

INTRODUCTION

Thank you for purchasing our engines.

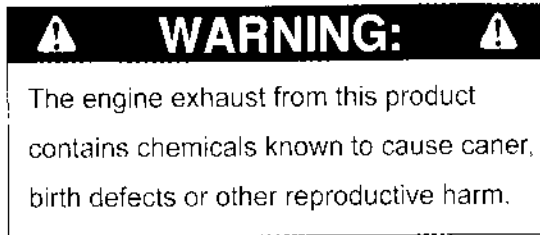
We want to help you get the best results from your new engine and to operate it safely. This manual contains the information on how to do that; please read it carefully.

As you read this manual, you will find information preceded by a **NOTICE** symbol. That information is intended to help you avoid damage to your engine, other property, or the environment.

We suggest you read the warranty policy to fully understand its coverage and your responsibilities of ownership. The warranty policy is a separate document that should have been given to you by your dealer.

When your engine needs scheduled maintenance, keep in mind that your servicing dealer is specially trained in servicing your engines. Your servicing dealer is dedicated to your satisfaction and will be pleased to answer your questions and concerns.

Best Wishes



Keep this user's manual handy, so you can refer to it at any time. This user's manual is considered a permanent part of the engine and should remain with the engine if resold.

The information and specifications included in this publication were in effect at the time of approval for printing. Illustrations are based on the 620 type.

INTRODUCTION


A FEW WORDS ABOUT SAFETY

Your safety and the safety of others are very important. And using this engine safely is an important responsibility.

To help you make informed decisions about safety, we have provided operating procedures and other information on labels and in this manual. This information alerts you to potential hazards that could hurt you or others.

Of course, it is not practical or possible to warn you about all the hazards associated with operating or maintaining an engine. You must use your own good judgment.

You will find important safety information in a variety of forms, including:

- **Safety Messages** — preceded by a safety alert symbol  and one of three signal words, DANGER, WARNING, or CAUTION.

These signal words mean:

▲ DANGER You WILL be KILLED or SERIOUSLY HURT if you don't follow instructions.

▲ WARNING You CAN be KILLED or SERIOUSLY HURT if you don't follow instructions.

▲ CAUTION You CAN be HURT if you don't follow instructions.

- **Safety Headings** — such as *IMPORTANT SAFETY INFORMATION*.
- **Safety Section** — such as *ENGINE SAFETY*.
- **Instructions** — how to use this engine correctly and safely.

This entire book is filled with important safety information — please read it carefully.

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ENGINE SAFETY

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.

Owner Responsibilities

- Our engines are designed to give safe and dependable service if operated according to instructions. Read and understand this user'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.

Refuel With Care

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.

Hot Exhaust

- 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 (1 meter) away from building walls and other equipment during operation. Do not place flammable objects close to the engine.

ENGINE SAFETY

Carbon Monoxide Hazard

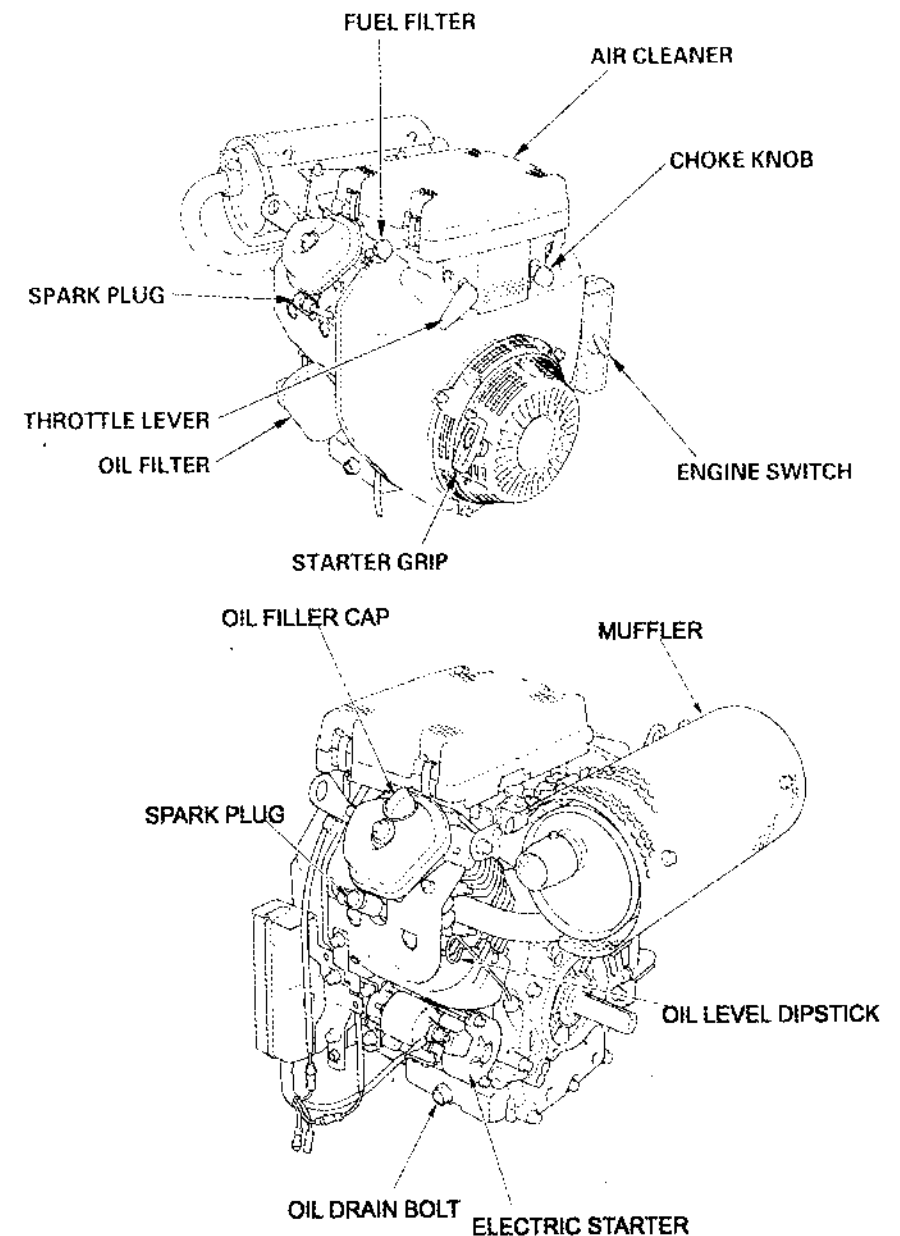
Exhaust gas contains poisonous carbon monoxide. Avoid inhalation of exhaust gas. Never run the engine in a closed garage or confined area.

Other Equipment

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, or operation, or protective apparel that may be needed to operate the equipment.

CONTROLS & FEATURES

COMPONENT & CONTROL LOCATIONS



CONTROLS

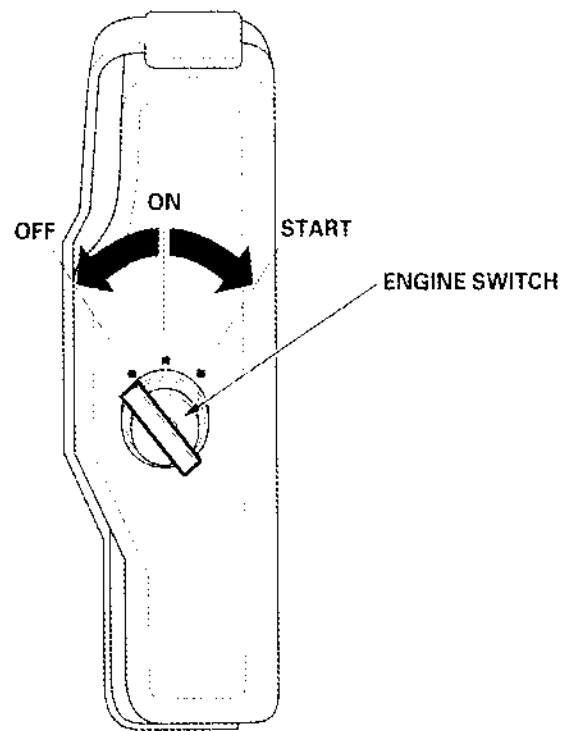
Engine Switch

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.

Turning the engine switch to the START position operates the electric starter to crank the engine. The key automatically returns to the ON position when released from the START position.



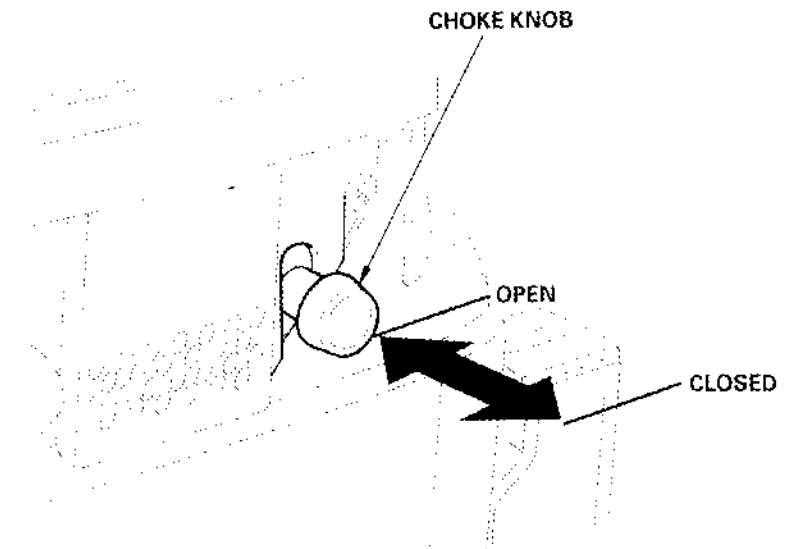
Choke Knob

The choke knob 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.

Some engine applications use a remotely-mounted choke control rather than the engine-mounted choke knob shown here. Refer to the instructions provided with the equipment powered by this engine for remote control information.



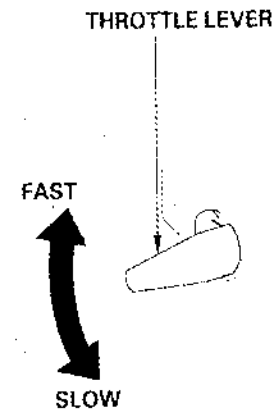
CONTROLS & FEATURES

Throttle Lever

The throttle lever controls engine speed.

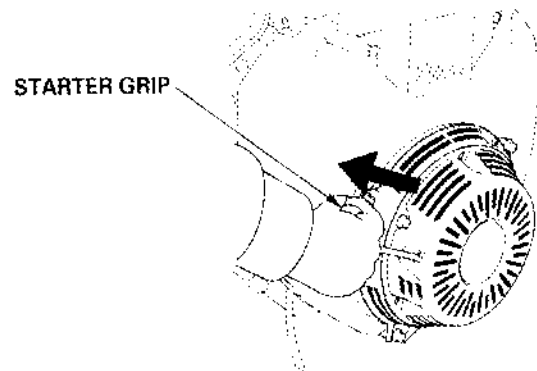
Moving the throttle lever in the directions shown makes the engine run faster or slower.

Some engine applications use a remotely-mounted throttle control rather than the engine-mounted throttle lever shown here. Refer to the instructions provided with the equipment powered by this engine for remote control information.



Recoil Starter Grip

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



CONTROLS & FEATURES

FEATURES

Oil Alert® System (applicable engine types)

The Oil Alert® system is designed to prevent engine damage caused by an insufficient amount of oil in the crankcase. Before the oil level in the crankcase can fall below a safe limit, the Oil Alert® system will automatically stop the engine (the ignition switch will remain in the ON position).

If the engine stops and will not restart, check the engine oil level (page 24) before troubleshooting in other areas.

Fuel-cut Solenoid

The engine is equipped with a fuel-cut solenoid that allows fuel to flow to the carburetor main jet when the engine switch is in the ON or START position and stops the flow of fuel to the main jet when the engine switch is in the OFF position.

The engine must be connected to the battery to energize the fuel-cut solenoid, allowing the engine to run. If the battery is disconnected, fuel flow to the carburetor main jet will stop.

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.

▲ WARNING

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 preoperation inspection before each operation, and correct any problem.

Before beginning your preoperation 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.
- Remove any excessive dirt or debris, especially around the muffler and recoil starter.
- Look for signs of damage.
- Check that all shields and covers are in place, and all nuts, bolts, and screws are tightened.

BEFORE OPERATION

Check the Engine

- Check the engine oil level (see page 24). Running the engine with a low oil level can cause engine damage.

The Oil Alert® system (applicable engine types) 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 (see page 28). 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.

OPERATION

SAFE OPERATING PRECAUTIONS

Before operating the engine for the first time, please review the *IMPORTANT SAFETY INFORMATION* on page 5 and the chapter titled *BEFORE OPERATION*.

⚠ 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.

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

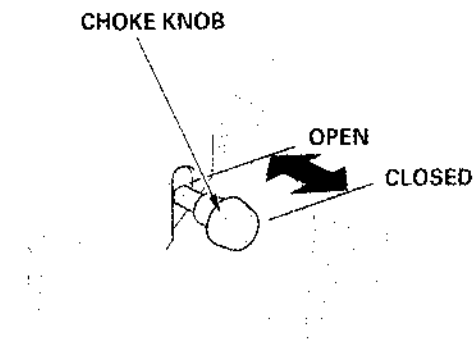
1. If the fuel tank is equipped with a valve, be sure the fuel valve is in the OPEN or ON position before attempting to start the engine.

OPERATION

2. To start a cold engine, pull the choke knob out to the CLOSED position.

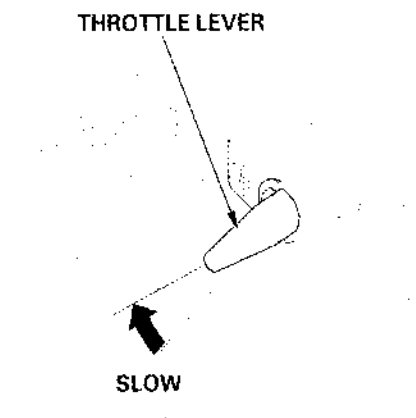
To restart a warm engine, leave the choke knob in the OPEN position.

Some engine applications use a remotely-mounted choke control rather than the engine-mounted choke knob shown here. Refer to the instructions provided with the equipment powered by this engine for remote control information.



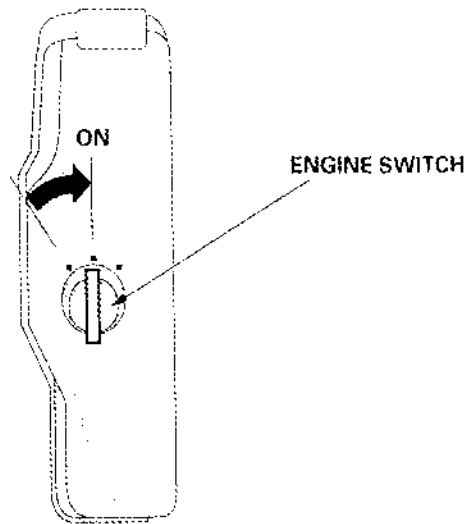
3. Move the throttle lever away from the SLOW position, about 1/3 of the way toward the FAST position.

Some engine applications use a remotely-mounted throttle control rather than the engine-mounted throttle lever shown here. Refer to the instructions provided with the equipment powered by this engine for remote control information.



OPERATION

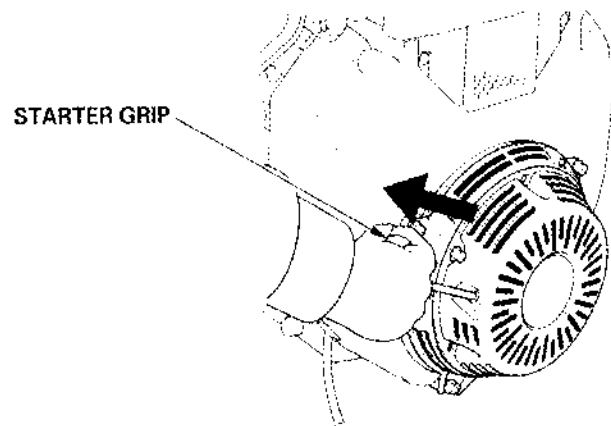
4. Turn the engine switch to the ON position.



5. Operate the starter.

RECOIL STARTER (applicable engine types):

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



OPERATION

ELECTRIC STARTER (all engine types):

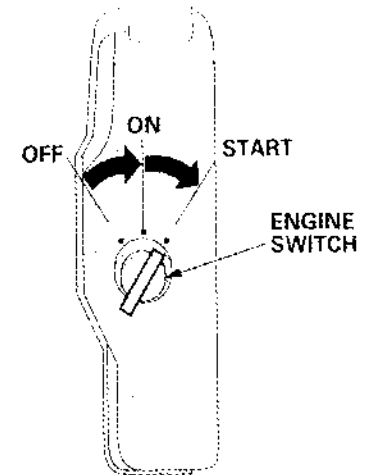
Turn the key to the START position, and hold it there until the engine starts.

If the engine fails to start within 5 seconds, release the key, and wait at least 10 seconds before operating the starter again.

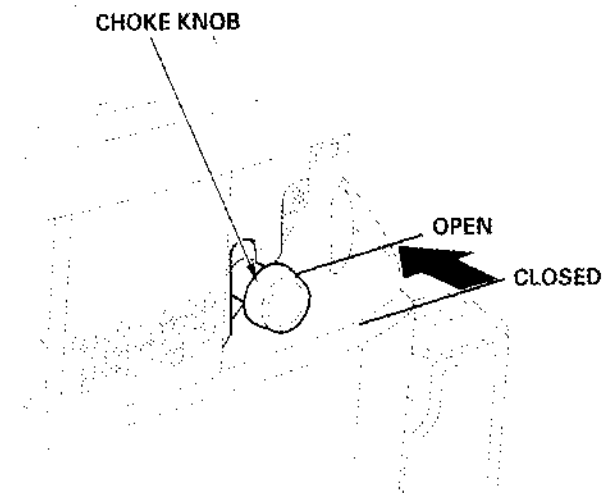
NOTICE

Using the electric starter for more than 5 seconds at a time will overheat the starter motor and can damage it.

When the engine starts, release the key, allowing it to return to the ON position.



6. If the choke knob has been pulled to the CLOSED position to start the engine, gradually push it to the OPEN position as the engine warms up.



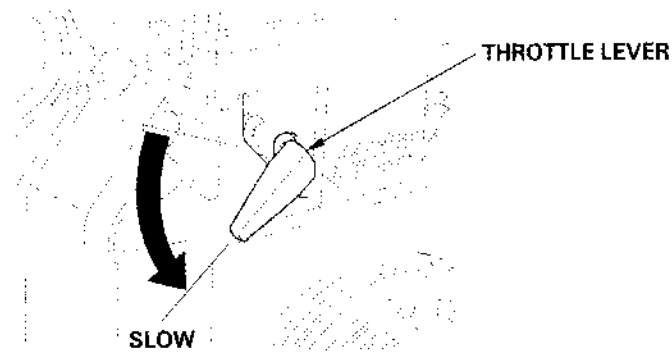
OPERATION

STOPPING THE ENGINE

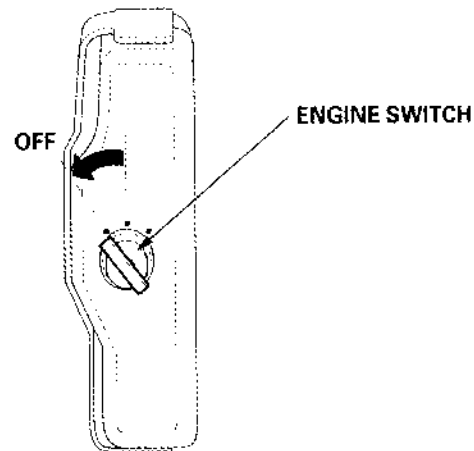
To stop the engine in an emergency, simply turn the engine switch to the OFF position. Under normal conditions, use the following procedure.

1. Move the throttle lever to the SLOW position.

Some engine applications use a remotely-mounted throttle control rather than the engine-mounted throttle lever shown here. Refer to the instructions provided with the equipment powered by this engine for remote control information.



2. Turn the engine switch to the OFF position.



3. If the fuel tank is equipped with a valve, turn the fuel valve to the CLOSED or OFF position.

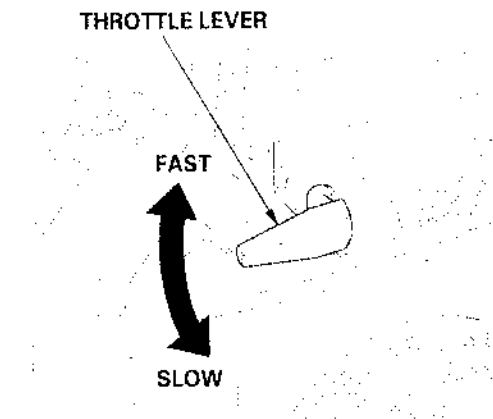
OPERATION

SETTING ENGINE SPEED

Position the throttle lever for the desired engine speed.

Some engine applications use a remotely-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.



Do not disconnect the battery from the engine while the engine is running. Disconnecting the battery causes the fuel-cut solenoid to shut off the flow of fuel to the carburetor main jet, and the engine will stop.

SERVICING YOUR 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 schedules in this owner's manual.

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 our technician or other 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.

SERVICING YOUR ENGINE

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.

▲ WARNING

Failure to properly follow maintenance instructions and precautions can cause you to be seriously hurt or killed. Always follow the procedures and precautions in the owner's manual.

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.

Remember that your servicing dealer knows your engine best and is fully equipped to maintain and repair it.

To ensure the best quality and reliability, use only new, genuine our engines' parts or their equivalents for repair and replacement.

SERVICING YOUR ENGINE

MAINTENANCE SCHEDULE

REGULAR SERVICE PERIOD (3)		Each use	First month or 20 Hrs.	Every 3 months or 50 Hrs.	Every 6 months or 100 Hrs.	Every year or 300 Hrs.	Refer to page
(1) M Perform at every indicated month or operating hour interval, whichever comes first.							
• Engine oil	Check						24
	Change						25
• Engine oil filter	Change					Every 200 Hrs.	26
• Air filter	Check						28
	Clean			(1)			29
	Replace						29
• Spark plug	Clean-Adjust						32
	Replace						32
• Spark arrester (optional part)	Clean						34
• Idle speed	Check-Adjust					(2)	—
• Valve clearance	Check-Readjust					(2)	—
• Combustion chamber	Clean		After every 500 Hrs. (2)				—
• Fuel filter	Check						31
	Change					(2)	—
• Fuel tank	Clean		Every year (2)				—
• Fuel tube	Check		Every 2 years (Replace if necessary) (2)				—

• Emission-related items.

* Replace the paper air filter element only.

- (1) Service more frequently when used in dusty areas.
- (2) These items should be serviced by your servicing dealer, unless you have the proper tools and are mechanically proficient.
- (3) For commercial use, log hours of operation to determine proper maintenance intervals.

SERVICING YOUR ENGINE

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 "spark knock" or "pinging" (metallic rapping noise) while operating under heavy loads. This is no cause for concern.

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 servicing dealer.

NOTICE

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

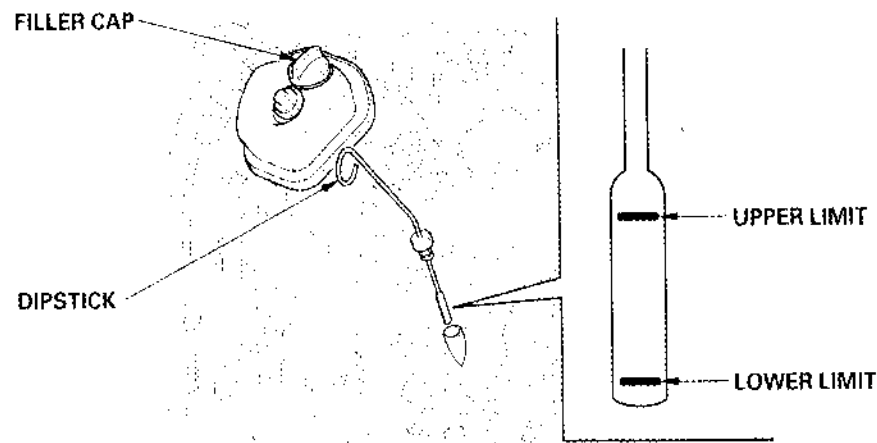
Running the engine with persistent spark knock or pinging is misuse, and the *Distributor's Limited Warranty* does not cover parts damaged by misuse.

SERVICING YOUR ENGINE

ENGINE OIL LEVEL CHECK

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

1. Place the engine horizontally on a level surface.
2. Remove the dipstick and wipe it clean.
3. Fully insert the dipstick, then remove it to check the oil level.
4. If the oil level is low, remove the oil filler cap, and fill to the upper limit mark on the dipstick with the recommended oil (see page 27).
5. Reinstall the dipstick and filler cap.



NOTICE

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

The Oil Alert® system (applicable engine types) 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.

SERVICING YOUR ENGINE

ENGINE 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 and the drain bolt.
2. Allow the used oil to drain completely, then reinstall the drain bolt, and tighten it 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 upper limit mark on the dipstick with the recommended oil (see page 27).

ENGINE OIL REFILL CAPACITIES:

Without oil filter replacement: approximately 1.16 US qt (1.10 ℓ, 0.97 Imp qt)

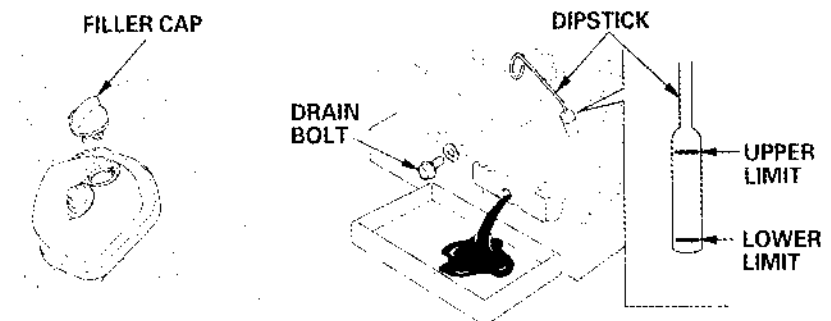
With oil filter replacement: approximately 1.48 US qt (1.40 ℓ, 1.23 Imp qt)

NOTICE

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

The Oil Alert® system (applicable engine types) 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.

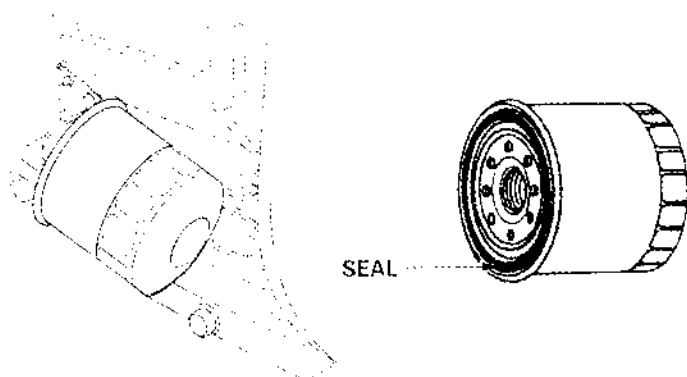
4. Reinstall the filler cap and dipstick securely.



SERVICING YOUR ENGINE

OIL FILTER CHANGE

1. Drain the engine oil, and retighten the drain bolt securely (see page 25).
2. Remove the oil filter, and drain the oil into a suitable container. Discard the used oil filter.



3. Clean the filter mounting base, and coat the seal of the new oil filter with clean engine oil.

NOTICE

Use only a genuine our engine's filter or a filter of equivalent quality specified for your model. Using the wrong filter, or a filter which is not of equivalent quality, may cause engine damage.

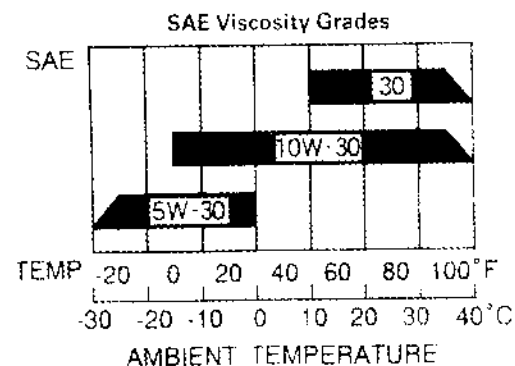
SERVICING YOUR ENGINE

4. Screw on the new oil filter by hand until the seal contacts the filter mounting base.
5. Refill the crankcase with the specified amount of the recommended oil. Reinstall the oil filler cap and dipstick.
6. Start the engine, and check for leaks.
7. Stop the engine, and check the oil level as described on page 24. If necessary, add oil to bring the oil level to the upper limit mark on the dipstick.

ENGINE 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.



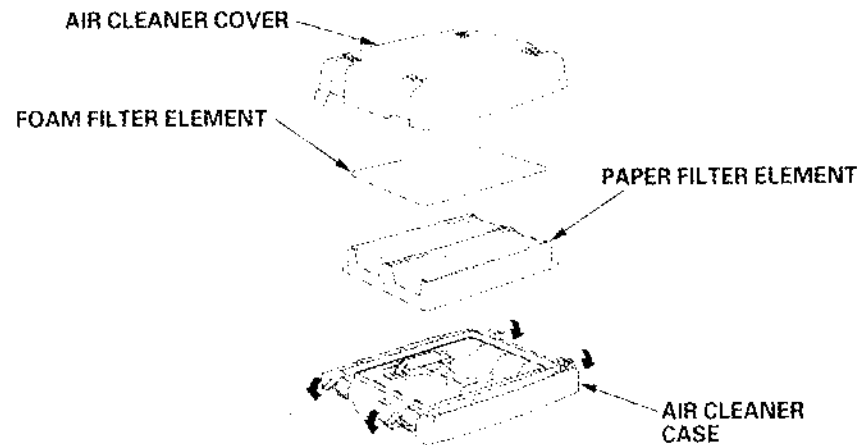
The SAE oil viscosity and service classification are in the API label on the oil container. We recommend that you use API SERVICE category SJ oil.

SERVICING YOUR ENGINE

AIR FILTER INSPECTION

Remove the air cleaner cover and inspect the filter elements. Clean or replace dirty filter elements. Always replace damaged filter elements.

Refer to page 29 for instructions that apply to the air cleaner and filter service.



SERVICING YOUR ENGINE

AIR CLEANER SERVICE

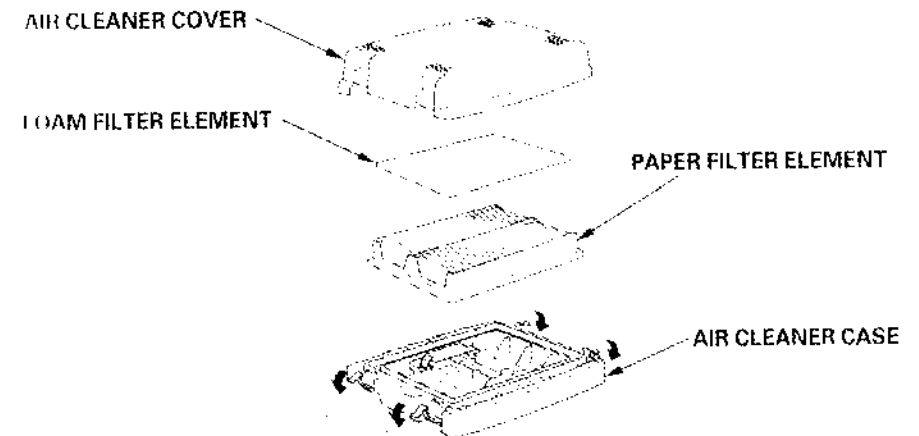
A dirty air filter will restrict air flow to the carburetor, reducing engine performance. If you operate the engine in very dusty areas, clean the air filter more often than specified in the MAINTENANCE SCHEDULE.

NOTICE

Operating the engine without an air filter, or with a damaged air filter, will allow dirt to enter the engine, causing rapid engine wear. This type of damage is not covered by the Distributor's Limited Warranty.

Standard Type

1. Release four latch tabs from the air cleaner cover, and remove the cover.
2. Remove the foam filter from the cover.
3. Remove the paper filter from the air cleaner case.



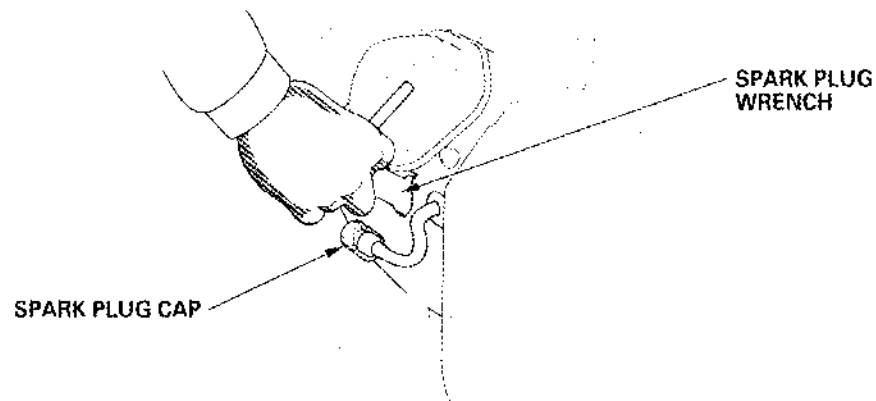
4. Inspect both air filter elements, and replace them if they are damaged. Always replace the paper air filter element at the scheduled interval (see page 24).
5. Clean the air filter elements if they are to be reused.

SPARK PLUG SERVICE

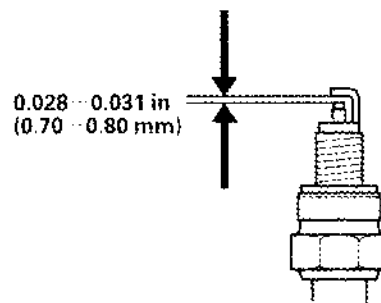
NOTICE

Incorrect spark plugs can cause engine damage.

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



3. Inspect the spark plugs. Replace them if the electrodes are worn, or if the insulator is cracked or chipped. Clean the spark plugs with a wire brush if you are going to reuse them.
4. Measure the spark plug electrode gap with a suitable gauge. The gap should be 0.028 - 0.031 in (0.70 - 0.80 mm). Correct the gap, if necessary, by carefully bending the side electrode.
5. Install the spark plug carefully, by hand, to avoid cross-threading.



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

If reinstalling the used spark plugs, tighten 1/8 - 1/4 turn after the spark plug seats.

If installing a new spark plugs, tighten 1/2 turn after the spark plug seats.

NOTICE

A loose spark plug can overheat and damage the engine. Overtightening the spark plug can damage the threads in the cylinder head.

7. Attach the spark plug caps.

SERVICING YOUR ENGINE

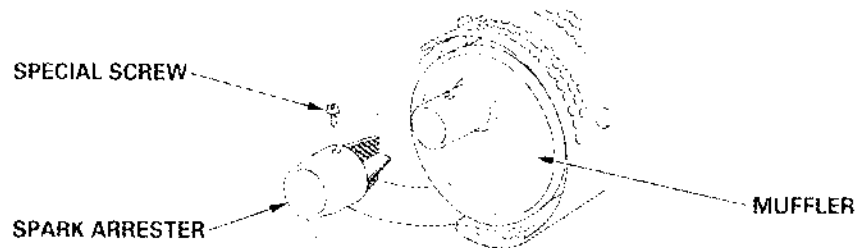
SPARK ARRESTER SERVICE (optional equipment)

Your engine is not factory-equipped with a spark arrester. In some areas, it is illegal to operate an engine without a spark arrester. Check local laws and regulations. A spark arrester is available from our authorized servicing dealers.

The spark arrester must be serviced every 100 hours to keep it functioning as designed.

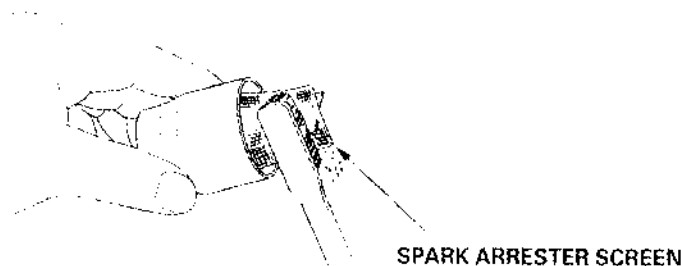
If the engine has been running, the muffler will be very hot. Allow the muffler to cool before servicing the spark arrester.

1. Remove the special screw from the muffler and remove the spark arrester.



2. Use a brush to remove carbon deposits from the spark arrester screen. Be careful to avoid damaging the screen.

The spark arrester must be free of breaks and holes. Replace the spark arrester if it is damaged.



3. Install the spark arrester, and muffler protector in the reverse order of disassembly.

HELPFUL TIPS & SUGGESTIONS

STORING YOUR ENGINE

Storage Preparation

Proper storage preparation is essential for keeping your engine troublefree 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 to start easier when you use it again.

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.

HELPFUL TIPS & SUGGESTIONS

The *Distributor's Limited 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 if the fuel tank is equipped with a fuel valve, move the fuel valve to the CLOSED or OFF position.

HELPFUL TIPS & SUGGESTIONS

DRAINING THE FUEL TANK AND CARBURETOR

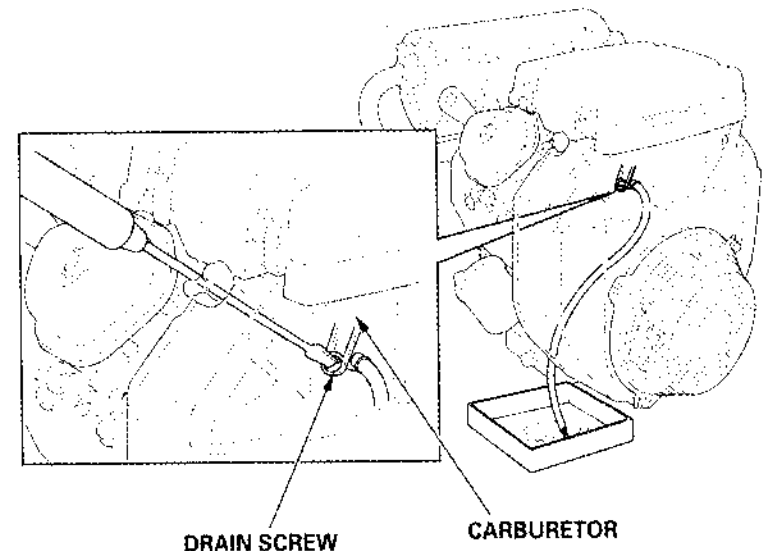
1. Disconnect the fuel line to the engine, and drain the fuel tank into an approved gasoline container. If the fuel tank is equipped with a valve, turn the fuel valve to the OPEN or ON position to enable draining. After draining is completed, reconnect the fuel line.
2. Loosen the carburetor drain screw, and drain the carburetor into an approved gasoline container. After draining is completed, tighten the carburetor drain screw.

⚠ WARNING

Gasoline is highly flammable and explosive.

You can be burned or seriously injured when handling fuel.

- Keep heat, sparks and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.



TAKING CARE OF UNEXPECTED PROBLEMS

ENGINE WILL NOT START	Possible Cause	Correction
1. Check battery and fuse.	Battery discharged.	Recharge battery.
	Fuse burnt out.	Replace fuse (p. 41).
2. Check control positions.	Fuel valve OFF. (if equipped)	Move lever to ON.
	Choke OPEN.	Move lever to CLOSED unless engine is warm.
3. Check fuel.	Engine switch OFF.	Turn engine switch to ON.
	Out of fuel.	Refuel.
4. Check engine oil level.	Bad fuel; engine stored without treating or draining gasoline, or refueled with bad gasoline.	Drain fuel tank and carburetor (p. 37). Refuel with fresh gasoline.
	Low oil level caused Oil Alert® to stop engine.	Add oil (p. 24).
5. Remove and inspect spark plugs.	Spark plugs faulty, fouled, or improperly gapped.	Clean, gap, or replace spark plugs (p. 32).
	Spark plugs wet with fuel (flooded engine).	Dry and reinstall spark plugs. Start engine with throttle lever in FAST position.
6. Take engine to an authorized servicing dealer.	Fuel filter clogged, carburetor malfunction, ignition malfunction, valves stuck, etc.	Replace or repair faulty components as necessary.

ENGINE LACKS POWER	Possible Cause	Correction
1. Check air filter.	Filter element(s) clogged.	Clean or replace filter element(s) (p. 29).
2. Check fuel.	Bad fuel; engine stored without treating or draining gasoline, or refueled with bad gasoline.	Drain fuel tank and carburetor (p. 37). Refuel with fresh gasoline.
3. Take engine to an authorized servicing dealer.	Fuel filter clogged, carburetor malfunction, ignition malfunction, valves stuck, etc.	Replace or repair faulty components as necessary.

TAKING CARE OF UNEXPECTED PROBLEMS

FUSE REPLACEMENT (3 A charge coil and switch box type)

The electric starter relay circuit and battery charging circuit are protected by a 25-ampere fuse. If the fuse burns out, the electric starter will not operate. The engine can be started manually if the fuse burns out, but running the engine will not charge the battery.

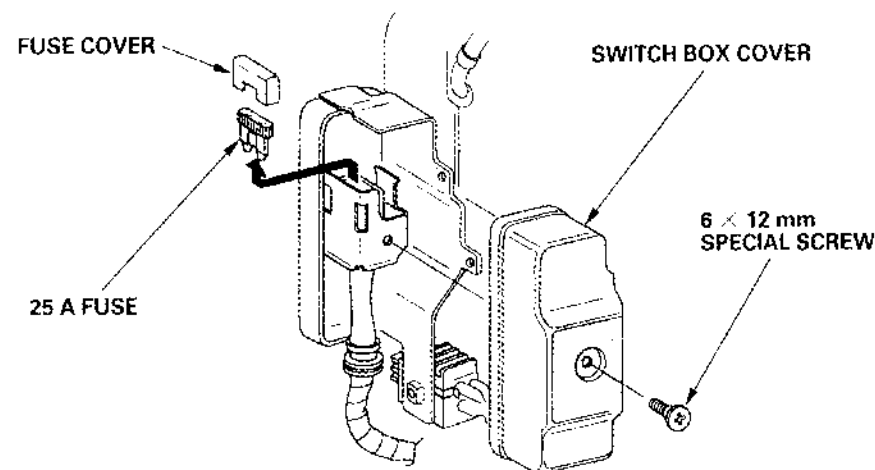
1. Remove the 6 × 12 mm screw from the rear cover of the engine switch box.
2. Remove the fuse cover, and inspect the fuse.

If the fuse is burnt out, remove the fuse cover, then pull out and discard the burnt-out fuse. Install a new 25-ampere fuse, and reinstall the fuse cover.

NOTICE

Never use a fuse with a rating greater than 25 amperes. Serious damage to the electrical system or a fire could result.

3. Reinstall the fuse cover. Install the 6 × 12 mm screw and tighten it securely.

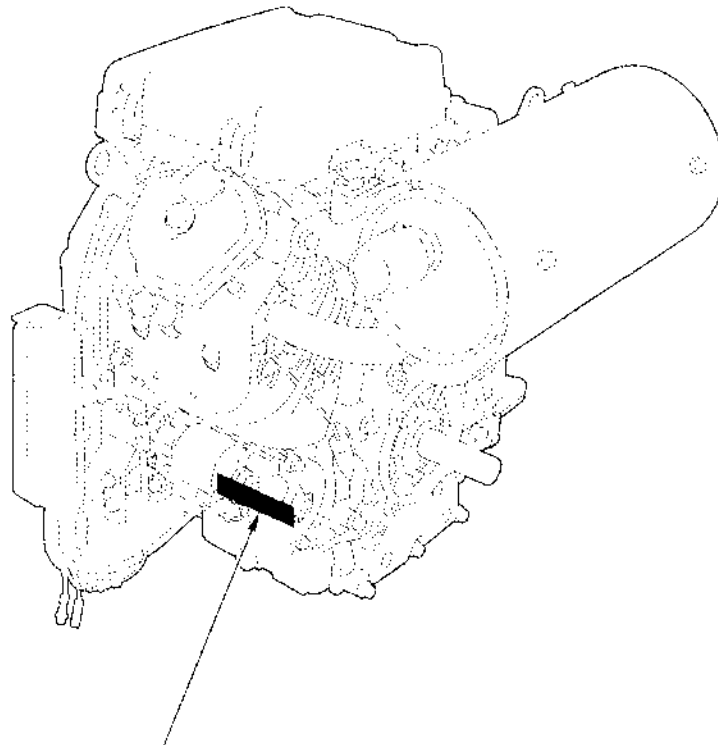


Frequent fuse failure usually indicates a short circuit or an overload in the electrical system. If the fuse burns out frequently, take the engine to a servicing dealer for repair.

TECHNICAL & CONSUMER INFORMATION

TECHNICAL INFORMATION

Serial Number Location



SERIAL NUMBER & ENGINE TYPE

Record the engine serial number in the space below. You will need this serial number when ordering parts, and when making technical or warranty inquiries (see page 51).

Engine serial number: _____

TECHNICAL & CONSUMER INFORMATION

Battery Connections for Electric Starter

Use a 12-volt battery with an ampere-hour rating of at least 45 Ah.

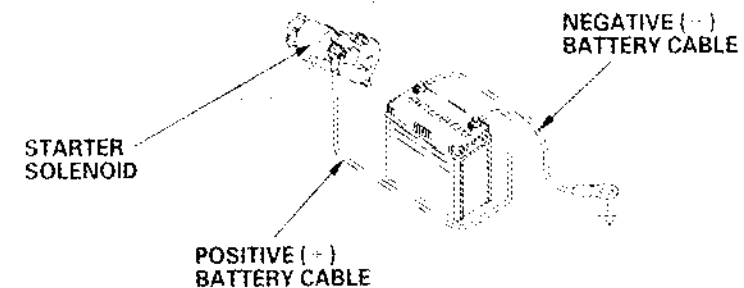
Be careful not to connect the battery in reverse polarity, as this will short circuit the battery charging system. Always connect the positive (+) battery cable to the battery terminal before connecting the negative (-) battery cable, so your tools cannot cause a short circuit if they touch a grounded part while tightening the positive (+) battery cable end.

▲ WARNING

A battery can explode if you do not follow the correct procedure, seriously injuring anyone nearby.

Keep all sparks, open flames, and smoking materials away from the battery.

1. Connect the battery positive (+) cable to the starter solenoid terminal as shown.
2. Connect the battery negative (-) cable to an engine mounting bolt, frame bolt, or other good engine ground connection.
3. Connect the battery positive (+) cable to the battery positive (+) terminal as shown.
4. Connect the battery negative (-) cable to the battery negative (-) terminal as shown.
5. Coat the terminals and cable ends with grease.



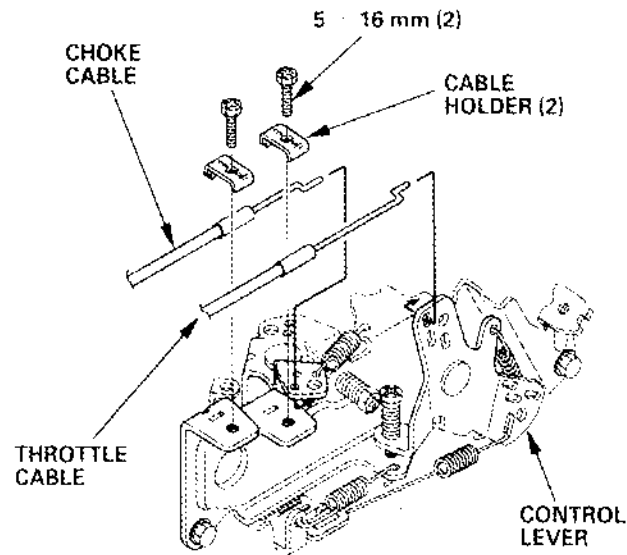
TECHNICAL & CONSUMER INFORMATION

Remote Control Linkage

The throttle and choke control levers are provided with holes for optional cable attachment.

1. The following illustrations show installation examples for a solid wire cable.

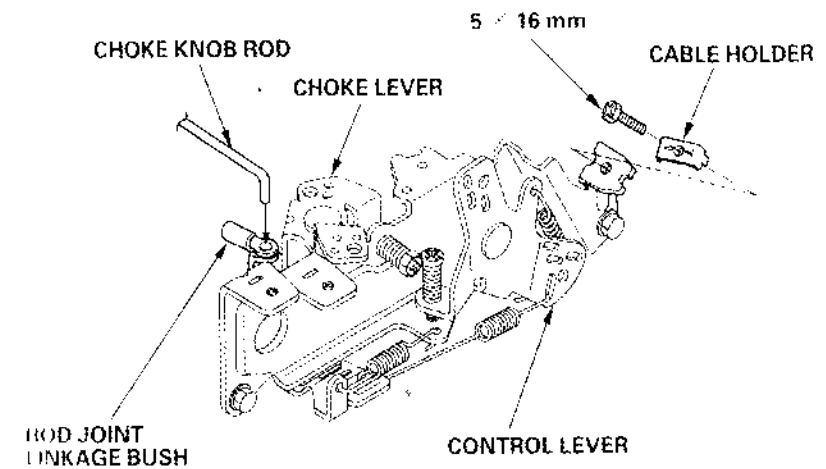
REMOTE THROTTLE AND REMOTE CHOKE



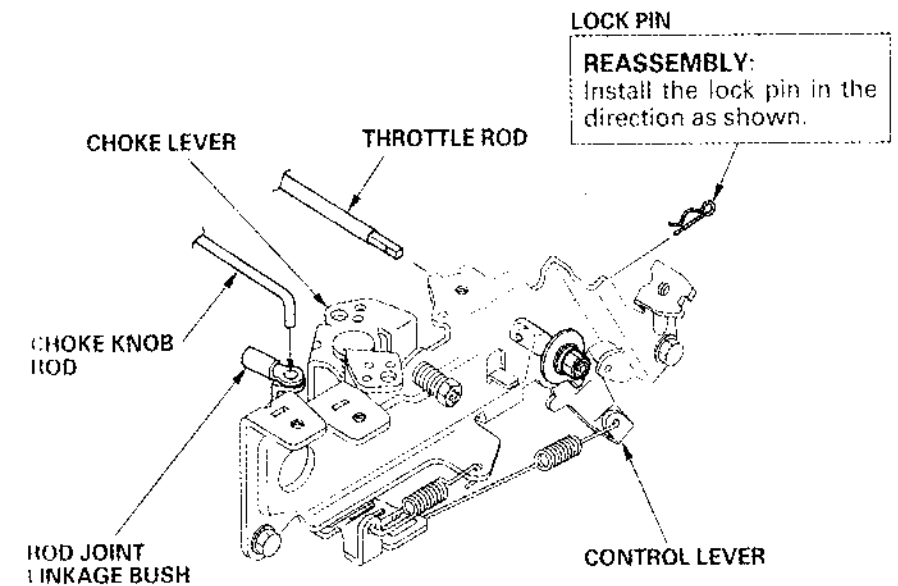
RIGHT SIDE CONTROL

TECHNICAL & CONSUMER INFORMATION

REMOTE THROTTLE AND MANUAL CHOKE



MANUAL THROTTLE AND MANUAL CHOKE



1. Install the throttle cable/rod or the choke cable/rod to the control base.

TECHNICAL & CONSUMER INFORMATION

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 your servicing dealer 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 your servicing dealer return the carburetor to original factory specifications.

TECHNICAL & CONSUMER INFORMATION

Emission Control System Information

Source of Emissions

The combustion process produces carbon monoxide, oxides of nitrogen, and hydrocarbons. Control of hydrocarbons and oxides of nitrogen is very important, because under certain conditions, they react to form photochemical smog when subjected to sunlight. Carbon monoxide does not react in the same way, but it is toxic.

We utilize lean carburetor settings and other systems to reduce the emissions of carbon monoxide, oxides of nitrogen and hydrocarbons.

Tampering and Altering

Tampering with or altering the emission control system may increase emissions beyond the legal limit. Among those acts that constitute tampering are:

- Removal or alteration of any part of the intake, fuel or exhaust systems.
- Altering or defeating the governor linkage or speed-adjusting mechanism to cause the engine to operate outside its design parameters.

TECHNICAL & CONSUMER INFORMATION

Problems That May Affect Emissions

If you are aware of any of the following symptoms, have your engine inspected and repaired by your servicing dealer.

- Hard starting or stalling after starting.
- Rough idle.
- Misfiring or backfiring under load.
- Afterburning (backfiring).
- Black exhaust smoke or high fuel consumption.

Replacement Parts

The emission control systems on your engine were designed, built, and certified to confirm with EPA emission regulations. We recommend the use of genuine our engines' 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.

Maintenance

Follow the maintenance schedule on page 22. Remember that this schedule is based on the assumption that your machine will be used for its designed purpose. Sustained high-load or high-temperature operation, or use in unusually wet or dusty conditions, will require more frequent service.

TECHNICAL & CONSUMER INFORMATION

Specifications

620

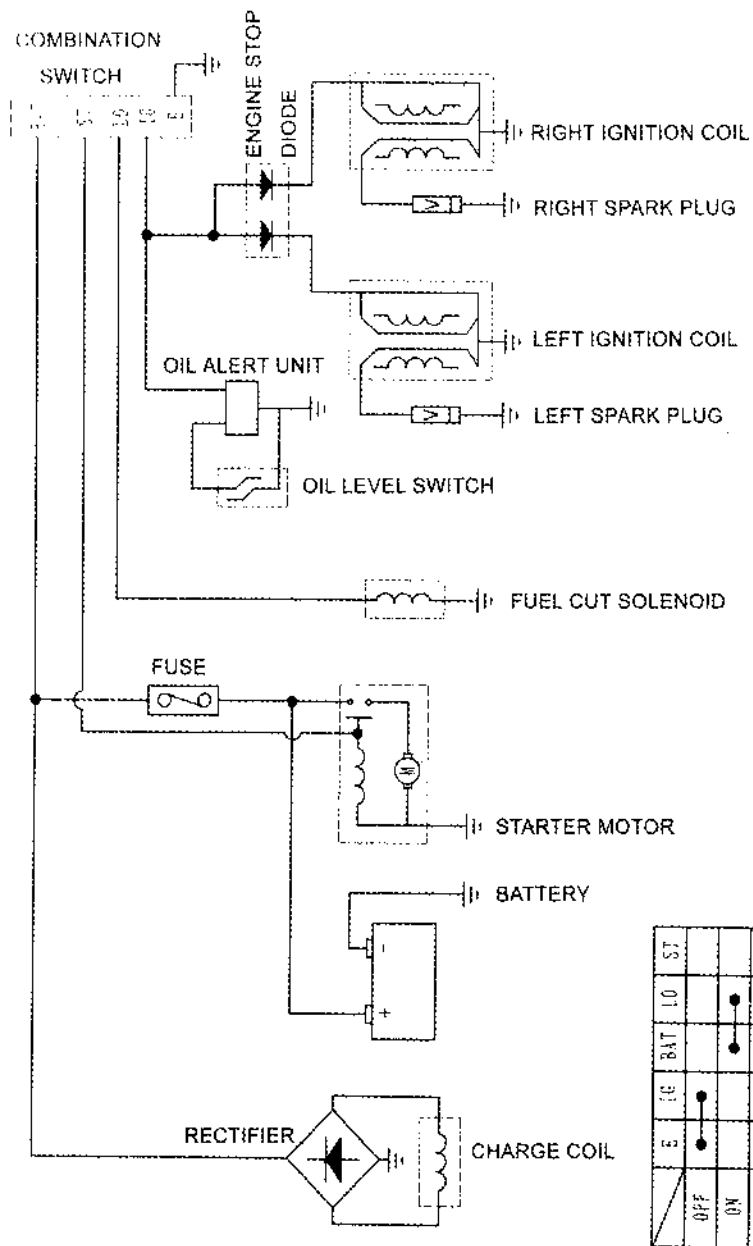
Length × Width × Height	15.3 × 18.0 × 17.8 in (388 × 457 × 452 mm)
Dry weight	92.6 lbs (42.0 kg)
Engine type	4-stroke, overhead valve, 2 cylinders (90° V-Twin)
Displacement	37.5 cu-in (614 cm ³)
[Bore × Stroke]	[3.03 × 2.60 in (77 × 66 mm)]
Max. output	20 hp (14.9 kW) at 3,600 rpm
Rated output	17 hp (12.5 kW) at 3,600 rpm
Fuel consumption	330 g/kWh
Cooling system	Forced air
Ignition system	Transistorized magneto
PTO shaft rotation	Counterclockwise

620 Tuneup

ITEM	SPECIFICATION	MAINTENANCE
Spark plug gap	0.028 - 0.031 in (0.70 - 0.80 mm)	Refer to page 32
Valve clearance (cold)	IN: 0.15 ± 0.02 mm EX: 0.20 ± 0.02 mm	See your authorized dealer
Other specifications	No other adjustments needed.	

Wiring Diagrams

3A Charge Coil and Switch Box Type



Warranty Service Information

Serviceing dealership personnel are trained professionals. They should be able to answer any question you may have. If you encounter a problem that your dealer does not solve to your satisfaction, please discuss it with the dealership's management. The Service Manager or General Manager can help.

QUICK REFERENCE INFORMATION

Fuel	Type	Unleaded gasoline with a pump octane rating of 86 or higher (page 23)
Engine Oil	Type	SAE 10W-30, API SJ, for general use (page 27)
	Capacity	Without oil filter replacement: approximately 1.16 US qt (1.10 ℓ, 0.97 Imp qt) With oil filter replacement: approximately 1.48 US qt (1.40 ℓ, 1.23 Imp qt)
Spark Plug		
	Gap	0.028 – 0.031 in (0.70 – 0.80 mm) (page 32)
Carburetor	Idle speed	1,400 ± 150 rpm
Maintenance	Each use	Check engine oil level. Check air filter.
	First 20 hours	Change engine oil.
	Subsequent	Refer to the maintenance schedule on page 22.