INTRODUCTION

Thank you for purchasing our petrol engine and hope that you enjoy operating one of the finest models in the market.

This Manual deals with the information and specifications concerning operation and maintenance of Models 160F, 168FA, 168FB, 170F, 173F, 177F, 182F, 188F, 190F，192F gasoline engines, and should be considered as a permanent part of the gasoline engine and should remain with it if it is resold.

Safety messages: Compose of a safety alert symbol and one of the three words: danger, warning, and caution.

! DANGER indicates a hazard, if not avoided, can result in human injury or death.

! WARNING indicates a hazard, if not avoided, could result in human injury and/or property damage.

CAUTION indicates a hazard, if not avoided, might result in slight injury and/or property damage.

Useful information:

If you are aware of any problem, have your gasoline engine inspected and repaired by an authorized dealer.

1. SAFETY

! WARNING

Safety operation information



Please read and understand this owner's manual before operation of the engine to avoid accidents by familiarizing yourself with your engine's controls and safe operation procedures.

1. Please do some pre-operation checking (see chapter 2) before operation to avoid human injury and equipment damage.

2. Keep the engine in good ventilated places at least 1 meter away from buildings and other equipments during operation and keep the flammable substances away from the engine to avoid fire.

3. Keep children and pets away from the operation area.

4. Make sure that the person who operates the engine receives proper instruction.

5. Keep the flammable substances (gasoline, matches) away from the operating engine.

6. As gasoline is extremely flammable and explosive under certain conditions, please refuel in a well-ventilated area with the engine stopped.

7. Do not fill above the shoulder of the fuel strainer.

8. Make sure the fuel cover is tightened.

9. Make sure that any spilled fuel has been wiped off before starting the engine.

10. Do not smoke or allow flames or sparks where the engine is refueled or where gasoline is stored.

! WARNING

Safety operation instructions

1. Exhaust contains poisonous carbon monoxide, a colorless and odorless gas. Breathing exhaust can cause loss of consciousness and may lead to death. Do not operate the engine without good ventilation or in enclosed room.

If you run the engine in an area that is confined, or even partially enclosed, the air you breathe could contain a dangerous amount of exhaust gas. Provide adequate ventilation so as to keep exhaust gas from accumulation.

2. Place the engine on level surface, tilting angle of the engine should not over 20^{o}, otherwise it will lead to fuel spilling out.

3. Do not cover the engine so as to avoid fire occurrence.

4. The engine has a spark arrestor. It may break the law if you operate the engine without spark arrester. Please enquiry local regulations and code before operating.

5. The muffler becomes very hot during and immediately after operation. Be careful not to touch the muffler while it is hot. Let the engine cool down before storing the engine indoor.

2. PRE-OPERATION CHECK

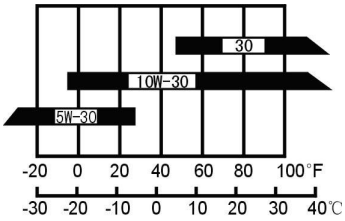
1. Check the oil level

(1) Lubricant oil

• Engine lubricant oil is a major factor affecting engine performance and service life. Non-detergent and 2-stroke engine oils will damage the engine and should not be used.

• Before checking engine lubricant oil, place the engine on level surface.

Use 4-stroke motor lubricant oil that meets or exceeds the requirements for API service classification SF or SG. Always check the API service label on the oil container to be sure it includes the letters SF or SG.



Temperature

2-1

SAE10W-30 is recommended for general, all temperature use. Other viscosities shown in the chart may be used when the average temperature in your area is within the indicated range.

• Make sure that engine on level surface.

• Turn out the oil filler cap and clean the dipstick with a clean cloth.

• Insert the dipstick back into the oil filler hole without turning it in.

• If oil level is below the lower mark of the dipstick, fill oil to the upper level of the dipstick.

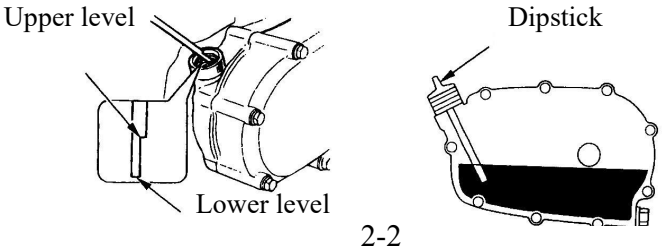
• Reinstall the oil filler cap well.

Low-speed gear oil (only for optional function)
(Auto-centrifugal clutch, 1/2 speed)

• Turn out the oil filer cap and clean the dipstick.

• Insert the dipstick back into the oil filler hole without turning it in.

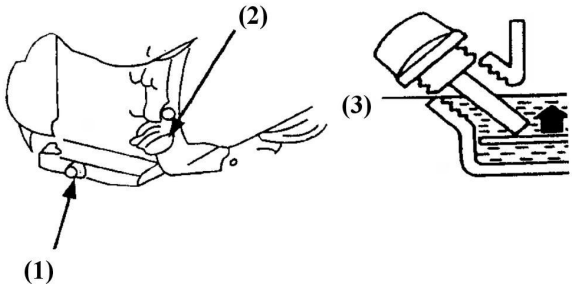
• If oil level is low and need to refill, be sure to use recommended oil.



2-2

Engine oil alert system (optional function)

The oil alert system is designed to prevent engine damage caused by insufficient oil in the crankcase. When the oil level in the crankcase falls below the safe limit, the oil alert system will automatically stop the engine even if the engine switch remains at the ON position. If the engine stops and cannot be restarted, check the engine oil level before troubleshooting in other areas.



(1) Drain plug (2) Engine switch (3) Lower level

2-3

2. FUEL LEVEL

• Check the fuel gauge, and refill the tank if the fuel level is low. Do not fill above the shoulder of the fuel strainer. The fuel 90# gasoline is recommended.

• Unleaded gasoline produces less engine and spark plug fouling and extends exhaust system life.

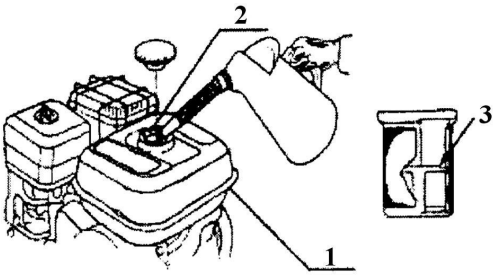
• Never use stale or contaminated gasoline or oil/gasoline mixture. Avoid getting earth, rubbish and water into the fuel tank.

• If spark knock or pinging occurs at a steady engine speed under normal load, change brands of gasoline. If spark knock or pinging persists, see an authorized dealer.

! WARNING:

• Running the engine with persistent spark knock or pinging can cause engine damage.

• If persistent spark knocks or pinging is caused by improper usage of the unit, the Distributor's Limited Warranty does not cover parts damaged by that.



(1) Fuel tank (2) Fill in hole (3) Red line level

2-4

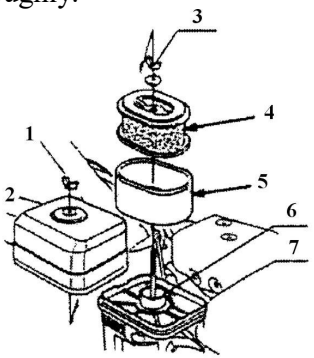
3. AIR CLEANER

The air cleaner is a dry type including paper element and foam element.

• Remove the clip and dismantle the air cleaner housing or remove the wing nuts and air cleaner cover.

• Wash the element in solution of household detergent and warm water, then rinse thoroughly, or wash in nonflammable or high flash point solvent. Allow the element to dry thoroughly.

(1) Butterfly nut (2) Air cleaner cover
(3) Butterfly nut (4) Paper element
(5) Foam element (6) Seal washer
(7) Silencer plate



2-5

! WARNING:

• Do not run the engine without air cleaner.

! DANGER

• Using gasoline or flammable solvent to clean the filter element can cause a fire or explosion.

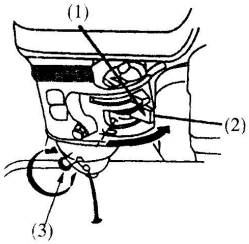
! CAUTION:

• Do not run the engine without air cleaner core, otherwise dust and/or other foreign matters may get into the engine through carburetor, and results in rapid engine worn-out.

3、 STARTING THE ENGINE

•Turn the fuel valve to ON position, unscrew the drain plug on carburetor bottom, and fasten the drain plug until oil spills out.

• Pull the choke rod to the CLOSE position. Adjust throttle to proper position. Pull the starter grip lightly until resistance is felt, then pull it rapidly.



(1) Fuel valve (2) Start level (3) Drain plug

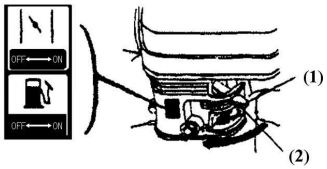
3-1

NOTICE:

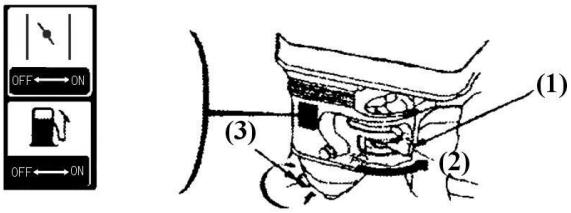
• Do not allow the starter grip to snap back against the engine. Return it gently to prevent damage to the starter.

• After engine started, let engine rotate 1---3 minutes at idle speed, check whether it is balanced, cracked, then pull the throttle to open position, adjust choke rod to OPEN .

(1) auto-throttle
(2) off position



3-2

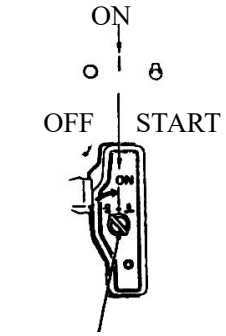


(3) starter knob

3-3

(4) Electrical Starting

Turn the engine switch to START position and hold a while until the engine started.



ENGINE SWITCH

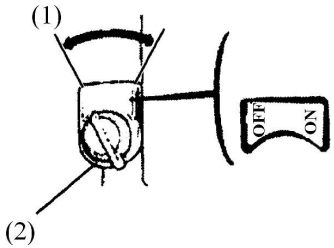
3-4

NOTICE:

• Restrict the starting time within 5 seconds to avoid engine damage. If engine can not be started, release starter knob, retry 10s later.

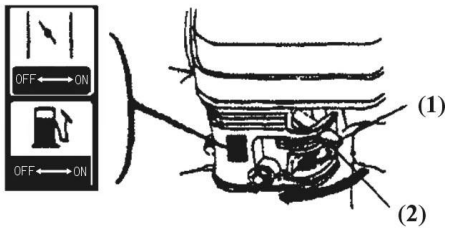
4、STOPPING THE ENGINE

Adjust throttle to proper position. Reduce engine speed, close the choke. Turn engine switch to OFF position.



3-5

(1) Throttle knob (2) Throttle is at OFF



3-6

! DANGER:

• Gasoline is extremely flammable and explosive under certain conditions.

• Refuel in well-ventilated places with the engine stopped. Do not smoke or allow flames or sparks near the places where the engine is refueled or gasoline is stored.

• Do not add fuel over the shoulder of strainer. After fueling, tighten the

tank cover.

• Fuel vapors are extremely flammable and may ignite after the engine has started. Make sure that any fuel spillage has been wiped off before starting the engine.

• Avoid skin contacting with gasoline for a long time, avoid breathing in gasoline vapors. Keep children away from them.

NOTICE

• Fuel can damage paintings and plastics. Be careful when refueling. Damage caused by spilling fuel is not covered under warranty.

5. ENGINE MAINTENANCE:

Do periodic maintenance to keep the engine in good performance. Always follow the inspection and maintenance recommendation and schedules in this manual.

⚠ WARNING:

- Stop the engine before maintenance. If the engine must be operated, provide adequate ventilation. Breathing in exhaust can cause loss of consciousness and even lead to death.

1. Everyday maintenance:

- Air cleaner: A dirty air cleaner will restrict air flow into the carburetor. To prevent carburetor malfunction, service the air cleaner regularly. Service more frequently when operating the generator in extremely dusty areas.

- Check air cleaner core, get rid of fouling, keep the core clean.
- Check bolts, fasten loose ones.
- Check whether lubricant oil level is at ranged limits.

2. Clean the core after the unit working up to 25hrs.

3. Clean carbon fouling of the spark plug after working up to 50hrs. Check the clearance, and adjust the gap to 0.6-0.7mm (see figure 4-1). Check radiator, and clean fouling among radiators.

Drain the oil while the engine is warm to assure rapid and complete draining.

- Remove the drain plug and sealing washer, remove the oil filler cap,

and drain the oil.

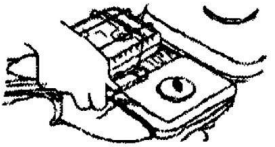
- Reinstall the drain plug and sealing washer. Tighten the plug securely.
- Refill with the recommended oil and check the oil level.

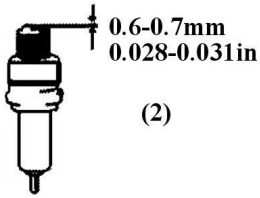
NOTICE

Oil recommended: 15W/40SAE

160F, 168FA/B, 170F oil capacity is 0.6L

173F, 177F, 182F, 188F, 190F 192F oil capacity is 1.1L

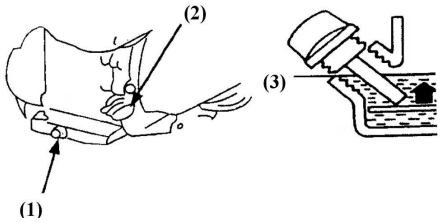




(1) dismantle spark plug (2) adjust clearance

4. Clean the fuel tank and filter when working time reaches 100hrs: Remove the fuel cover, drop out filter, and wash it with brush lightly. Remove fuel tank, clean the fouling and water inside fuel tank. Reinstall fuel tank, place filter from fill-in hole, filling the clean fuel to red line level. (see NO.2 charter 2)

(1) Drain plug
(2) Engine switch
(3) Lower level



Check aging of fuel pipe every 2 years. If aging, hardening and cracking is detected, have it replaced. Tighten the joints, and check leakage.
Before storing the unit for an extended period:
1. Make sure the storage area is free of excessive humidity and dust.
2. Service according to the table below.

STORAGE TIME	RECOMMENDED SERVICE PROCEDURE TO PREVENT HARD STARTING
Less than 1 month	No preparation required
1 to 2 months	Fill with fresh gasoline and add gasoline conditioner
2 months to 1 year	Fill with fresh gasoline and add gasoline conditioner Drain the carburetor float bowl Drain the fuel sediment cup

6. ENGINE STORAGE

If the engine is not used for long time, do the necessary maintenance before its storage.

Firstly, take off the fuel tank, drain out all fuel, and clean the dirt and water inside the tank. Open the fuel cock, unscrew the drain plug at the bottom of carburetor, drain out fuel in carburetor thoroughly, and then tighten the drain plug.

Secondly, unscrew the drain plug at the bottom of the crankcase and drain out the lubricant oil in the crankcase thoroughly, then tighten the drain plug.

Finally, clean the surface of the engine with clean cloth, remove the dirt and dust etc. Then store the engine in a well-ventilated, dirt-free place.

7. Transportation

• Contacting with a hot engine or exhaust system can cause serious burns or fires. Let the engine cool down before transporting or storing the engine.

• When transporting the engine, turn the engine switch and the fuel valve to OFF. Keep the engine cool.

8、Troubleshooting

1. The engine can’t startup

Have the engine checked if it is hard to or cannot be started.

Firstly, check the fuel level of the fuel tank. Turn fuel valve to (2), Fuel should flow from the drain when the fuel valve is turned ON. Tighten the drain plug. (see figure 3-1)

2. Spark plug

Check the spark plug. Remove the spark plug cap and clean any dirt around it. If the engine still cannot be started after repeating several times, please see the authorized dealer. Users are not allowed to dismantle or reassemble the unit by themselves.

3. Not enough power

1.1 Check the air-cleaners. Please refer the maintenance inspection book to clear the air-cleaner.

1.2 Check the fuel. Please strain out the gasoline in fuel tank and in carburetor, and fill in new gasoline.

1.3 Other situation please contact our dealer.

9. SPECIFICATIONS

CHART I

160F, 168FA, 168FB, 168FA-1, 168FB-1, 170F

TYPE	160F	168FA	168FB	168FA-1	168FB-1	170F
Engine model	Single-cylinder, OHV25°, Four stroke, Forced Air-cooling, 2:1 Speed reducer					
Bore×stroke (mm)	60×42	68×45	68×54	68×47	68×56	70×55
Displacement (cm^3)	118	163	196	170	203	212
Max. power (Kw/rpm)	3/3600	4/3600	4.8/3600	4.2/3600	5/3600	5/3600
Rated power (Kw/rpm)	1.8/3600	2.8/3600	3.4/3600	2.9/3600	3.5/3600	4/3600
Max. torque (N.m/rpm)	7.4/2500	10.5/2500	11.5/2500	10.5/2500	11.5/2500	12/2500
Fuel tank capacity (L)	2.5	3.6				
Engine oil capacity (L)	0.6					
Ignition system	Non-contact transistor					
Fuel consumption (g/kw.h)	420	395				
Starting system	Recoil start					
N.W (kg)	13	15	16	15	16	

CHART Ⅱ

173F, 177F, 173F-1, 177F-1

TYPE	173F	177F	173F-1	177F-1
Engine model	Single-cylinder,OHV25°, Four stroke, Forced Air-cooling,			
Bore×stroke (mm)	73×58	77×58	73×60	77×60
Displacement (cm^3)	242	277	251	279
Max. power (Kw/rpm)	5.9/3600	6.6/3600	6.1/3600	6.8/3600
Rated power (Kw/rpm)	4.5/3600	5.0/3600	4.6/3600	5.1/3600
Max. torque (N.m/rpm)	16.7/2500	19.1/2500	16.7/2500	19.1/2500
Fuel tank capacity (L)	6.0			
Engine oil capacity (L)	1.1			
Ignition system	Non-contact transistor			
Fuel consumption (g/kw.h)	374			
Starting system	Recoil start			
N.W (kg)	25			

CHART Ⅲ

182F, 188F, 182F-1, 188F-1, 190F，192F

TYPE	182F	188F	182F-1	188F-1	190F	192F
Engine model	Single-cylinder,OHV25°, Four stroke, Forced Air-cooling					
Bore×stroke (mm)	82×64	88×64	82×66	88×66	90×66	92×69
Displacement (cm^3)	337	389	348	401	420	459
Max. power (Kw/rpm)	8.1/3600	9.6/3600	8.4/3600	9.9/3600	11.2/3600	11.5/3600
Rated power (Kw/rpm)	6/3600	7.3/3600	6.2/3600	7.5/3600	8.5/3600	8.8/3600
Max. torque (N.m/rpm)	23.5/2500	26.5/2500	23.5/2500	26.5/2500	25.5/2500	28/2500
Fuel tank capacity (L)	6.5					
Engine oil capacity (L)	1.1					
Ignition system	Non-contact transistor					
Fuel consumption (g/kw.h)	374					
Starting system	Recoil start					
N.W (kg)	31					

CHART Ⅳ

168FA-L, 168FB-L, 173F-L, 177F-L

TYPE	168FA-L	168FB-L	173F-L	177F-L
Engine model	Single-cylinder,OHV25°, Four stroke, Forced Air-cooling, 2:1 Speed reducer			
Bore×stroke (mm)	68×45	68×54	73×58	77×58
Displacement (cm^3)	163	196	242	277
Max. power (Kw/rpm)	4/3600	4.8/3600	5.9/3600	6.6/3600
Rated power (Kw/rpm)	2.8/3600	3.4/3600	4.5/3600	5/3600
Fuel tank capacity (L)	3.6		6.0	
Engine oil capacity (L)	0.6		1.1	
Ignition system	Non-contact transistor			
Fuel consumption (g/kw.h)	395		374	
Starting system	Recoil start			
N.W (kg)	16		27	

CHART Ⅴ

182F-L, 188F-L, 190F-L, 190F-C

TYPE	182F-L	188F-L	190F-L	190F-C
Engine model	Single-cylinder,OHV25°, Four stroke, Forced Air-cooling, Speed reducer			
Bore×stroke (mm)	82×64	88×64	90×66	
Displacement (cm^3)	337	389	420	
Max. power (Kw/rpm)	8.1/3600	9.6/3600	11.2/3600	
Rated power (Kw/rpm)	6/3600	7.3/3600	8.5/3600	
Reduce ratio	2.0:1			1.28:1
Fuel tank capacity (L)	6.5			
Engine oil capacity (L)	1.1			
Ignition system	Non-contact transistor			
Fuel consumption (g/kw.h)	374			
Starting system	Recoil start			
N.W (kg)	34			

CHART Ⅵ

168FAE, 168FBE, 173FE, 177FE, 182FE, 188FE, 190FE，192FE

TYPE	168FAE/ 168FBE	173FE/ 177FE	182FE/ 188FE	190FE/ 192FE
Engine model	Single-cylinder,OHV25°, Four stroke, Forced Air-cooling			
Bore×stroke (mm)	68×45/ 68×54	73×58/ 77×58	82×64/ 88×64	90×66/ 92×69
Displacement (cm^3)	163/196	242/277	337/389	420/ 459
Max. power (Kw/rpm)	4/3600 4.8/3600	5.9/3600 6.6/3600	8.1/3600 9.6/3600	11.2/3600 11.5/3600
Rated power (Kw/rpm)	2.8/3600 3.4/3600	4.5/3600 5/3600	6/3600 7.3/3600	8.5/3600 8.8/3600
Max. torque (N.m/rpm)	10.5/2500 11.5/2500	16.7/2500 19.1/2500	23.5/2500 26.5/2500	25.5/2500 28/2500
Fuel tank capacity (L)	3.6	6.0	6.5	
Engine oil capacity (L)	0.6	1.1		
Ignition system	Non-contact transistor			
Fuel consumption (g/kw.h)	395	374		
Starting system	Recoil start/Electrical start			