double-core type air filter. Air filter should be checked and cleaned periodically according to maintenance schedule. Cleaning method may vary as the different type of air filter is equipped on the machine.

Dismantle the air filter housing and check its air filter element, make sure it is clean and intact, otherwise clean or replace it.



! NOTICE

Never run the engine without an air filter, otherwise severe wear of the engine may occur.

Preparation

! NOTICE

Always check the level of the engine oil prior to starting the machine. Failure to do so could cause the engine to seize if the oil is low or empty.

Pre-operation checklist

Follow the pre-operation checklist below before starting to use the machine every time:

1. Check the gasoline engine location.

! NOTICE

This gasoline engine must have at least 1.5 m (5 ft.) of clearance from combustible material. Leave at least 90 cm (3 ft.) of clearance on all sides of the gasoline engine to allow for adequate cooling, maintenance and servicing. Place the gasoline engine in a well ventilated area. Do not place the gasoline engine near vents or intakes where exhaust fumes could be drawn into occupied or confined spaces. Carefully consider wind and air currents when positioning gasoline engine.

2. Check the engine oil level to make sure it is located at the proper position.
3. Add fuel and check the fuel level to make sure there is sufficient gasoline in the fuel tank.
4. Check there is no leakage of oil or fuel.
5. Double-check and observe all safety precautions and instructions in this manual prior to starting the machine.

Start and stop the engine

WARNING

It is very dangerous to run a gasoline engine that equipped with broken parts or lacks of any parts. Before starting the engine, make sure that all the parts are installed properly.

WARNING

To reduce the risk of serious or even fatal injury:

- Do not allow children or other unauthorized persons to attempt to start or otherwise use the machine.
- Never allow children or unauthorized persons access to the machine.
- Never leave the machine unattended while working or during work breaks
- After work, store the machine in a safe, secure location out of the reach of children and other unauthorized persons
- Observe safety precautions and instructions.

WARNING

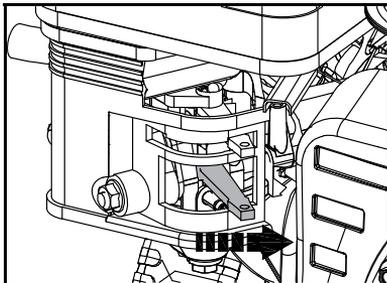
When starting the engine, make sure that your body does not contact with the muffler. A hot muffler can cause serious burns.

Start the engine

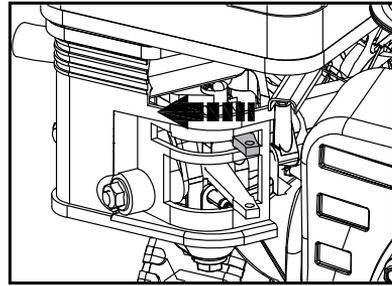
WARNING

Never start or stop the gasoline engine unless the water supply is turned on.

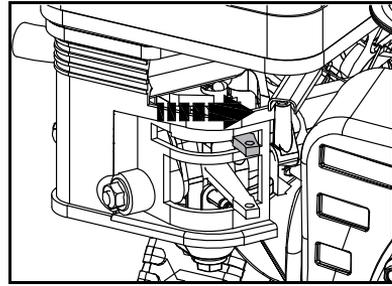
1. Finish the procedures described in the section of *Preparation*, make sure your machine is ready to start the engine.
2. Place the machine on a flat and firm ground in a clear area.
3. Move the fuel valve rightward to the “ON” position.



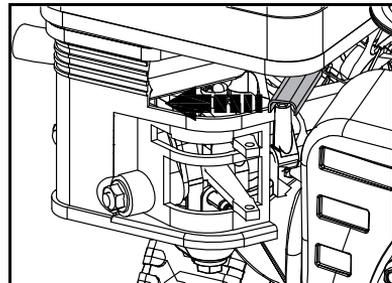
4. If the engine is cold, move the choke lever leftward to “CLOSE”  position.



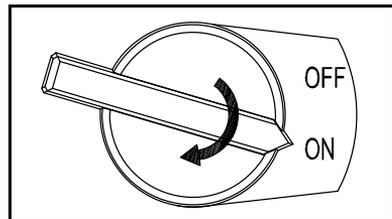
5. If the engine is warm, move the choke lever rightward to “OPEN”  position.



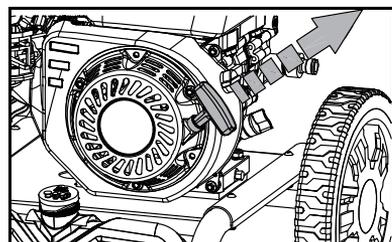
6. Move the throttle lever leftward to its maximum setting.



7. Turn engine switch to “ON” position.



8. Grip the starter rope handle securely, pull it slowly until resistance is felt, then pull it rapidly until start the engine (or 5 pulls maximum).

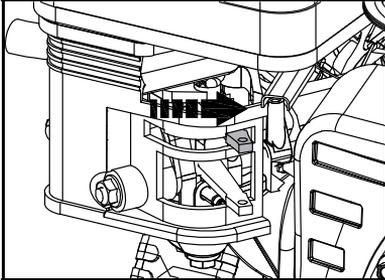


NOTICE

Do not pull out the starter rope all the way, otherwise it might break.

Do not let the starter rope snap back by itself. Guide it slowly back into the housing, so that the starter rope can rewind properly.

9. After engine fires (or 5 pulls), move choke lever rightward to "OPEN"  position.



10. Restart engine if necessary, and allow the machine to warm up at idle engine speed.

NOTICE

If engine does not start with choke lever in "OPEN" position after 5 pulls, repeat steps 3 ~ 10.

NOTICE

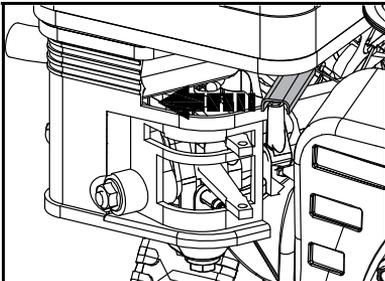
When restarting the engine immediately after stopping it, leave the choke lever in "OPEN" position.

Stop the engine

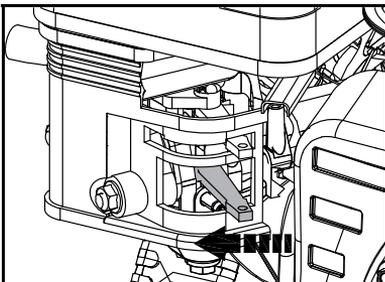
WARNING

In an emergency, turn the engine switch to "OFF" position to stall the engine.

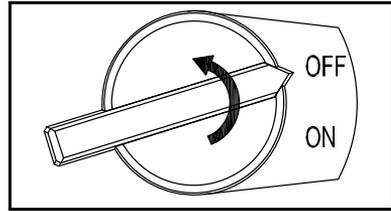
1. Move the throttle lever leftward to its maximum setting.



2. Move the fuel valve leftward to the "OFF" position.



3. Let the engine run until fuel starvation has stopped the engine. This usually takes a few minutes.
4. Turn engine switch to the "OFF" position.



5. Squeeze and hold the spray trigger until water only drips from the spray nozzle and the system is depressurized.
6. Turn off water supply and unplug all hoses.

WARNING

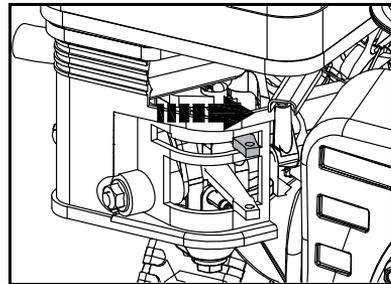
Always ensure that the fuel valve and the engine switch are in the "OFF" position when the engine is not in use.

WARNING

If engine does not stop when engine stop switch is moved to "STOP" position, move choke control lever to "CLOSE" position to stall engine. Have your local authorized dealer or service center to repair engine stop switch before using the machine again.

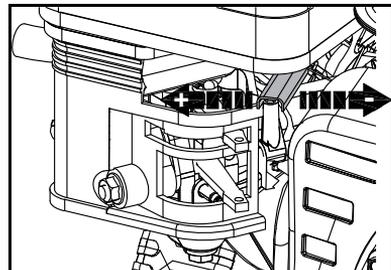
Operation

After start a cold engine, preheat the engine and move the choke lever rightward to "OPEN"  position.



Adjust the engine speed

Set the throttle lever in proper position to ensure the engine runs at required velocity.



Moving the throttle lever towards the left (Fast direction) will increase the engine speed.

Moving the throttle lever towards the right (Slow direction) will decrease the engine speed.

information

When moving the engine throttle to the minimum (rightmost), the output power of engine is low. Please don't operate the machine, if not, the machine will be flameout stop due to low engine output power.

Engine oil alarm

information

If the engine is hot, closing the choke is unnecessary.

This machine is equipped with an engine oil alarm which is designed to alarm the user the fact that the engine oil in the crankcase is insufficient. Run with insufficient engine oil may damage the engine. Once oil level in the crankcase is too low, the engine oil alarm will stall the engine automatically to make it free of damage while the engine switch is still at "ON".

NOTICE

If the engine still fails to work, check the engine oil level first before go to other check items.

Operation at high altitude

Only under this standard operation conditions, this machine can be plugged electrical loads with rated power; otherwise, it may reduce the cooling performance of the engine, thus it is necessary to reduce the amount of rated power of electrical loads.

The density of air at high altitude is lower than at sea level. Engine power is reduced as the air mass and air-fuel ratio decrease. Engine power will be reduced approximately 3.5% for every 1000 ft. of elevation above sea level, even the proper main jet is used. This is a natural trend and cannot be changed by adjusting the engine. At high altitudes increased exhaust emissions can also result due to the increased enrichment of the air fuel ratio. Other high altitude issues can include hard starting, increased fuel consumption and spark plug fouling.

At high altitudes, the standard mixture ratio is relatively too big so the engine performance may be impaired while the fuel consumption may increase. This problem can be solved by replacing the main jet of carburetor with a smaller one, then adjusting the idle screw. If always using on highlands with a height above sea level of 1830 meters, ask your dealer for doing the job.

NOTICE

The engine equipped with the main jet applicable to highlands may be damaged seriously in area below specified altitude, because its mixture ratio is too thin, output drops and the engine overheats for operation in low altitude area. In this case, ask your dealer to recover the engine to its normal technical status.

Exhaust control system

With the engine running, carbon monoxide, oxide of nitrogen and hydrocarbon will produce, and in certain conditions, oxide of nitrogen and hydrocarbon will react chemically each other to make smoke while carbon monoxide is toxic, so exhaust control of them is very important. The company decreases the exhaust emissions by introducing poor-fuel carburetors and other devices into the engine to solve the problem.

To keep the exhaust of your engine within the standard exhaust emission values, pay attention to the following:

Maintenance

Maintain the engine periodically in accordance with the Maintenance Schedule in the manual. The maintenance schedule is made out on the base of normal use in normal conditions, if using under heavy load, dusty or wet circumstances or in high temperature, more frequent maintenance will be necessary.

Replacement of parts

We recommend that you should choose such parts which are manufactured by our Co. or equivalent to these in quality as replacement ones. Replacement without so high quality may impair the exhaust control system in effectiveness.

Modifying

Modifying the exhaust control system may make actual exhaust emissions exceeding statutory limit values.

Illegal modification is as follows:

- Dismantle or modify any part of air inlet or outlet system.
- Modify or take off speed-adjusting connection device or speed adjustment device to result in the engine's running outside the set parameters.

Problems affecting exhaust emissions

- Difficult starting or difficult stopping.
- Unstable idling.
- Give off black smoke or consume too much fuel.
- Poor ignition sparks or sparks returned.
- Ignition is too advanced.

Once you find any above problems, contact your authorized dealer for help.

Maintenance and care

Maintenance schedule

IMPORTANT! Time intervals shown are maximum. Actual use and your experience will determine the frequency of required maintenance.		Before starting to work	Daily and/or at the end of work	First month or 20hrs	Each season or 50hrs	Every 6-month or 100hrs	Each year or 300 hrs	if there is a failure	if there is a damage	As required
		System / Component	Maintenance Procedure							
Complete machine	Visual inspection (Condition, leak)	√								
	Clean		√							√
Engine switch, Throttle lever, Fuel lever, Choke lever	Function test	√			√					
Engine oil	Oil level check	√								
	Replace		√							
Reduction gear oil	Oil level check	√								
	Replace		√			√				
Air filter	Inspect			√	√					
	Clean				√	√				
	Replace						√			√
Deposit cup	Clean					√				
Valve clearance	Inspect						√			
	Adjust						√			
Fuel filter	Inspect				√					
	Clean						√			√
Fuel tank	Clean						√			√
Fuel supply line	Clean	Every two years (replace if necessary)								
Recoil Starter Rope	Inspect	√								
	Clean		√							
Cooling system	Inspect	√								
	Clean		√							
Spark Plug	Inspect					√				
	Clean					√				
	Adjust					√				
	Replace								√	√
Spark arrestor	Clean					√				
Idling	Check						√			
	Adjust						√			
Fasteners, inclusive of Bolts, Screws, Nuts	Inspect	√								
	Tighten									√
	Replace								√	
Safety Information Label	Replace								√	

WARNING

Moving parts can amputate fingers or cause severe injuries. Keep hands, clothing and loose objects away from all moving attachments.

Always stop engine, disconnect spark plug, and make sure all moving parts have come to a complete stop before performing any inspection or maintenance.

Allow the machine to cool down before performing maintenance service. Wear gloves to protect hands from sharp edges and hot surfaces.

Before cleaning, inspecting or repairing the machine, make sure that engine has been stopped and cooled down. Disconnect the spark plug to prevent accidental starting.

NOTICE

Use only parts manufactured by the company or equivalents in quality; otherwise damage to engine may occur.

NOTICE

The maintenance instructions described in this section are only for inside-ventilating double-core carburetors and only for paper core air filters.

More often than that in the schedule should be considered if the engine is used in dusty circumstances.

The maintenance items should be done by your authorized dealer unless you are specially trained and is well equipped with tools.

WARNING

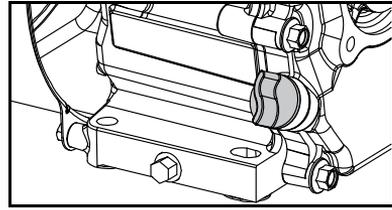
Stall the engine before service. If service is required with the engine running, be sure to keep good ventilation in the area. The exhaust emissions from the engine contain toxic carbon monoxide, inbreathing of it may do harm to personnel and even result in death of personnel.

Change engine oil

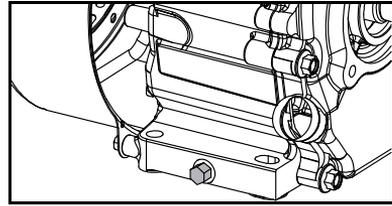
NOTICE

Change engine oil when the engine is warm. A still hot engine is helpful to drain out the engine oil in the crankcase rapidly and entirely.

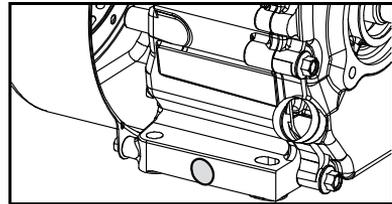
1. Place your machine at proper position on a hard and flat ground so that the gasoline engine is located at a flat level.
2. Turn off the engine
3. Place an oil pan under the drain oil port.
4. Clean the oil gauge dipstick/cap and the area around it to ensure that no dirt falls into the crankcase.



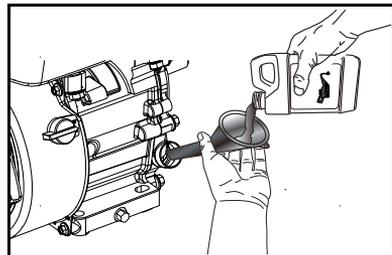
5. Turn the oil gauge dipstick/cap counter-clockwise, remove it and clean it with a clean cloth.



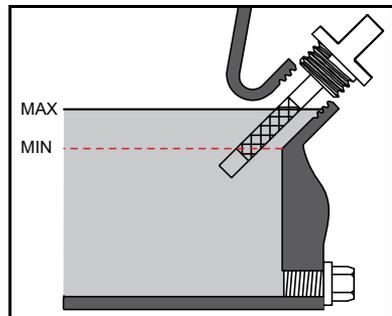
6. Remove the hexagon head drain plug, allow the oil to drain completely.



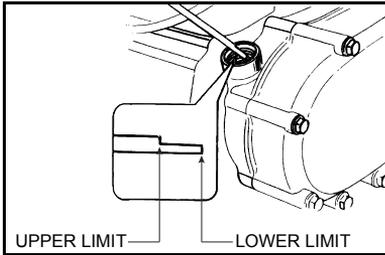
7. Reinstall the hexagon head drain plug and tighten securely.
8. Add engine oil into the crankcase through the oil gauge dipstick/cap installation port (a fuel funnel may be needed here). Do not overfill.



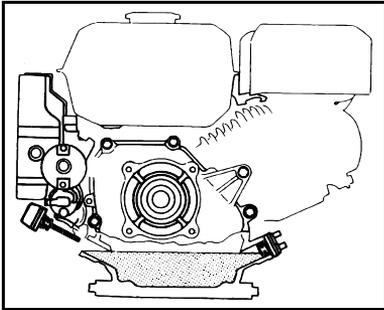
9. Fully reinsert the oil gauge dipstick and pull it out to check the oil level.



- If the oil level is just at MIN marker or below, refill SAE 10W-30 oil through the dipstick hole until the oil level is between upper limit and lower limit marker.



- Reposition the oil gauge dipstick and tighten it by turning clockwise.



NOTICE
Do not dump oil containers or discarded engine oil into rubbish boxes or onto the ground. For the sake of environmental protection, we suggest you take in discarded engine oil with a closed container and bring to local recycling station.

Air filter

This machine is equipped with a double-core type air filter.

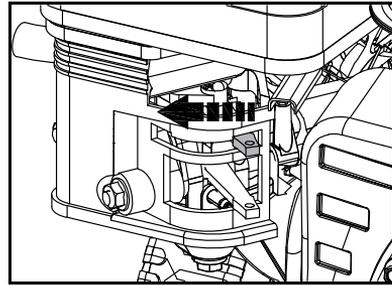
A dirty air filter may block enough air's flowing into the carburetor. To keep the carburetor in good working conditions, please service the air filter periodically. If operating the engine in extremely dusty area, the job should be done more often.

NOTICE
The air filter should be checked after prolonged storage, the following steps should be done when checking the air filter. It is recommended to replace the air filter once every spring.

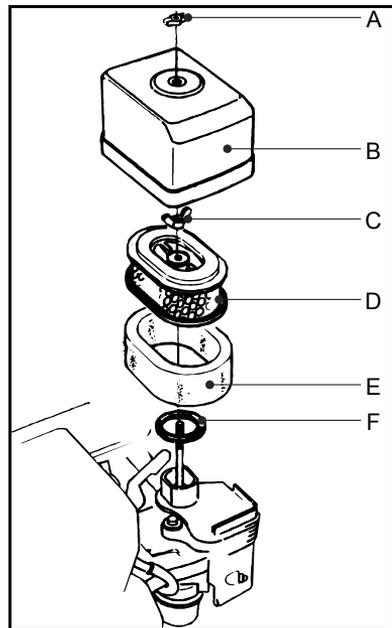
WARNING
Never clean the air filter core in gasoline or low flash-point detergents, otherwise explosion may happen.

NOTICE
Never run the engine without an air filter, or air with dirt and dust may enter the engine so speed the engine's wear.

- Move choke lever leftward to "CLOSE" position. This prevents dirt from entering into the carburetor throat when the air filter is removed.



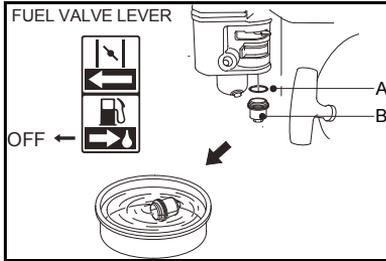
- Brush accumulated dirt from air filter area.
- Unscrew the wing nut (A), dismantle the air filter housing (B). Check the two cores (D,E) for damage. If any, replace it with new one.
- Paper filter element (D): knock the core against a solid plane to get rid of accumulated dust or blow out dust from inside to outside with high-pressure air flow(not more than 30 psi). Never clean with a brush, as brushing may force the dust into the core fiber. If the core is extremely filthy, replace it with a new one.
- Foam filter element (E): clean with home detergents and warm water(or non-flammable of high flash-point cleaning solvents) and dry up, then soak it in clean engine oil until saturated. Squeeze out excess oil, otherwise, the engine will discharge smoke in starting stage.



Washing deposit cup

- Set the fuel switch at "OFF" position.
- Remove the deposit cup and O-ring (A).
- Wash them in non-flammable or high flashpoint cleansing solvents.
- Dry them up completely.
- Reinstall them in the reverse sequence.
- Set the fuel switch to "ON" position.

- After reinstalling the deposit cup (B), check it for leakage and make sure the area around the engine is dry enough.

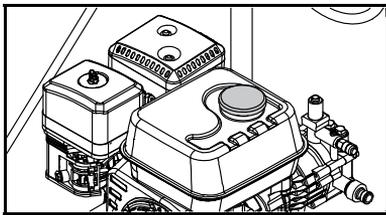


WARNING
Gasoline is extremely flammable and explosive in certain conditions. Keep cigarette, sparks and open flames away.

Fuel filter

DANGER
Fuel is very flammable. Use extreme care when mixing, storing or handling, or serious personal injury may result.

- Use a clean rag to remove loose dirt from around fuel cap and empty fuel tank.
- Use a fuel line hook to pull the fuel line and filter from the tank.
- Remove the used fuel filter from the line, replace it with a new fuel filter.
- Install the new fuel filter.



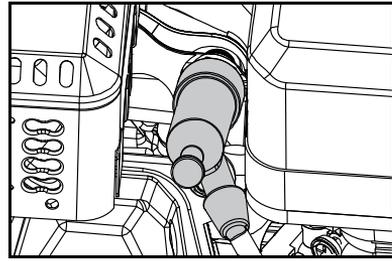
Spark plug

Starting failure and misfiring are often caused by a fouled spark plug. Clean the spark plug and check that the plug gap is in the correct range. Proper spark plug clearance ensures the engine's normal running under no deposit around the spark plug.

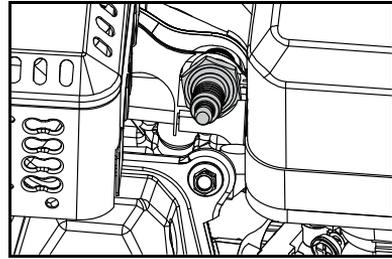
For a replacement plug, use the correct type.

WARNING
Do not touch the muffler, spark plug, or other metallic parts of the engine while the engine is running or immediately shutting down, otherwise burn injury will result.

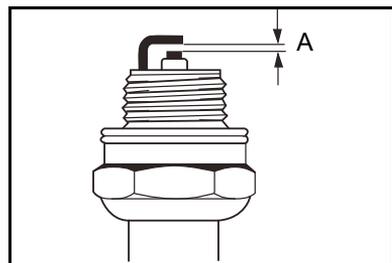
- Disconnect the spark plug wire by pulling it off the spark plug.



- Using the spark plug wrench, remove the spark plug by turning counterclockwise.



- Check spark plug condition for fouling, worn and rounded center electrode.
- Check to see if there is carbon sediment build-up, if so, remove it. If the carbon sediment is excessive, replace the spark plug.
- Clean the plug with a soft brass brush. If the insulator is damaged, replace with a new one. Do not clean it with sand blast. Remaining sand will damage the engine.
- Measure the electrodes clearance with a feeler gauge. The spark plug electrode clearance (A) should be 0.7~0.8 mm. If the clearance exceeds 0.8 mm, replace the spark plug.



- According to Technical Specification, adjust spark plug gap by bending outer electrode. Replace the spark plug with a new one when necessary.
- Screw on the spark plug to the bottom first by hand and then tighten it up by a spark plug wrench. If a new spark plug is used, twist 1/2 more turns after impacting the gasket; if reinstall the original one, just twist 1/8~1/4 more turns.
- Check if the spark plug gasket is in good conditions, or replace with a new one.
- Reconnect the wire to spark plug.

NOTICE
Using any spark plug other than those designated in this manual may result in the engine failing to operate properly, or in the engine becoming overheated and damaged.

NOTICE

The spark plug must be tightened securely, otherwise it may become very hot to damage the engine.

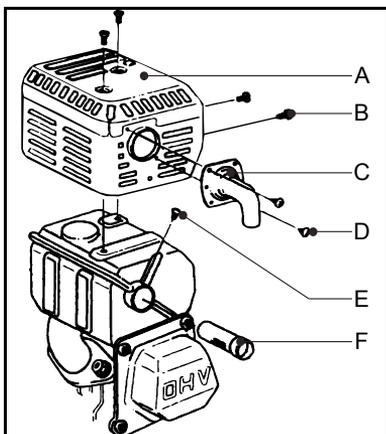
Spark arrestor (optional part)

The spark arrestor should be serviced at least once every 100 hour's operation so as to keep it in sound condition.

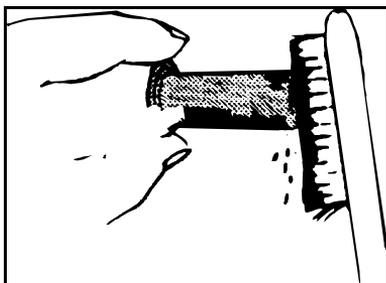
WARNING

The muffler is very hot during running the engine and even a long time after stopping. Never touch it, or you may get burns. Service after the engine cools down.

Unscrew two M4 screws (D), and remove the exhaust elbow from the engine body.



1. Turn off four M5 screws (A) from the muffler guard and take out the latter.
2. Turn off M4 screw (E) from the spark arrestor (F) and separate it from the muffler.
3. Clear away carbon deposit from the spark arrestor (F) mesh with a brush.



4. Reinstall the spark arrestor (F) in reverse order of removal.

WARNING

Be careful not to damage the mesh of the spark arrestor. Never use a damaged spark arrestor.

Carburetor adjustment

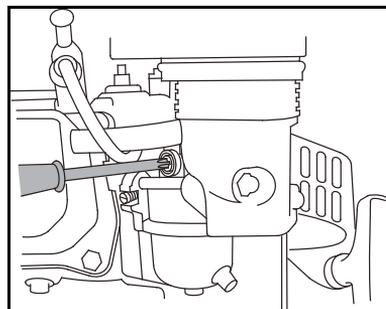
The carburetor has been adjusted at the factory with a standard setting.

This setting provides an optimal fuel-air mixture under most operating conditions.

NOTICE

Carburetor adjustments, other than idle speed, must be performed by an authorized dealer or service center.

1. Shut off the engine.
2. Check the air filter, clean or replace it if necessary.
3. Check the spark arrestor in the muffler, clean or replace it if necessary.
4. Start and preheat the engine until arriving at its normal working temperature.
5. Obtain standard idling by adjusting the throttle fixing screw under the engine runs at a low speed. Standard idling: 1700 ± 15 rpm.



Clean the gasoline engine

NOTICE

Do not spray the gasoline engine with water. Water can contaminate the fuel system and can enter the engine through the cooling slots and damage the engine.

1. Use a damp cloth to clean exterior surfaces of the gasoline engine.
2. Use a soft bristle brush to remove dirt and oil.
3. Use an air compressor (25 PSI) to clear dirt and debris from the gasoline engine.
4. Inspect all air vents and cooling slots to ensure that they are clean and unobstructed.

Repair

Users of this machine should only carry out the maintenance and service work described in this owner's manual. CRAFTOP recommends that other repair work be performed by authorized dealer and service center using genuine CRAFTOP replacement parts.

Storage

DANGER

Do not store the machine in enclosure where fuel fumes may accumulate or reach an open flame or spark, otherwise serious personal injury may result.

WARNING

The muffler and surrounding covers become hot during operation. Always keep exhaust area clear of flammable debris during transportation or when storing, otherwise serious property damage or personal injury may result.

NOTICE

Do not store your machine for periods of time 30 days or longer without performing protective storage maintenance which includes the following procedure:

Gasoline engine storage

1. Allow the gasoline engine to cool completely before storage.
2. Turn off the fuel supply at the fuel valve.
3. Clean the gasoline engine according to the instructions described in this manual.
4. Store the machine in a clean, dry area out of direct sunlight.

Engine stored for 1~2 month

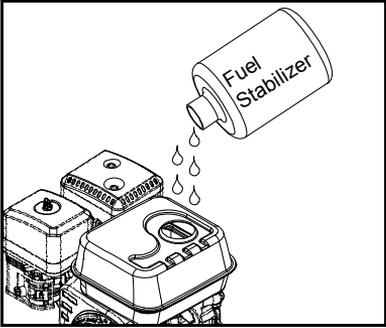
1. Allow the engine to cool completely before storage.
2. Clean engine according to the instructions described in this manual.
3. Drain out the fuel from the fuel tank and refuel with fresh fuel.
4. To extend the fuel storage life, add a properly formulated fuel stabilizer to the tank.
5. Ensure the fuel valve is set to the "OFF" position.

Engine Stored for 2 months ~ 1 year

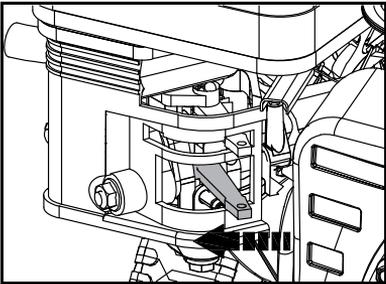
1. Allow the engine to cool completely before storage.
2. Clean engine according to the instructions described in this manual.
3. Drain out the fuel from the fuel tank.
4. Screw off the drain plug and drain out fuel in the carburetor.
5. Turn off the engine switch firstly, disconnect the deposit cup and empty it.
6. Refuel the fuel tank with fresh fuel.
7. To extend the fuel storage life, add a properly formulated fuel stabilizer to the tank.
8. Ensure the fuel valve is set to the "OFF" position.

Engine Stored for more than 1 year

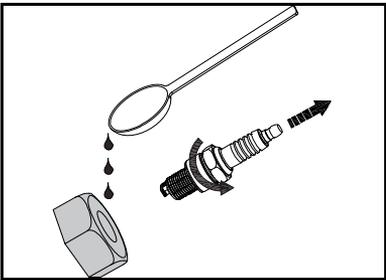
1. Drain out the fuel from the fuel tank.
2. Screw off the drain plug and drain out fuel in the carburetor.
3. Turn off the engine switch firstly, disconnect the deposit cup and empty it.
4. Refuel with fresh fuel.
5. Add a properly formulated fuel stabilizer to the tank.



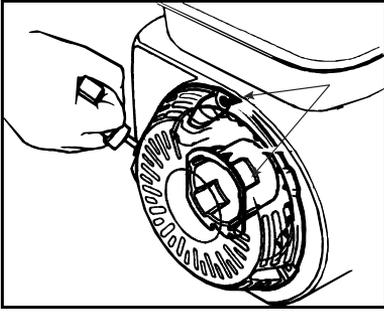
6. Run the engine for a few minutes so the treated fuel cycles through the fuel system and carburetor.
7. Turn the fuel valve to the "OFF" position.



8. Let the engine run until fuel starvation has stopped the engine. This usually takes a few minutes.
9. The engine needs to cool completely before cleaning and storage.
10. Clean the engine according to the Maintenance section.
11. Change the engine oil.
12. Remove the spark plug and pour about 0.5oz. (14.9ml) of oil into the cylinder. Crank the engine slowly to distribute the oil and lubricate the cylinder.



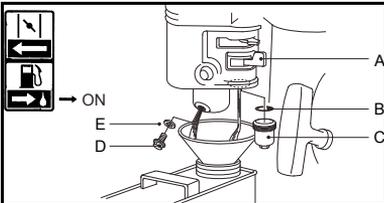
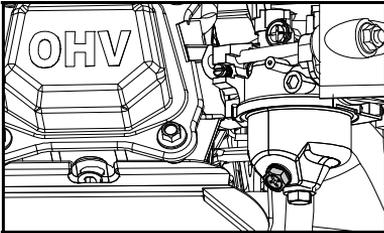
13. Reattach the spark plug.
14. Pull the starting rope slowly until feel a slight anti-action, and then keep pulling so as to align the arrow of the starting sleeve with the hole of the starter. At this time, both the inlet and outlet valves are closed so to help prevent the engine inside from rusting.



15. Cover the engine so keep dust away.

If you wish to drain the fuel instead of adding fuel stabilizer, please follow these steps below:

1. Turn fuel valve (A) to the "OFF" position.
2. Remove drain hex screw (D) and washer (E) from the carburetor.
3. Turn fuel valve (A) to the "ON" position and drain the fuel from the tank, carburetor and hose.
4. Reposition the carburetor drain hex screw once the fuel is completely drained.



For the sake of environmental protection, we highly recommend to fill the discarded fuel into a closed container and bring to your local recycling station.

Contact your local recycling center or factory to dispose used engine oil in a proper way.

! DANGER
Plastic bags can be a danger to young children, dispose of immediately!

Contact your local authorized dealer or service center for the latest information on waste disposal.

! NOTICE
Always store and transport gasoline engines in a stable, horizontal position. Support gear case to prevent excessive flexing, which may cause damage to these components.

Disposal

Observe all country-specific and local waste disposal rules and regulations.

CRAFTOP products must not be thrown in the garbage bin. Take the machine, accessories and packaging to an approved disposal site for environment friendly recycling.

Dispose of all packing material in an environmentally responsible manner.

Troubleshooting guide

DANGER

Fuel vapors are extremely flammable and may cause fire and/or explosion. Never test for ignition spark by grounding spark plug near cylinder plug hole, otherwise serious personal injury may result.

Problem	Cause	Solution
Engine will not start (or stops while operating)	<ol style="list-style-type: none"> 1. Low-oil shutdown 2. Engine switch not in "ON" position. 3. Pressure built up in the hose 	<ol style="list-style-type: none"> 1. Fill engine with SAE 10W-30 engine oil 2. Turn switch "ON" 3. Squeeze trigger while starting
If engine sounds abnormally, it could be overloaded.	<ol style="list-style-type: none"> 1. Nozzle partially blocked 2. Excessive pressure 	<ol style="list-style-type: none"> 1. Clean nozzle using nozzle cleaning tool or paper clip 2. Shorten the spring coil of the reflux valve
Engine is running but pump won't build maximum pressure or has irregular pressure	<ol style="list-style-type: none"> 1. Faucet closed 2. Machine has been stored in freezing temperatures 3. Inadequate water supply 4. Water inlet screen clogged 5. Kink in garden hose 6. Wand tip worn or damaged 7. Air in pump 8. Engine speed not set to maximum position 	<ol style="list-style-type: none"> 1. Open faucet 2. Thaw out unit completely including hose, gun and wand. 3. Provide a minimum of 4 GPM at 30 PSI 4. Clean screen 5. Straighten garden hose 6. Replace wand 7. Let it run with gun open and wand removed until steady stream of water is released 8. Set throttle to maximum position
No intake of chemicals	<ol style="list-style-type: none"> 1. Injection tube not securely inserted into unit 2. Tube cracked or split 3. Wrong nozzle 4. Nozzle blocked 5. Clogged chemicals injector 	<ol style="list-style-type: none"> 1. Push firmly into injector fitting 2. Replace tube 3. Switch to low pressure nozzle 4. Clean nozzle 5. Dissolve by running warm water
Trigger will not move	<ol style="list-style-type: none"> 1. Gun safety lock engaged 	<ol style="list-style-type: none"> 1. Release safety lock
Water in crankcase	<ol style="list-style-type: none"> 1. High humidity 2. Worn seals 	<ol style="list-style-type: none"> 1. Change oil more frequently 2. Change the oil seals
Noisy operation	<ol style="list-style-type: none"> 1. Worn bearings 2. Air mixed with water 	<ol style="list-style-type: none"> 1. Change the bearing 2. Check inlet lines for restrictions and/or proper sizing
High crankcase temperatures	<ol style="list-style-type: none"> 1. Wrong grade of oil 2. Improper amount of oil in crankcase 	<ol style="list-style-type: none"> 1. Use SAE 10W-30 engine oil 2. Adjust oil level to proper amount
Rough/pulsating operating with pressure drop	<ol style="list-style-type: none"> 1. Inlet restriction 2. Air mixed with water 	<ol style="list-style-type: none"> 1. Check system for stoppages, air leaks, correctly sized inlet, plumbing to pump 2. Check inlet lines for restrictions and/or proper sizing

Starting engine difficulty

Problem	Cause	Solution
1. Something wrong with the fuel system	There is no enough fuel in fuel tank or fuel cock is closed	Fill fuel, open fuel cock
2. Fuel supply is blocked or on fuel. ▲ Normal cylinder compression	Air vent in the fuel filter cap is clogged	Dredge are vent
	Fuel cock is clogged	Clean first and then dredge

Starting engine difficulty		
Problem	Cause	Solution
▲ Normal spark	Improper or clogged main jet	Readjust or clean, blow to get through
	Needle valve is closed improperly or start hole is clogged	Dismantle needle valve and repair, clean, blow to get through
	Floater is damaged or sticking	Repair floater
3. Something wrong with the fuel system ▲ Normal cylinder compression ▲ Normal spark ▲ Fuel flows easily and smoothly	Fuel is filthy or deteriorated	Replace
	There is water in fuel	Replace
	Too much fuel in engine cylinder	Drain extra fuel, dry up spark plug electrodes
4. Spark plug is in bad condition ▲ Normal cylinder compression ▲ Normal fuel supply ▲ Normal high-pressure coil spark	Wrong fuel type	Select proper fuel brand corresponding with technical specification
	Too much carbon fouling and dirt around electrodes	Clear away
	Electrodes are burn damaged seriously or insulators damaged	Replace spark plug
5. No high-pressure coil spark ▲ Normal cylinder compression ▲ Normal fuel supply ▲ Normal spark plug	Improper electrodes gap	Adjust to proper value
	High-pressure coil is damaged	Replace
	Ignition coil damaged	Replace
6. Poor cylinder compression ▲ Normal fuel supply system ▲ Normal ignition system	Magneto loses magnetism	Replace
	Piston ring is so worn to over its wear limit	Replace a set of piston rings
	Piston ring is sticking	Clear up carbon fouling
	Piston ring is broken	Replace
	Spark plug is not installed tighten or without a gasket	Tighten with a gasket in
	Air leakage between cylinder block and cylinder	Check cylinder gasket and the flatness of the surface by which cylinder block contacting with cylinder head; tighten cylinder bolts in the order to stipulated torque
Air leakage in valve	Check valve clearance and tightness, repair if necessary	

WARNING

When testing the spark plug, never hold the high-voltage wire of the spark plug with wet hand. Make sure there is no spilled fuel outside the engine and that the spark plug isn't dipped with fuel. To prevent fire, keep sparks far away from the spark plug mount hole. Having fulfilled all the check items above, if the engine still fails to work, contact your dealer for help.

Low gasoline engine power output			
Problem	Cause		Solution
When turning throttle greater, speed increase responds slowly or speed is	Ignition system	Incorrect ignition time	Readjust ignition advance angle
	Fuel supply	Air in fuel line, fuel line clogged	Exhaust air or dredge fuel line

Low gasoline engine power output			
Problem	Cause		Solution
decreased even engine stops	system	Main jet is not adjusted properly	Readjust
		In carburetor, needle valve hole and main jet clogged	Clean and blow to get through
		Fuel cock is clogged up	Cheam, replace damage part
		Too much carbon fouling in combusting chamber	Clear away
		Air filter is clogged up	Clean filter element
		Intake pipe is leaking	Replace
		Piston or cylinder or piston ring is worn	Replace it with a new one
	Poor compression	Air leakage from the surface by which cylinder block contacting with cylinder head	Replace cylinder gasket
		Too big or too small valve	Adjust
		Valve tightness is poor	Repair

Gasoline engine can not run smoothly		
Problem	Cause	Solution
Engine is pinking	Piston pin and piston pin hole are worn excessively	Replace the worn
	Tie rod small head is worn excessively	Replace piston or piston pin
	Roller bearing for crank shaft main shaft is worn	Replace tie rod
	Roller bearing for crank shaft main shaft is worn	Replace roller bearing
Abnormal combustion	Engine is too hot	Shoot trouble
	Too much carbon fouling in combustion chamber	Clear away
	Improper gasoline brand or low gasoline quality	Replace with qualified gasoline
Engine can not start because of spark lacking	There is water in floater room	Clean
	Improper spark plug electrodes clearance	Adjust
	Incorrect ignition time	Readjust
	Something wrong with induced coil, and so on	Check and replace damaged parts

Stop suddenly when running			
Problem	Cause	Solution	
Stop suddenly when running	Fuel supply system	Fuel is used up	Fill fuel
		Carburetor is clogged	Check fuel line and dredge
		Floater is leaking	Repair
		Needle valve sticks	Dismantle floater chamber and eliminate it

Stop suddenly when running			
Problem	Cause	Solution	
	Ignition system	Spark plug is truck through, or short-circuited by carbon deposit	Replace spark plug
		Side electrode of spark plug is dropped out	Replace spark plug and remove the dropped object
		Hi-voltage wire is dripped out	Connect it
		Engine oil in the crankcase is insufficient	Add engine oil until it arrives the proper level
		Ignition coil is truck through to be short-circuited	Replace ignition coil with new one
		Parking wire is located on the engine body	Find out meeting and insulate
	The other	Cylinder is pulled considerably, valve falls off	Repair or replace damaged parts

Gasoline engine excessively hot		
Problem	Cause	Solution
Gasoline engine is excessively hot	Improper ignition time	Adjust ignition advance angle properly
	Insufficient engine oil supply	Refill sufficient engine oil
	Exhaust pipe is clogged	Dredge exhaust pipe
	Flow guard is leaking	Repair leakage
	Dirt or something like this fill up among air cooling fins	Clear away dirty of something like this
	Cooling fan is loosen, losing function	Reinstall it well
	Cylinder, piston or piston ring is worn, resulting in air flow between cylinder and crankcase	Replace tie rod
	Tie rod deformation makes piston and cylinder bushing side wear	Replace the worn part
	Improper adjustment of engine speed produces excessive rotational speed	Readjust engine speed to proper value by speed regulator
	Bearing of crankshaft is burnt out	Replace main bearing

NOTICE

The gasoline engine should run under certain temperature. Generally, permitting temperature at the flow guard outlet is between 80~100 °C, while the temperature of the crankcase is about 60 °C under the magneto. If temperatures surpass the limits, it is an indication that the gasoline engine is excessive hot.

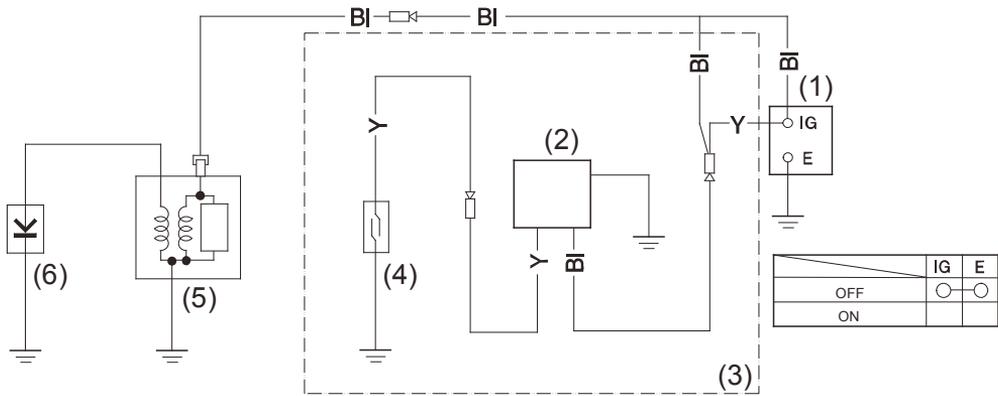
Abnormal noise when engine is running		
Problem	Cause	Solution
There is noise of beating or piston slap is heard	Piston or piston ring or cylinder is worn	Replace the worn part
	Tie rod or piston pin and piston pin hole is worn	Replace the worn part
	Main bearing of crankshaft is worn	Replace
	Piston ring is broken	Replace

Abnormal noise when engine is running		
Problem	Cause	Solution
There is metal-beaten noise in abnormal combustion	Too much carbon deposit in combusting chamber	Clear away carbon deposit
	Too small electrodes clearance of spark plug	Adjust electrodes clearance properly
	Engine is flooded with fuel	Check relative parts such as carburetor
	Improper fuel brand	Replace fuel
	Engine is excessively hot	Shoot trouble
Others	Improper valve clearance	Readjust valve clearance properly
	Fly wheel is not connected to crankshaft tightly	Connect tightly

 **information**

If your gasoline engine seems to need further service, please consult with your local authorized dealer or service center.

Electrical diagram



BI = BLACK

Y = YELLOW

- (1) ENGINE SWITCH
- (2) OIL ALERT UNIT
- (3) Type with Oil Alert unit
- (4) OIL LEVEL SWITCH
- (5) SPARK PLUG
- (6) IGNITION COIL

CRAFTOP®

WWW.CRAFTOP.COM