JF120 • JF168 • JF200

Owner's Manual

CONTENTS

SPECIFICATIONS

JF120

Length x Width x Height	12.0 X13.4 X12.5 in
Dry Weight	28.7 Lbs
Engine Type	4-Stroke, Overhead Valve, Single Cylinder
Displacement [Bore x Stroke]	7.3 cu-in [2.4 X1.7 in]
Valve clearance	IN: 0.15 ±0.02 mm (cold) EX: 0.20+0.02 mm (cold)
Spark Plug	LD: F7RTC NGK:BPR6ES
Spark plug gap	0.028-0.031 in
Idle speed	1,400* rpm
Max. Output	4.0 HP At 3,600 rpm
Max. Torque	5.4 ft-lbs At 2,500 rpm
Engine Oil	SAE 10W-30, API SJ or SL, for general use
Engine Oil Capacity	0.63 qt
Fuel	Unleaded gasoline with a pump octane rating of 86 or higher
Fuel Tank Capacity	0.55 gal
Fuel Consumption	0.51 GPH
Cooling System	Forced Air
Ignition System	Transistorized Magneto
PTO Shaft Rotation	Counterclockwise

JF168

Length x Width x Height	12.3 X14.3 X 13.2 in
Dry Weight	33.1 Lbs
Engine Type	4-Stroke, Overhead Valve, Single Cylinder
Displacement [Bore x Stroke]	9.9 cu-in 12.7X 1.8 in]
Valve clearance	IN: 0.15 ±0.02 mm (cold) EX: 0.20±0.02 mm (cold)
Spark Plug	LD: F7RTC NGK:BPR6ES
Spark plug gap	0.028-0.031 in
Idle speed	1,400T, rpm
Max. Output	5.5 HP At 3,600 rpm
Max. Torque	8.0 ft-lbs At 2,500 rpm
Engine Oil	SAE 10W-30, API SJ or SL, for general use

SPECIFICATIONS

Engine Oil Capacity	0.63 qt
Fuel	Unleaded gasoline with a pump octane rating of 86 or higher
Fuel Tank Capacity	0.79 gal
Fuel Consumption	0.51 GPH
Cooling System	Forced Air
Ignition System	Transistorized Magneto
PTO Shaft Rotation	Counterclockwise

J F200

Length x Width x Height	12.3 X14.8 X 13.2 in
Dry Weight	35.3 Lbs
Engine Type	4-Stroke, Overhead Valve, Single Cylinder
uispiacement [Bore x Stroke]	12 cu-in [2.7X 2.1 in]
Valve clearance	IN: 0.15 ±0.02 mm (cold) EX: 0.20±0.02 mm (cold)
Spark Plug	LD:F7RTC NGK:BPR6ES
Spark plug gap	0.028-0.031 in
Idle speed	1,400Trpm
Max. Output	6.5 HP At 3,600 rpm
Max. Torque	9.76 ft-lbs At 2,500 rpm
Engine Oil	SAE 10W-30, API SJ or SL, for general use
Engine Oil Capacity	0.63 qt
Fuel	Unleaded gasoline with a pump octane rating of 86 or higher
Fuel Tank Capacity	0.79 gal
Fuel Consumption	0.51 GPH
Cooling System	Forced Air
Ignition System	Transistorized Magneto
PTO Shaft Rotation	Counterclockwise

SAVE THIS MANUAL

You will need this manual for the safety warnings and precautions, operating, inspection, maintenance and cleaning procedures, parts list and assembly diagram. Keep your invoice with this manual. Write the invoice number on the inside of the front cover. Keep this manual and invoice in a safe and dry place for future reference.

IMPORTANT SAFETY INFORMATION

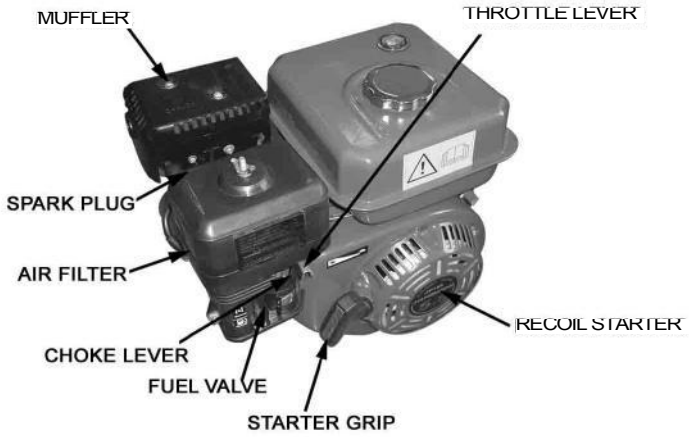
Most accidents with engines can be prevented if you follow all instructions in this manual and on the engine. Some of the most common hazards are discussed below, along with the best way to protect yourself and others.

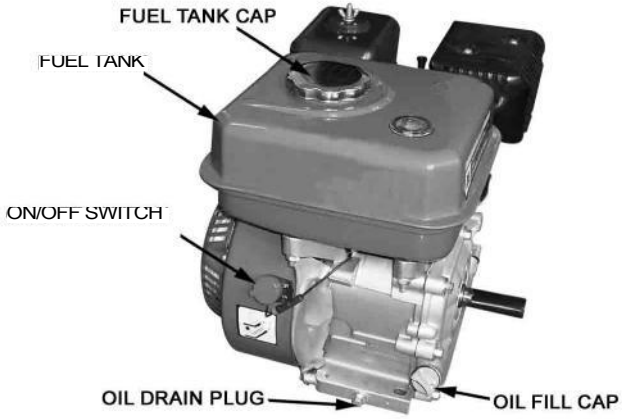
The warnings, cautions and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that COMMON SENSE AND CAUTION ARE FACTORS WHICH CANNOT BE BUILT INTO THIS

WARNING! PRODUCT, BUT MUST BE SUPPLIED BY THE OPERATOR.

- Read and understand this owner's manual before operating the engine. Failure to do so could result in personal injury or equipment damage.
- Know how to stop the engine quickly, and understand the operation of all controls. Never permit anyone to operate the engine without proper instructions.
- Do not allow children to operate the engine. Keep children and pets away from the area of operation.
- Do not operate engine in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Engines create sparks, which may ignite the dust or fumes.
- Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and
  gloves away from moving parts. Loose clothes, jewelry, and long hair can be caught in moving parts.
- Gasoline is extremely flammable, and gasoline vapor can explode. Refuel outdoors, in a well-ventilated area, with the engine stopped. Never smoke near gasoline, and keep other flames and sparks away. Always store gasoline in an approved container. If any fuel is spilled, make sure the area is dry before starting the engine.
- The muffler becomes very hot during operation and remains hot for a while after stopping the engine. Be careful not to touch the muffler while it is hot. Let the engine cool before storing it indoors.
- To prevent fire hazards and to provide adequate ventilation for stationary equipment applications, keep the engine at least 3 feet away from building walls and other equipment during operation. Do not place flammable objects close to the engine.
- Exhaust gas contains poisonous carbon monoxide. Avoid inhalation of exhaust gas. Never run the engine in a closed garage or confined area.
- Review the instructions provided with the equipment powered by this engine for any additional safety precautions that should be observed in conjunction with engine startup, shutdown, operation, or protective apparel that may be needed to operate the equipment.
- Do not overload the engine. Use the correct engine for your application. The correct engine will do the job better and safer at the rate for which it is designed.

COMPONENT & CONTROL LOCATIONS





BEFORE OPERATION

IS YOUR ENGINE READY TO GO?

For your safety, and to maximize the service life of your equipment, it is very important to take a few moments before you operate the engine to check its condition. Be sure to take care of any problem you find, or have your servicing dealer correct it, before you operate the engine.

Improperly maintaining this engine, or failing to correct a problem before operation, could cause a malfunction in which you could be seriously injured.

Always perform a pre-operation inspection before each operation, and correct any problem.

WARNING!

Before beginning your pre-operation checks, be sure the engine is level and the engine switch is in the OFF position.

CHECK THE GENERAL CONDITION OF THE ENGINE

- Look around and underneath the engine for signs of oil or gasoline leaks.
- Look for signs of damage.
- Remove any excessive dirt or debris, especially around the muffler and recoil starter.
- Check that all shields and covers are in place, and all nuts, bolts, and screws are tightened.

CHECK THE ENGINE

- Check the engine oil level. Running the engine with a low oil level can cause engine damage.
  The oil sensor will automatically stop the engine before the oil level falls below safe limits. However, to avoid the inconvenience of an unexpected shutdown, always check the engine oil level before startup.
- Check the air filter. A dirty air filter will restrict air flow to the carburetor, reducing engine performance.
- Check the fuel level. Starting with a full tank will help to eliminate or reduce operating interruptions for refueling.

CHECK THE EQUIPMENT POWERED BY THIS ENGINE

Review the instructions provided with the equipment powered by this engine for any precautions and procedures that should be followed before engine startup.

Carbon monoxide gas is toxic. Breathing it can cause unconsciousness and even kill you. Avoid any areas or actions that expose you to carbon monoxide.

WARNING!

OPERATION

Before operating the engine for the first time, please review the *IMPORTANT SAFETY INFORMATION on* page 3 and the above information.

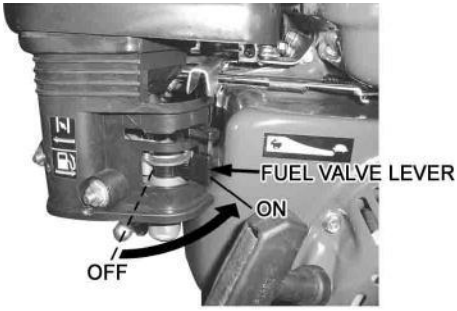
Review the instructions provided with the equipment powered by this engine for any safety precautions that should be observed in conjunction with engine startup, shutdown, or operation.

STARTING THE ENGINE

1. Move the fuel valve lever to the ON position.

   The fuel valve opens and closes the passage between the fuel tank and the carburetor.

   The fuel valve lever must be in the ON position for the engine to run.

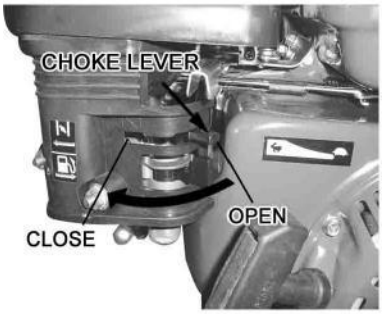


2. To start a cold engine, move the choke lever to the CLOSED position. To restart a warm engine, leave the choke lever in the OPEN position.

   The choke lever opens and closes the choke valve in the carburetor.

   The CLOSED position enriches the fuel mixture for starting a cold engine.

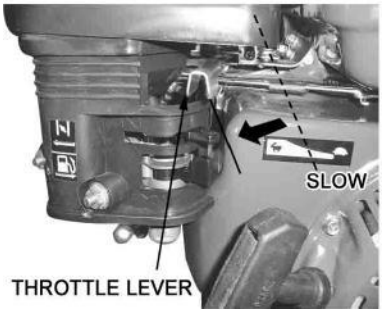
   The OPEN position provides the correct fuel mixture for operation after starting, and for restarting a warm engine.



3. Move the throttle lever away from the SLOW position, about 1/3 of the way toward the FAST position.

   The throttle lever controls engine speed.

   Moving the throttle lever in one direction or the other, makes the engine run faster or slower.

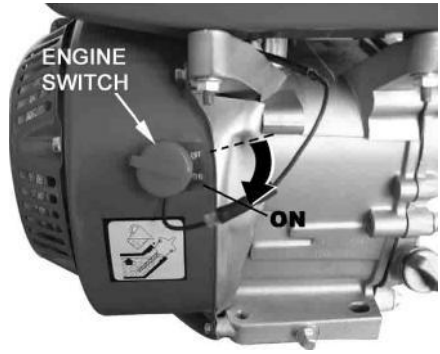


4. Turn the engine switch to the ON position.

The engine switch enables and disables the ignition system.

The engine switch must be in the ON position for the engine to run.

Turning the engine switch to the OFF position stops the engine.

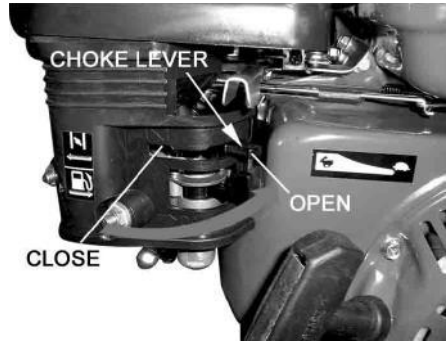


5. Operate the RECOIL STARTER:

Pull the starter grip lightly until you feel resistance, then pull briskly. Return the starter grip gently.

Pulling the starter grip operates the recoil starter to crank the engine.

6. If the choke lever has been moved to the CLOSED position to start the engine, gradually move it to the OPEN position as the engine warms up.



SETTING ENGINE SPEED

Position the throttle lever for the desired engine speed.

Moving the throttle lever in the directions shown makes the engine run faster or slower.

Some engine applications use a remote-mounted throttle control rather than the engine-mounted throttle lever shown here.

For engine speed recommendations, refer to the instructions provided with the equipment powered by this engine.

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WARNING!

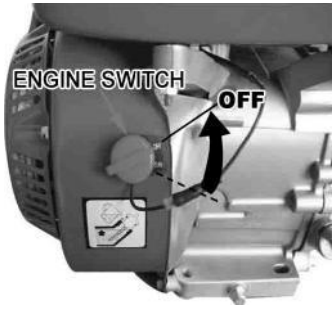
Carbon monoxide gas is toxic. Breathing it can cause unconsciousness and even kill you. Avoid any areas or actions that expose you to carbon monoxide.

STOPPING THE ENGINE

To stop the engine in an emergency, simply turn the engine switch to the OFF position. Under normal conditions, use the following procedure.

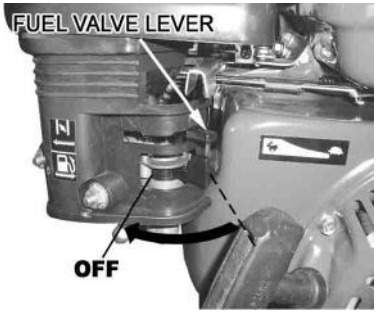
1. Move the throttle lever to the SLOW position

2. Turn the engine switch to the OFF position.



3. Turn the fuel valve lever to the OFF position.

   When the engine is not in use, leave the fuel valve lever in the OFF position to prevent carburetor flooding and to reduce the possibility of fuel leakage.



SERVICING THE ENGINE

THE IMPORTANCE OF MAINTENANCE

Good maintenance is essential for safe, economical, and trouble-free operation. It will also help reduce air pollution.

WARNING!

Improperly maintaining this engine, or failure to correct a problem before operation, can cause a malfunction in which you can be seriously hurt or killed.

Always follow the inspection and maintenance recommendations and

To help you properly care for your engine, the following pages include a maintenance schedule, routine inspection procedures, and simple maintenance procedures using basic hand tools. Other service tasks that are more difficult, or require special tools, are best handled by professionals and are normally performed by a qualified mechanic.

The maintenance schedule applies to normal operating conditions. If you operate your engine under unusual conditions, such as sustained high-load or high-temperature operation, or use in unusually wet or dusty conditions, consult your servicing dealer for recommendations applicable to your individual needs and use.

Maintenance, replacement or repair of emission control devices and systems may be done by any engine repair establishment or individual, using parts that are "certified" to EPA standards.

MAINTENANCE SAFETY

Some of the most important safety precautions follow. However, we cannot warn you of every conceivable hazard that can arise in performing maintenance. Only you can decide whether or not you should perform a given task.

SAFETY PRECAUTIONS

- Make sure the engine is off before you begin any maintenance or repairs. This will eliminate several potential hazards:

  > Carbon monoxide poisoning from engine exhaust.
  Be sure there is adequate ventilation whenever you operate the engine.

  > Burns from hot parts.
  Let the engine and exhaust system cool before touching.

  > Injury from moving parts.
  Do not run the engine unless instructed to do so.

- Read the instructions before you begin, and make sure you have the tools and skills required.
- To reduce the possibility of fire or explosion, be careful when working around gasoline. Use only a nonflammable solvent, not gasoline, to clean parts. Keep cigarettes, sparks and flames away from all fuel-related parts.

To ensure the best quality and reliability, use only new, original replacement parts or their equivalents for repair and replacement.

MAINTENANCE SCHEDULE

			REGULAR SERVICE PERIOD (3) ITEM Perform at every indicated month or operating hour interval, whichever comes first.	Each use	First month or 20 Hours	Every 3 months or 50 Hours	Every 6 months or 100 Hours	Every year or 300 Hours	Refer to page
	Engine oil	Check level	V					
		Change		✓		✓		
	Reduction gear oil	Check level	✓					
	(applicable types)	Change		✓ ✓				
e	Air filter	Check	✓					
		Clean			✓ (1)	✓*(1)		
		Replace			✓*			
	Sediment cup	Clean		✓				
	Sparkplug	Check-adjust		✓				
		Replace			✓			
	Spark arrester (optional parts)	Clean				✓		
	Idle speed	Check-adjust					✓ (2)	
•	Valve clearance	Check-adjust					✓ (2)	—
•	Combustion chamber	Clean	After every 500 Hours (2)					—
	Fuel tank & filter	Clean				✓ (2)		—
•	Fuel tube	Check	Every 2 years (Replace if necessary) (2)					—

• Emission-related items.

* Internal vent carburetor (See page 7) with dual element type only.

** Replace paper element type only.

(1) Service more frequently when used in dusty areas.

(2) These items should be serviced by a qualified mechanic, unless you have the proper tools and are mechanically proficient.

(3) For commercial use, log hours of operation to determine proper maintenance intervals.

REFUELING

With the engine stopped and on a level surface, remove the fuel tank cap and check the fuel level. Refill the tank if the fuel level is low.

WARNING!

Gasoline is highly flammable and explosive.

You can be burned or seriously injured when handling fuel.

- Stop the engine and keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

MAXIMUM FUEL LEVEL

TOP OF FUEL TANK

Refuel in a well-ventilated area before starting the engine. If the engine has been running, allow it to cool. Refuel carefully to avoid spilling fuel. Do not fill the fuel tank completely. Fill tank to approximately 1 inch below the top of the fuel tank to allow for fuel expansion. It may be necessary to lower the fuel level depending on operating conditions. After refueling, tighten the fuel tank cap securely.

Never refuel the engine inside a building where gasoline fumes may reach flames or sparks. Keep gasoline away from appliance pilot lights, barbecues, electric appliances, power tools, etc.

Spilled fuel is not only a fire hazard, it causes environmental damage. Wipe up spills immediately.

NOTICE: *Fuel can damage paint and plastic. Be careful not to spill fuel when filling your fuel tank. Damage caused by spilled fuel is not covered under warranty.*

FUEL RECOMMENDATIONS

Use unleaded gasoline with a pump octane rating of 86 or higher.

These engines are certified to operate on unleaded gasoline. Unleaded gasoline produces fewer engine and spark plug deposits and extends exhaust system life.

Never use stale or contaminated gasoline or an oil/gasoline mixture. Avoid getting dirt or water in the fuel tank.

Occasionally you may hear a light "knocking" or "pinging" (metallic rapping noise) while operating under heavy loads. This is no cause for concern.

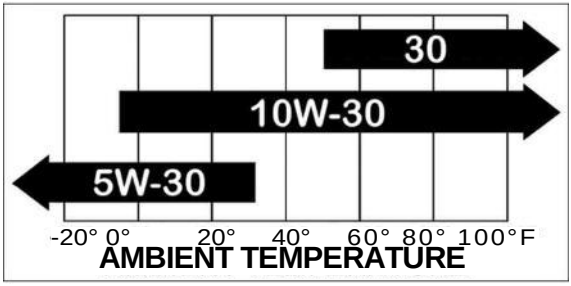
If knocking or pinging occurs at a steady engine speed, under normal load, change brands or higher octane of gasoline. If knocking or pinging persists, see an authorized qualified mechanic.

NOTICE: *Running the engine with persistent knocking or pinging can cause engine damage. Running the engine with persistent knocking or pinging is considered misuse, and the warranty does not cover parts damaged by misuse.*

OIL RECOMMENDATIONS

Oil is a major factor affecting performance and service life. Use 4-stroke automotive detergent oil.

SAE 10W-30 is recommended for general use. Other viscosities shown in the chart may be used when the average temperature in your area is within the recommended range.
The SAE oil viscosity and service classification are in the API label on the oil container. The



manufacture recommends that you use API SERVICE category SJ or SL oil.

OIL LEVEL CHECK

Check the engine oil level with the engine stopped and in a level position.

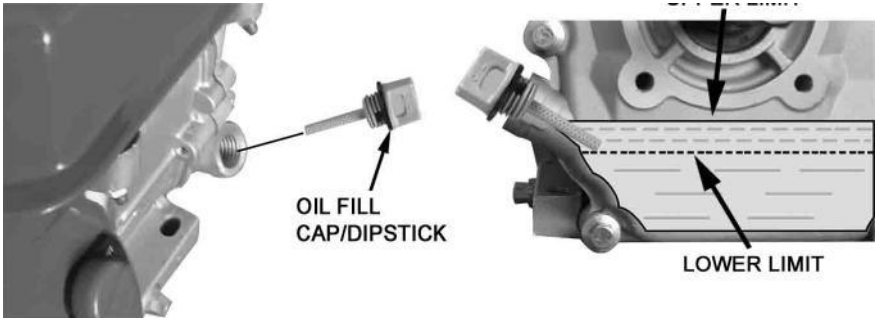
1. Remove the filler cap/dipstick and wipe it clean.
2. Insert and remove the dipstick with out screwing it into the filler neck. Check the oil level shown on the dipstick.
3. If the oil level is low, fill to the edge of the oil filler hole with the recommended oil.
4. Screw in the filler cap/dipstick securely.

UPPER LIMIT

LOWER LIMIT

NOTICE: *Running the engine with* a low *oil level can cause engine damage.*

The oil sensor will automatically stop the engine before the oil level falls below safe limit. However, to avoid the inconvenience of an unexpected shutdown, always check the engine oil level before startup.



OIL CHANGE

Drain the used oil while the engine is warm. Warm oil drains quickly and completely.

1. Place a suitable container below the engine to catch the used oil, then remove the filler cap/dipstick, drain plug, and washer.
2. Allow the used oil to drain completely, then reinstall the drain plug, washer, and tighten drain plug securely.

   Please dispose of used motor oil in a manner that is compatible with the environment. We suggest you take used oil in a sealed container to your local recycling center or service station for reclamation. Do not throw it in the trash; pour it on the ground, or down a drain.

3. With the engine in a level position, fill to the outer edge of the oil filler hole with the recommended oil.

NOTICE: *Running the engine with a low oil level can cause engine damage.*

The oil sensor will automatically stop the engine before the oil level falls below the safe limit. However, to avoid the inconvenience of an unexpected shutdown, fill to the upper limit, and check the oil level regularly.

4. Screw in the filler cap/dipstick securely.

OIL/CAP
DIPSTICK

\- WASHER

OIL LEVEL

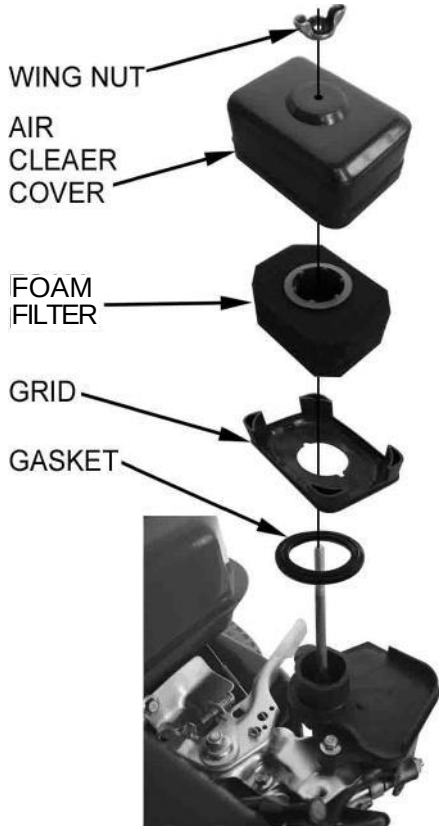
DRAIN BOLT

AIR FILTER INSPECTION & SERVICE

A dirty air filter will restrict air flow to the carburetor, reducing engine performance. If you operate the engine in very dusty areas, clean the air filter more often than specified in the MAINTENANCE SCHEDULE.

NOTICE: *Operating the engine without an air or with a damaged air filter, will allow dirt to the engine, causing rapid engine wear. This type of damage is not covered by the warranty.*

1. Remove the wing nut, and remove the air cleaner cover.
2. Carefully remove plastic grid from the bottom of the cover.
3. Carefully remove the foam air filter from the cover. Wash the filter in warm, soapy water, rinse, and allow to dry thoroughly.
4. Wipe dirt from the inside of the air cleaner base and cover, using a moist rag. Be careful to prevent dirt from entering the air duct that leads to the carburetor.
5. Insert the cleaned, dry or new foam air filter in the cover and replace plastic grid.
6. Reinstall the air cleaner assembly. Be sure the gasket is in place beneath the air filter.
7. Tighten the air filter wing nut securely.



SEDIMENT CUP CLEANING

1. Move the fuel valve to the OFF position, then remove the fuel sediment cup and 0-ring.

WARNING!

Gasoline is highly flammable and explosive.
You can be burned or seriously injured when handling fuel.

- Stop the engine and keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

2. Wash the sediment cup and 0-ring in nonflammable solvent, and dry them thoroughly.
3. Place the 0-ring in the fuel valve, and install the sediment cup. Tighten the sediment cup securely.
4. Move the fuel valve to the ON position, and check for leaks. Replace the 0-ring if there is any leakage.

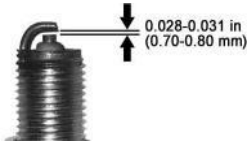
SPARK PLUG SERVICE

Recommended spark plugs: BPR6ES (NGK)
W20EPR-U (DENSO)

NOTICE: *An incorrect spark plug can cause engine damage.*

1. Disconnect the spark plug cap, and remove any dirt from around the spark plug area.
2. Remove the spark plug with a 13/16-inch spark plug wrench.

3. Inspect the spark plug. Replace it if the electrodes are worn, or if the insulator is cracked or chipped.
4. Measure the spark plug electrode gap with a suitable gauge. The gap should be 0.028-0.031 in. Correct the gap, if necessary, by carefully bending the electrode.
5. Install the spark plug carefully, by hand, to avoid cross-threading.



6. After the spark plug is seated, tighten with a 13/16-inch spark plug wrench to compress the sealing washer.

If reinstalling the used spark plug, tighten 1/8 — 1/4 turn after the spark plug is seated.

If installing a new spark plug, tighten 1/2 turn after the spark plug is seated.

SEALING WASHER

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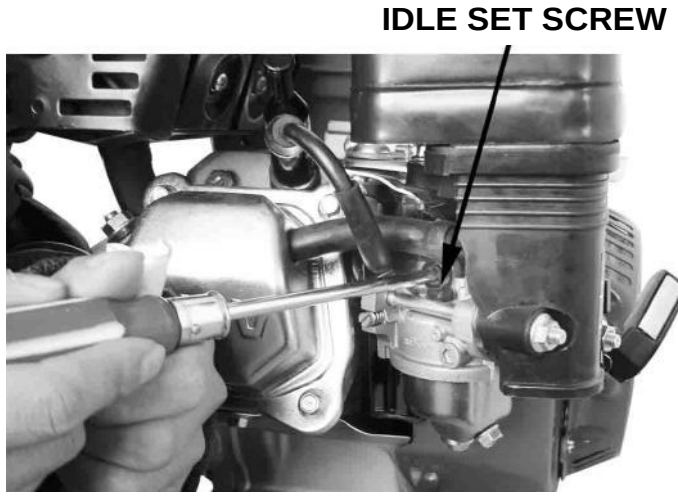
NOTICE: *A loose spark plug can overheat and damage the engine. Over-tightening the spark plug can damage the threads in the cylinder head.*

7. Attach the spark plug cap.

IDLE SPEED ADJUSTMENT

1. Start the engine outdoors, and allow it to warm up to operating temperature.
2. Move the throttle lever to its slowest position.
3. Turn the throttle stop screw to obtain the standard idle speed.

   Standard idle speed: 1,400:1^{2}50 rpm



STORING THE ENGINE

Proper storage preparation is essential for keeping your engine trouble free and looking good. The following steps will help to keep rust and corrosion from impairing your engine's function and appearance, and will make the engine easier to start after storage.

CLEANING

If the engine has been running, allow it to cool for at least half an hour before cleaning. Clean all exterior surfaces, touch up any damaged paint, and coat other areas that may rust with a light film of oil.

NOTICE:

- *Using a garden hose or pressure washing equipment can force water into the air cleaner or muffler opening. Water in the air cleaner will soak the air filter, and water that passes through the air filter or muffler can enter the cylinder, causing damage.*
- *Water contacting a hot engine can cause damage. If the engine has been running, allow it to cool for at least half an hour before washing.*

FUEL

Gasoline will oxidize and deteriorate in storage. Old gasoline will cause hard starting, and it leaves gum deposits that clog the fuel system. If the gasoline in your engine deteriorates during storage, you may need to have the carburetor and other fuel system components serviced or replaced.

The length of time that gasoline can be left in your fuel tank and carburetor without causing functional problems will vary with such factors as gasoline blend, your storage temperatures, and whether the fuel tank is partially or completely filled. The air in a partially filled fuel tank promotes fuel deterioration. Very warm storage/temperatures accelerate fuel deterioration. Fuel deterioration problems may occur within a few months, or even less if the gasoline was not fresh when you filled the fuel tank.

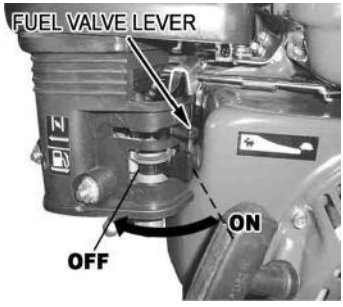
The Warranty does not cover fuel system damage or engine performance problems resulting from neglected storage preparation.

You can extend fuel storage life by adding a fuel stabilizer that is formulated for that purpose, or you can avoid fuel deterioration problems by draining the fuel tank and carburetor.

ADDING A FUEL STABILIZER TO EXTEND FUEL STORAGE LIFE

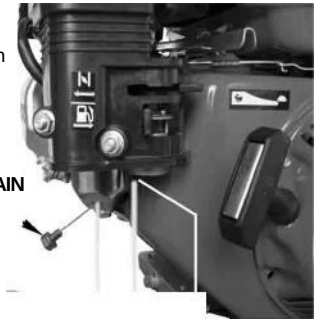
When adding a fuel stabilizer, fill the fuel tank with fresh gasoline. If only partially filled, air in the tank will promote fuel deterioration during storage. If you keep a container of gasoline for refueling, be sure that it contains only fresh gasoline.

1. Add fuel stabilizer following the manufacturer's instructions.
2. After adding a fuel stabilizer, run the engine outdoors for 10 minutes to be sure that treated gasoline has replaced the untreated gasoline in the carburetor.
3. Stop the engine, and move the fuel valve to the OFF position.



DRAINING THE FUEL TANK AND CARBURETOR

1. Place an approved gasoline container below the carburetor, and use a funnel to avoid spilling fuel.
2. Remove the carburetor drain bolt and sediment cup, then move the fuel valve lever to the ON position.



A Gasoline is highly flammable and

seriously injured when handling
explosive. You can be burned or
fuel.

WARNING! • Keep heat, sparks, and flame away.

•

Handle fuel only

outdoors.

• Wise us s ills immediatel

3. After all the fuel has drain into the container, reinstall the drain bolt and sediment cup. Tighten them securely.

SEDIMENT CUP

E N G I N E O I L

1. Change the engine oil.
2. Remove the spark plugs.
3. Pour a tablespoon of clean engine oil into the cylinder.
4. Pull the starter rope several times to distribute the oil in the cylinder.
5. Reinstall the spark plug.
6. Pull the starter rope slowly until resistance is felt and the notch on the starter pulley aligns with the hole at the top of the recoil starter cover. This will close the valves so moisture cannot enter the engine cylinder. Return the starter rope gently.

STORAGE PRECAUTIONS

If your engine will be stored with gasoline in the fuel tank and carburetor, it is important to reduce the hazard of gasoline vapor ignition. Select a well-ventilated storage area away from any appliance that operates with a flame, such as a furnace, water heater, or clothes dryer. Also avoid any area with a spark-producing electric motor, or where power tools are operated.

If possible, avoid storage areas with high humidity, because that promotes rust and corrosion.

Unless all fuel has been drained from the fuel tank, leave the fuel valve lever in the OFF position to reduce the possibility of fuel leakage.

Position the equipment so the engine is level. Tilting can cause fuel or oil leakage.

With the engine and exhaust system cool, cover the engine to keep out dust. A hot engine and exhaust system can ignite or melt some materials. Do not use sheet plastic as a dust cover. A nonporous cover will trap moisture around the engine, promoting rust and corrosion.

REMOVAL FROM STORAGE

Check your engine as described in the *BEFORE OPERATION chapter* of this manual.

If the fuel was drained during storage preparation, fill the tank with fresh gasoline. If you keep a container of gasoline for refueling, be sure that it contains only fresh gasoline. Gasoline oxidizes and deteriorates over time, causing hard starting.

If the cylinder was coated with oil during storage preparation, the engine may smoke briefly at startup. This is normal.

TRANSPORTING

If the engine has been running, allow it to cool for at least 15 minutes before loading the engine-powered equipment on the transport vehicle. A hot engine and exhaust system can burn you and can ignite some materials.

Keep the engine level when transporting to reduce the possibility of fuel leakage. Move the fuel valve lever to the OFF position.

TROUBLESHOOTING

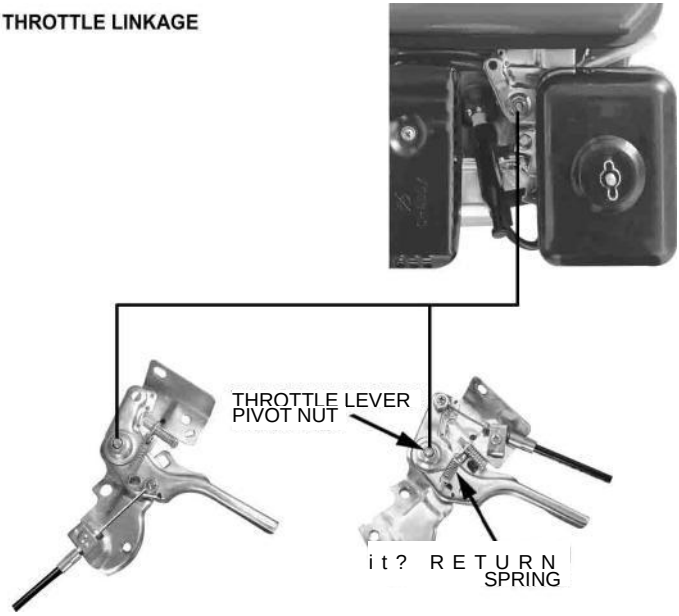
PROBLEM	POSSIBLE CAUSE	CORRECTION
Engine Will Not Start	1. Fuel valve OFF.	1. Move fuel valve lever to ON.
	2. Choke OPEN.	2. Move choke lever to CLOSED unless engine is warm.
	3. Engine switch OFF.	3. Turn engine switch to ON.
	4. Out of fuel.	4. Refuel.
	5. Bad fuel; engine stored without treating or draining gasoline, or refueled with bad gasoline.	5. Drain fuel tank and carburetor. Refuel with fresh gasoline.
	6. Spark plug faulty, fouled, or improperly gapped.	6. Remove and inspect spark plug. Clean, gap, or replace spark plug.
	7. Spark plug wet with fuel (flooded engine).	7. Remove and inspect spark plug. Dry and reinstall spark plug. Start engine with throttle lever in FAST position.
	8. Fuel filter clogged, carburetor malfunction, ignition malfunction, valves stuck, etc.	8. Take engine to a qualified mechanic. Replace or repair faulty components as necessary.
Engine Lacks Power	1. Filter element(s) clogged.	1. Check air filter. Clean or replace filter.
	2. Bad fuel; engine stored without treating or draining gasoline, or refueled with bad gasoline.	2. Drain fuel tank and carburetor. Refuel with fresh gasoline.
	3. Fuel filter clogged, malfunction, ignition malfunction, valves stuck, etc.	3. Take engine to a qualified mechanic. Replace or repair faulty components as necessary.

REMOTE CONTROL LINKAGE (Optional)

The throttle and choke control levers can be modified for optional cable attachment. The following illustrations show installation examples for a solid wire cable and for a flexible, braided wire cable. If using a flexible, braided wire cable, add a return spring as shown.

It is necessary to loosen the throttle lever friction nut when operating the throttle with a remote-mounted control.

REMOTE THROTTLE LINKAGE



Flexible wire core cable

Solid wire core cable

WIRE

SCREW

MI10⁶-.WIRE HOLDER

OPTIONAL ASSEMBLY

r-THROTTLE LEVER

CIRCLIP

CARBURETOR MODIFICATION FOR HIGH ALTITUDE OPERATION

At high altitude, the standard carburetor air-fuel mixture will be too rich. Performance will decrease, and fuel consumption will increase. A very rich mixture will also foul the spark plug and cause hard starting. Operation at an altitude that differs from that at which this engine was certified, for extended periods of time, may increase emissions.

High altitude performance can be improved by specific modifications to the carburetor. If you always operate your engine at altitudes above 5,000 feet (1,500 meters), have a qualified mechanic perform this carburetor modification. This engine, when operated at high altitude with the carburetor modifications for high altitude use, will meet each emission standard throughout its useful life.

Even with carburetor modification, engine horsepower will decrease about 3.5% for each 1,000-foot (300-meter) increase in altitude. The effect of altitude on horsepower will be greater than this if no carburetor modification is made.

NOTICE: *When the carburetor has been modified for high altitude operation, the air-fuel mixture will be too lean for low altitude use. Operation at altitudes below 5,000 feet (1,500 meters) with a modified carburetor may cause the engine to overheat and result in serious engine damage. For use at low altitudes, have a qualified mechanic return the carburetor to original factory specifications.*

REPLACEMENT PARTS

The emission control systems on your engine were designed, built, and certified to conform with EPA and California emission regulations. We recommend the use of original replacement parts whenever you have maintenance done. These original-design replacement parts are manufactured to the same standards as the original parts, so you can be confident of their performance. The use of replacement parts that are not of the original design and quality may impair the effectiveness of your emission control system.

A manufacturer of an aftermarket part assumes the responsibility that the part will not adversely affect emission performance. The manufacturer or rebuilder of the part must certify that use of the part will not result in a failure of the engine to comply with emission regulations.

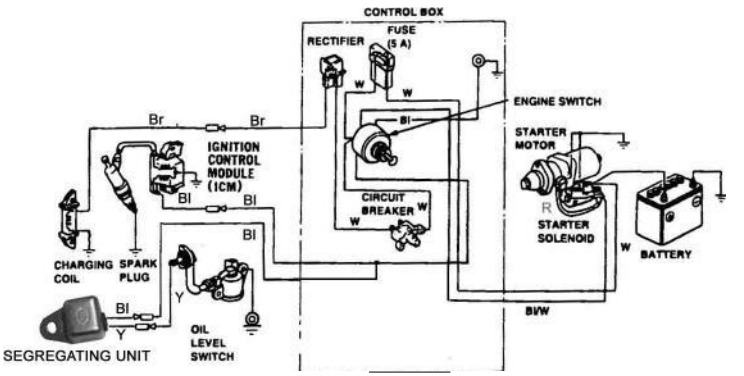
Wiring Diagrams

Oil sensor and Electric Starter Types

ENGINE SWITCH

	1G	E	ST	BAT
OFF				
ON				
START				

Bl	BLACK	Br	BROWN
Y	YELLOW	R	RED
W	WHITE	G	GREEN



Engine Types With Oil sensor and Without Electric Starter

ELI BLACK Y
YELLOW G
GREEN