



Operator's Manual
Viper Engine
159cc



MODEL NO. 60005072

OM60005072
R100209
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WARRANTY

Ardisam, Inc., Manufacturing Company warrants its Viper Engines under a **two year** limited warranty to be free from defects in materials and workmanship for the service life of the product not to exceed twenty four consecutive months from the date of purchase for consumer applications. As an Ardisam Viper small engine owner, you are responsible for executing proper maintenance listed in your Operating and Maintenance Instructions. The warranty period begins on the date of purchase by the first retail consumer or commercial end user, and continues for the period of time stated above.

This warranty applies only to products which have not been subjected to negligent use, misuse, alteration, accident, unauthorized parts, failure to use proper fuel and oil, or if repairs have been performed at non-authorized service centers. This warranty supersedes all other warranties either expressed or implied and all other obligations or liabilities on our part. Ardisam, does not assume, and does not authorize any other person to assume for us, any liability in connection with the sale of our products. To be at "No Charge," however, warranty work must be sent directly to Ardisam, Inc. or one of our authorized service centers and performed by them. To obtain warranty service and replacement instructions, contact our customer service department at 800-345-6007 Monday through Friday from 8 a.m. to 5 p.m. or visit www.ardisam.com. Ardisam will at no charge, repair or replace, at their discretion, any defective part which falls under the conditions stated above. Ardisam retains the right to change models, specifications and price without notice.



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REGISTRATION, SERVICE AND MAINTENANCE LOG

Record the model number and serial number in the space provided for easy reference. Fill out and mail the registration card located in the parts packet or register online at www.ardisam.com.

OWNERSHIP RECORDS		
Owner's Name:		
Owner's Address:		
City:	State/Province:	Zip Code/Postal Code:
Model Number:	Serial Number:	
Date of Purchase:		
Notes:		

Explanation of Emissions Control Warranty Provisions

Viper Engines are designed, built and equipped to meet all EPA requirements. It warrants that it is free from defects in material and workmanship that could cause failure to the warranted part; and that it is identical in all material respects to the engine described in the manufacturer's application for certification. When a warrantable condition exists, Viper will repair your engine at no cost to you, including parts and labor. The engine emissions label will indicate certification information. If the purchaser is in need of a warrantable repair and is not within 100 miles distance from an Ardisam authorized repair center, Ardisam will pay for shipping costs to and from an authorized Ardisam repair center.

Listed below are the parts covered by the Emissions Control Systems Warranty. Some parts listed below may require scheduled maintenance and are warranted up to the first scheduled replacement point for that part. Coverage under this warranty includes only the parts listed below (the emission and evaporation control systems) if so equipped:

- Air Filter Assembly (only to the first scheduled replacement point)
- Fuel Filter (only to the first scheduled replacement point)
- Carburetor
- Fuel Lines, Fuel Line Fittings and Clamps
- Fuel Metering Valve (if equipped)
- Evaporative System (if equipped)
 - Canister (if equipped)
 - Canister filter (if equipped)
 - Vapor hose (if equipped)
 - Orifice connector (if equipped)
 - Fuel tank
 - Fuel cap
 - Primer bulb canister (if equipped)
- Spark Plugs
- Magneto Ignition System
- Muffler Assembly

LIMITATIONS

The Emission Control Systems Warranty shall not cover any of the following:

- a) Repair or replacement required because of misuse or neglect, improper maintenance, repairs improperly performed or replacements not conforming to Ardisam, Inc. specifications that adversely affect performance and/or durability and alterations or modifications not recommended or approved in writing by Ardisam, Inc.
- b) Replacement of parts and other services and adjustments necessary for required maintenance at or after the first scheduled replacement point;
- c) Consequential damages such as loss of time, inconvenience, loss of use of the engine or equipment, etc.
- d) Diagnosis and inspection fees that do not result in eligible warranty service being performed; and
- e) Any add-on or modified part, or malfunction of authorized parts due to the use of add-on or modified parts.

These items will be covered for a period of **two years** from

the date of the original purchase. Viper warrants that: the components are designed, built and equipped so as to conform with all applicable regulations adopted by the EPA; that they are free from defects in material and workmanship that could cause failure to the engine or other; and that the components used are identical in all material respects to the engine described in the manufacturer's application for certification. The warranty period begins on the date the engine is originally purchased.

MAINTENANCE AND REPAIR REQUIREMENTS

The owner is responsible for the proper use and maintenance of the engine. Ardisam, Inc. recommends that all receipts and records covering the performance of regular maintenance be retained in case questions arise. If the engine is resold during the warranty period, the maintenance records should be transferred to each subsequent owner. Ardisam, Inc. reserves the right to deny warranty coverage if the engine has not been properly maintained; however, Ardisam, Inc. may not deny warranty repairs solely because of the lack of repair maintenance or failure to keep maintenance records.

Normal maintenance replacement or repair of emission control devices and systems may be performed by any repair establishment or individuals; however, warranty repairs must be performed by an Ardisam authorized service center. Any replacement parts or service that is equivalent in performance and durability may be used in non-warranty maintenance or repairs, and shall not reduce the warranty obligations of the engine manufacturer.

The warranty on emissions-related parts is as follows:

- Any warranted part that is not scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the warranty period stated above. If any such part fails during the period of warranty coverage, that part will be repaired or replaced at no charge to the owner. Any such part repaired or replaced under the warranty will be warranted for the remaining warranty period.
- Any warranted part that is scheduled only for regular inspection in the owner's manual supplied, is warranted for the warranty period. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.
- Any warranted part that is scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part will be repaired or replaced at no charge to the owner. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
- Add on or modified parts that are not exempted by the Air Resources Board may not be used. The use of any nonexempted add on or modified parts by the owner will be grounds for disallowing a warranty claim. The manufacturer will not be liable to warrant failures of warranted parts caused by the use of a nonexempted add on or modified part.



INTRODUCTION

Thank You . . .

for purchasing a Viper engine from Ardisam, Inc. We have worked to ensure that our product meets high standards for usability and durability. With proper care, your engine will provide many years of excellent service. Please take the time to read this manual carefully to learn how to correctly operate and maintain your Viper engine. Due to continuous efforts to perfect our products, certain procedures and specifications are subjected to change without notice. Congratulations on your investment in quality.

Ardisam, Inc. warrants to the retail purchaser, that this small, off-road engine was designed, built and equipped to conform at the time of initial sale to all applicable regulations of the U.S. Environmental Protection Agency (EPA).

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General Safety Precautions

Please read this section carefully. It is important to operate the engine according to the safety instructions and recommendations outlined here and throughout the manual. Anyone who uses this engine must read the instructions and be familiar with the controls.

Owner's Responsibility:

It is the owner's responsibility to accurately assemble the engine for safe and effective use.

- Read and follow all safety instructions.
- Carefully follow all assembly instructions.
- Maintain the engine according to directions and schedule included in this operator's manual.
- Ensure that anyone who uses this engine is familiar with all controls and safety precautions.

Signal Words

This is the safety alert symbol.



The safety alert symbol accompanies a signal word. A signal word alerts you to potential hazards that could harm you or others. Each signal word is preceded by the safety alert symbol and by one of the following words: **DANGER, WARNING, CAUTION** or **IMPORTANT**.

Each signal word will make you aware of what the hazard is, what can happen, and what you can do to prevent or decrease injury occurrence.

Keep this owner's manual handy, so you can refer to it at any time. This owner'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.

READ THIS OWNER'S MANUAL CAREFULLY. Pay special attention to these symbols and any instructions that follow. If a problem should arise, or if you have questions about your engine, consult your engine dealer.

IMPORTANT NOTE: *We do not necessarily know what equipment this engine will power. For that reason, you should carefully read and understand the operating instructions for the equipment on which your engine is placed.*

WARNING

INDICATES SERIOUS INJURY OR DEATH WILL RESULT IF INSTRUCTIONS ARE NOT FOLLOWED.

DANGER

INDICATES A STRONG POSSIBILITY THAT SERIOUS INJURY OR DEATH COULD RESULT IF INSTRUCTIONS ARE NOT FOLLOWED.

CAUTION

INDICATES A POSSIBILITY THAT MINOR INJURY COULD RESULT IF INSTRUCTIONS ARE NOT FOLLOWED.

IMPORTANT

INDICATES HELPFUL INFORMATION FOR PROPER ASSEMBLY, OPERATION, OR MAINTENANCE OF YOUR ENGINE.

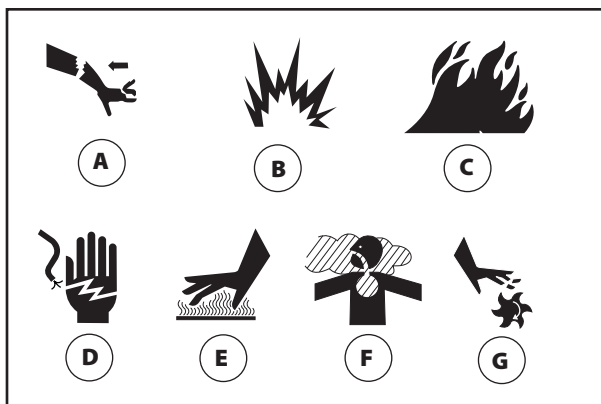
WARNING



READ THE ENTIRE OPERATING AND MAINTENANCE INSTRUCTIONS AND THE INSTRUCTIONS FOR THE EQUIPMENT THIS ENGINE POWERS. FAILURE TO FOLLOW ALL INSTRUCTIONS MAY RESULT IN ELECTRIC SHOCK, FIRE AND/OR SERIOUS INJURY.


WARNING

THE ENGINE EXHAUST FROM THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS, OR OTHER REPRODUCTIVE HARM.



Hazard Symbols and Meanings


- A - Kickback
- B - Explosions
- C - Fire
- D - Electrick Shock
- E - Hot Surface
- F - Toxic Fumes
- G - Moving Parts



WARNING

STARTING ENGINE CREATES SPARKING.
SPARKING CAN IGNITE NEARBY FLAMMABLE GASES.
EXPLOSION AND FIRE COULD RESULT.

- IF THERE IS A NATURAL GAS LEAKAGE IN AREA, DO NOT START ENGINE.
- DO NOT USE PRESSURIZED STARTING FLUIDS BECAUSE VAPORS ARE FLAMMABLE.



WARNING

FUEL AND ITS VAPORS FLAMMABLE AND EXPLOSIVE. LOCATE THE MACHINE IN AREAS AWAY FROM COMBUSTIBLE MATERIALS, COMBUSTIBLE FUMES OR DUST.

WHEN ADDING FUEL

- TURN ENGINE OFF AND LET ENGINE COOL AT LEAST 2 MINUTES BEFORE REMOVING GAS CAP.
- FILL FUEL TANK OUTDOORS OR IN WELL-VENTILATED AREA.
- DO NOT OVERFILL FUEL TANK. FILL TANK TO APPROXIMATELY 1-1/2 INCHES BELOW TOP OF NECK TO ALLOW FOR FUEL EXPANSION.
- KEEP GASOLINE AWAY FROM SPARKS, OPEN FLAMES, PILOT LIGHTS, HEAT, AND OTHER IGNITION SOURCES.
- CHECK FUEL LINES, TANK, CAP, AND FITTINGS FREQUENTLY FOR CRACKS OR LEAKS. REPLACE IF NECESSARY.

WHEN STARTING ENGINE

- MAKE SURE SPARK PLUG, MUFFLER, FUEL CAP AND AIR CLEANER ARE IN PLACE.
- DO NOT CRANK ENGINE WITH SPARK PLUG REMOVED.
- IF FUEL SPILLS, WAIT UNTIL IT EVAPORATES BEFORE STARTING ENGINE.
- IF ENGINE FLOODS, SET CHOKE TO OPEN/RUN POSITION, PLACE THROTTLE IN FAST AND CRANK UNTIL ENGINE STARTS.

WHEN OPERATING EQUIPMENT

- DO NOT TIP ENGINE OR EQUIPMENT AT ANGLE WHICH CAUSES GASOLINE TO SPILL.
- DO NOT CHOKE CARBURETOR TO STOP ENGINE.

WHEN TRANSPORTING EQUIPMENT

- TRANSPORT WITH FUEL TANK EMPTY OR WITH FUEL SHUT-OFF VALVE OFF

WHEN STORING EQUIPMENT WITH FUEL

- STORE AWAY FROM FURNACES, STOVES, WATER HEATERS OR OTHER APPLIANCES THAT HAVE PILOT LIGHT OR OTHER IGNITION SOURCE BECAUSE THEY CAN IGNITE GASOLINE VAPORS.



WARNING

THE RAPID RETRACTION OF THE STARTER CORD CAN CAUSE BODILY INJURY. THE RETRACTION WILL PULL YOUR HAND AND ARM TOWARD THE ENGINE FASTER THAN YOU CAN LET GO.

- WHEN STARTING ENGINE, PULL CORD SLOWLY UNTIL RESISTANCE IS FELT, THEN PULL RAPIDLY.
- REMOVE ALL EXTERNAL EQUIPMENT/ENGINE LOADS BEFORE STARTING ENGINE.
- DIRECT COUPLED EQUIPMENT COMPONENTS SUCH AS, BUT NOT LIMITED TO, BLADES, IMPELLORS, PULLEYS, SPROCKETS, ETC., MUST BE SECURELY ATTACHED.



WARNING

ROTATING PARTS CAN CONTACT OR ENTANGLE HANDS, FEET, HAIR, CLOTHING, OR ACCESSORIES.

TRAUMATIC AMPUTATION OR SEVERE LACERATION CAN RESULT.

- OPERATE EQUIPMENT WITH GUARDS IN PLACE.
- KEEP HANDS AND FEET AWAY FROM ROTATING PARTS.
- TIE UP LONG HAIR AND REMOVE JEWELRY.
- DO NOT WEAR LOOSE-FITTING CLOTHING, DANGLING DRAWSTRINGS OR ITEMS THAT COULD BECOME CAUGHT.



WARNING

UNINTENTIONAL SPARKING CAN RESULT IN FIRE OR ELECTRIC SHOCK.

UNINTENTIONAL START-UP CAN RESULT IN ENTANGLEMENT, TRAUMATIC AMPUTATION, OR LACERATION.

BEFORE PERFORMING ADJUSTMENTS OR REPAIRS

- DISCONNECT SPARK PLUG WIRE AND KEEP IT AWAY FROM SPARK PLUG.
- DISCONNECT BATTERY AT NEGATIVE TERMINAL (ONLY ENGINES WITH ELECTRIC START).

WHEN TESTING FOR SPARK

- USE APPROVED SPARK PLUG TESTER.
- DO NOT CHECK FOR SPARK WITH SPARK PLUG REMOVED.



WARNING

RUNNING ENGINES PRODUCE HEAT. ENGINE PARTS, ESPECIALLY MUFFLER, BECOME EXTREMELY HOT.

SEVERE THERMAL BURNS CAN OCCUR ON CONTACT.

COMBUSTIBLE DEBRIS, SUCH AS LEAVES, GRASS, BRUSH, ETC. CAN CATCH FIRE.

- ALLOW MUFFLER, ENGINE CYLINDER AND FINS TO COOL BEFORE TOUCHING.
- REMOVE ACCUMULATED COMBUSTIBLES FROM MUFFLER AREA AND CYLINDER AREA.



WARNING

ENGINES GIVE OFF CARBON MONOXIDE, AN ODORLESS, COLORLESS, POISON GAS.

BROKEN BONES, FRACTURES, BRUISES OR SPRAINS COULD RESULT.

- START AND RUN ENGINE OUTDOORS.
- DO NOT START OR RUN ENGINE ENCLOSED AREA, EVEN IF DOORS OR WINDOWS ARE OPEN.

ENGINE SAFETY

IMPORTANT SAFETY INFORMATION

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

Owner Responsibilities

- The engines are designed to give safe and dependable service if operated according to instructions. 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.

Refuel With Care

Gasoline is extremely flammable and gasoline vapors can spark an explosion. 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 gets very hot during operation and remains hot 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, 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.

Carbon Monoxide Hazard

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

WARNING

DO NOT ATTEMPT TO START ENGINE IN THE FOLLOWING WAYS:

- **DO NOT USE STARTING FLUID.**
- **DO NOT SPRAY FLAMMABLE LIQUIDS OR VAPORS INTO AIR FILTER, CARBURETOR OR SPARK PLUG CHAMBER.**
- **DO NOT REMOVE SPARK PLUG AND PULL ON STARTER ROPE. FLAMMABLE FUEL CAN SPRAY OUT AND IGNITE FROM A SPARK FROM SPARK PLUG.**
- **DO NOT REFUEL WHILE SMOKING, NEAR OPEN FLAME, OR OTHER POTENTIAL HAZARDS.**

FUEL IS HIGHLY FLAMMABLE AND MUST BE HANDLED WITH CARE. NEVER FILL THE TANK WHEN THE ENGINE IS HOT OR RUNNING. ALWAYS MOVE OUTDOORS TO FILL TANK.

CAUTION

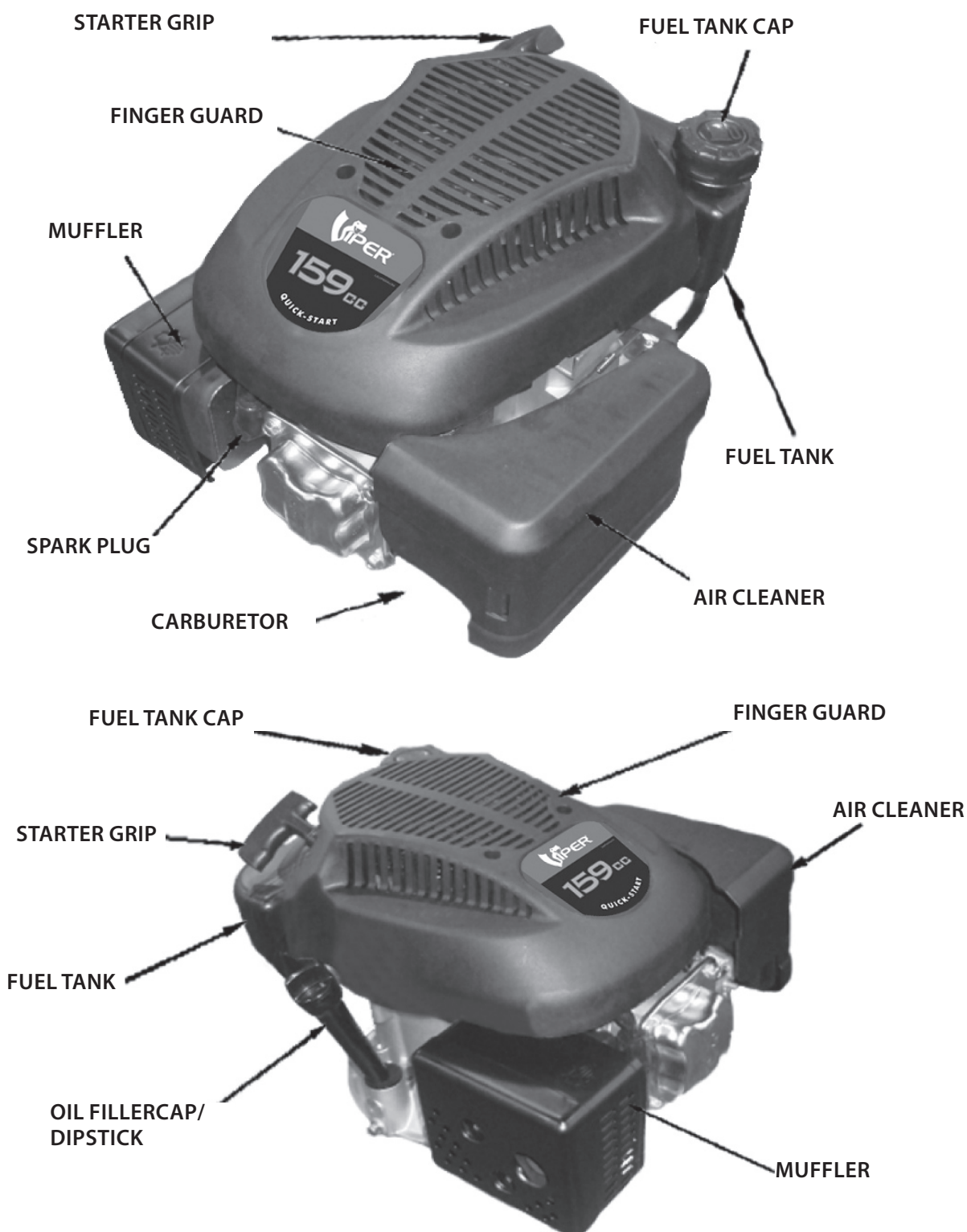
FOR THE SAFETY OF THE USER, AND TO MAXIMIZE THE LIFE OF THE ENGINE, IT IS CRUCIAL TO TAKE TIME TO CHECK THE CONDITION OF THE ENGINE. PROBLEMS MUST BE CORRECTED BEFORE OPERATING.

AVOID INJURY! ENGINE OIL IS HAZARDOUS TO YOUR HEALTH. DISPOSE OF OIL APPROPRIATELY. USE A SAFE DISPOSAL/RECYCLING CENTER.

Other Equipment

ALWAYS 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.

ENGINE COMPONENTS



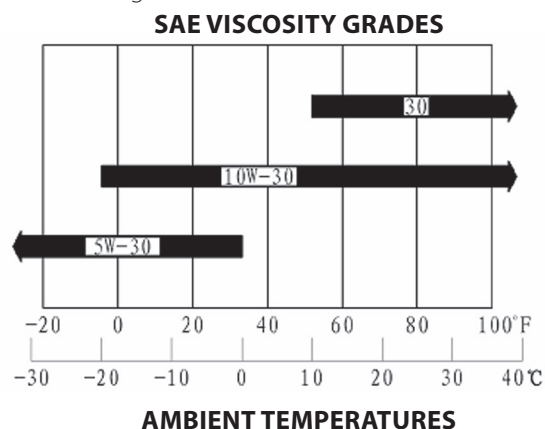
BEFORE STARTING

ENGINE OIL

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 SE or SF oil.

To check the oil

- Check the engine oil level with the engine stopped and in a level position.
- Remove the oil filler cap/dipstick and wipe it clean.
- Insert the oil filler cap/dipstick into the oil filler neck as shown, but do not screw it in, then remove it to check the oil level.
- If the oil level is near or below the lower limit mark on the dipstick, fill with the recommended oil to the upper limit mark. Do not overfill.
- Reinstall the oil filler cap/dipstick.

NOTE:

Engine oil capacities

0.55L (0.146 US Gal, 0.119 Imp Gal)

⚠ WARNING

CARBON MONOXIDE GAS IS TOXIC. INHALATION CAN CAUSE UNCONSCIOUSNESS AND DEATH.

NEVER LEAVE ENGINE RUNNING WHILE UN-ATTENDED.

DO NOT ATTEMPT TO START ENGINE IN THE FOLLOWING WAYS:

- **DO NOT USE STARTING FLUID.**
- **DO NOT SPRAY FLAMMABLE LIQUIDS OR VAPORS INTO AIR FILTER, CARBURETOR OR SPARK PLUG CHAMBER.**
- **DO NOT REMOVE SPARK PLUG AND PULL ON STARTER ROPE. FLAMMABLE FUEL CAN SPRAY OUT AND IGNITE FROM A SPARK FROM SPARK PLUG.**

⚠ CAUTION

THIS ENGINE IS SHIPPED FROM FACTORY WITHOUT OIL. CHECK OIL LEVEL BEFORE STARTING ENGINE. IF YOU START THE ENGINE WITHOUT OIL, THE ENGINE WILL BE DAMAGED BEYOND REPAIR AND WILL NOT BE COVERED UNDER WARRANTY.

⚠ CAUTION

DO NOT OVERFILL. OVERFILLING WITH OIL MAY CAUSE SMOKING, HARD STARTING, SPARK PLUG FOULING, OR OIL SATURATION OF AIR FILTER. USED OIL SHOULD BE SENT TO SPECIAL RECYCLE BIN FOR DISPOSING.

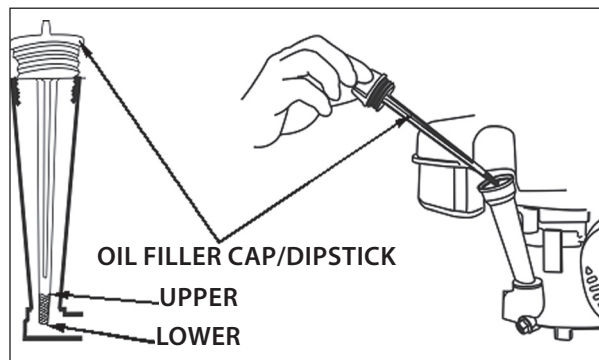


Figure 2: Checking the oil level

FUEL

FUEL RECOMMENDATIONS

Use clean, fresh, regular unleaded gasoline with a minimum of 85 octane.

- 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.

Fuel tank capacity

1P65FA : 1.2L (0.32 US Gal, 0.26 Imp Gal)

WARNING

FUEL AND FUEL VAPORS ARE HIGHLY FLAMMABLE AND MUST BE HANDLED WITH CARE. NEVER FILL THE TANK WHEN THE ENGINE IS HOT OR RUNNING. ALWAYS MOVE OUTDOORS TO FILL THE TANK. DO NOT USE PRESURIZED STARTING FLUIDS.

WARNING

DONOT REFUEL WHILE SMOKING, NEAR OPEN FLAME, OR OTHER POTENTIAL HAZARDS.

FUEL IS HIGHLY FLAMMABLE AND MUST BE HANDLED WITH CARE. NEVER FILL THE TANK WHEN THE ENGINE IS HOT OR RUNNING. ALWAYS MOVE OUTDOORS TO FILL THE TANK.

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.

CAUTION

TO PREVENT ACCIDENTAL STARTING:

AVOID INJURY! ENGINE MUST BE TURNED OFF AND COOL AND SPARK PLUG WIRE MUST BE REMOVED FROM SPARK PLUG BEFORE CHECKING AND ADJUSTING ENGINE OR EQUIPMENT.

AVOID INJURY! TEMPERATURE OF MUFFLER AND NEARBY AREAS MAY EXCEED 150° F (65° C). AVOID THESE AREAS.

AVOID INJURY! CHECK ENGINE OFTEN FOR LOOSE NUTS AND BOLTS. KEEP THESE ITEMS TIGHTENED.

STARTING ENGINE

Control Lever

- FOR STARTING A COLD ENGINE: Move the Control Lever to the choke position.
- FOR RESTARTING A WARM ENGINE: Do not use the choke when the engine is warm. Move the control Level slightly past the idle position.
- FLYWHEEL BRAKE MODELS: Move the flywheel brake lever (located on equipment) to release the flywheel brake.

Start Engine

- Grasp rope handle. Pull slowly until resistance is felt, then pull rapidly to start engine and avoid kickback.
- If the choke was used to start the engine, move the throttle to the fast (or high) position as soon as the engine warms up enough to run smoothly without use of the choke.
- FLYWHEEL BRAKE MODELS: Continue to hold the flywheel brake lever (located on equipment). The engine will stop if you release the flywheel brake lever.
- Position the control Level for the desired engine speed. For best engine performance, it is recommended the engine be operated with the throttle in the FAST (or high) position.
- If using primer pump carburetor, press primer one to three times according to the direction of the arrow when coldstart, then start it.

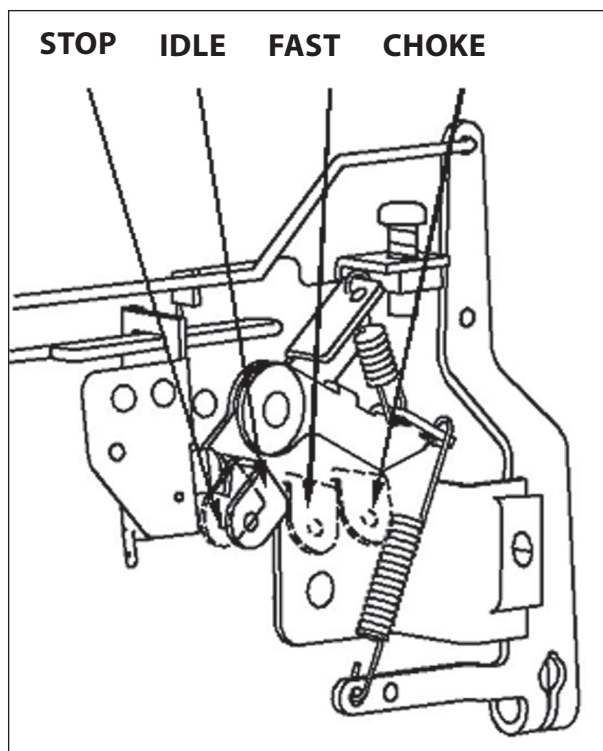


Figure 2: Starting the engine

⚠ DANGER

DANGER: RAPID RETRACTION OF STARTER CORD (KICKBACK) WILL PULL HAND AND ARM TOWARD ENGINE FASTER THAN YOU CAN LET GO.

ROTATING PARTS CAN CONTACT OR ENTANGLE HANDS, FEET, HAIR, CLOTHING, OR ACCESSORIES.

RUNNING ENGINES PRODUCE HEAT. ENGINE PARTS, ESPECIALLY MUFFLER, BECOME EXTREMELY HOT.

SEVERE THERMAL BURNS CAN OCCUR ON CONTACT.

⚠ CAUTION

CAREFULLY CHECK IF THERE IS ENOUGH OIL BEFORE STARTING.

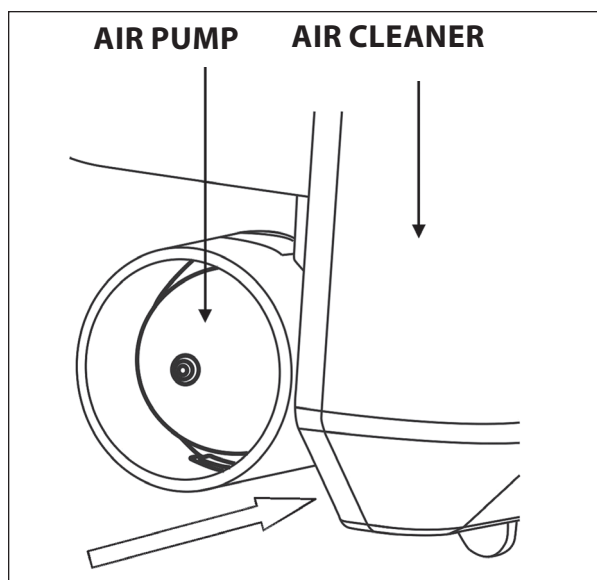


Figure 3: Using the primer pump

STOPPING ENGINE

1. Move the Control Level to the slow (IDLE) position.
2. Move the Control Level to the stop position.
3. FLYWHEEL BRAKE MODELS: Release the flywheel brake lever (located on equipment) to stop the engine.
4. Turn the fuel valve to the OFF position if you do not intend to restart the engine soon.

MAINTENANCE

The Importance of Maintenance

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

Maintenance, replacement or repair of the emissions control devices and y systems may be performed by any non-road engine repair establishment or individuals. However, items must be serviced by an authorized dealer to obtain "no charge" emissions control service.

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.

⚠ 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.

⚠ 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.

MAINTENANCE SCHEDULE

Regular service period		Each use	First month or 20 hours	Every 3 months or 50 hours	Every 6 months or 100 hours	Every Year or 300 hours
Engine oil	Check	•				
	Change		•		• (1)	
Air cleaner	Check	•				
	Clean			• (2)		
	Re-place					•*
Flywheel brake pad	Check				•	
Spark plug	Clean/Check				•	Replace
Spark arrester	Clean				•	
Idel speed	Check/adjust					• (3)
Valve clearance	Check/adjust					• (3)
Combustion chamber	Clean	After every 100 hours (b)				
Fuel line	Check	Every two years (replace if necessary) (3)				

(1) Change engine oil every 25 hours when used under heavy load or in high ambient temperatures.

(2) Clean more often under dusty conditions or when airborne debris is present. Replace air cleaner parts, if very dirty.

(3) These items should be serviced by your servicing dealer unless you have the proper tools and are mechanically proficient. Refer to manual for service procedures.

• Replace paper element only.

Failure to follow this maintenance schedule could result in nonwarrantable failures.

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 parts or their equivalents for repair and replacement.

CHANGE ENGINE OIL

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, and then remove the filler cap/dipstick, the drain bolt and sealing washer.
2. Allow the used oil to drain completely, and then reinstall the drain bolt and sealing washer, and tighten it securely.
3. With the engine in a level position, fill to the upper limit mark on the dipstick with the recommended oil.
4. Reinstall the oil filler cap/dipstick securely.

⚠ 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.**

⚠ CAUTION

USED OIL IS A HAZARDOUS WASTE PRODUCT. DISPOSE OF USED OIL PROPERLY. DO NOT DISCARD WITH HOUSEHOLD WASTE. WE SUGGEST YOU TAKE USED OIL IN A SEALED CONTAINER TO YOUR LOCAL RECYCLING CENTER OR SERVICE STATION FOR RECLAMATION.

⚠ CAUTION

RUNNING THE ENGINE WITH A LOW OIL LEVEL CAN CAUSE ENGINE DAMAGE.

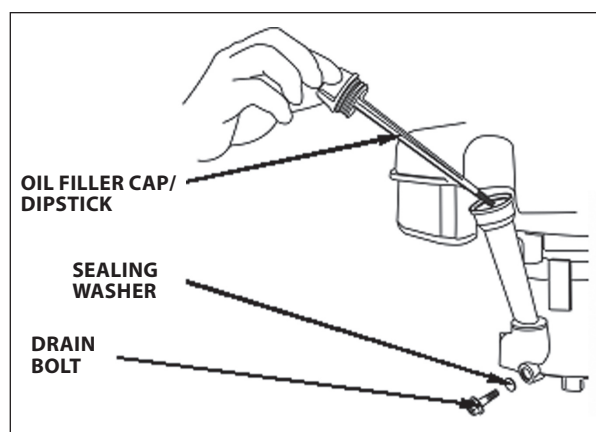


Figure 4: Changing the engine oil

REFUELING

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

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 above the fuel strainer shoulder. After refueling, tighten the fuel tank cap securely.

NOTE: Spilled fuel isn't only a fire hazard, it causes environmental damage. Wipe up spills immediately.

SPARK PLUG SERVICE

Recommended spark plugs: F7RTC or other equivalents.

NOTE: 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 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 (0.70 - 0.80 mm). Correct the gap, if necessary, by carefully bending the side electrode.

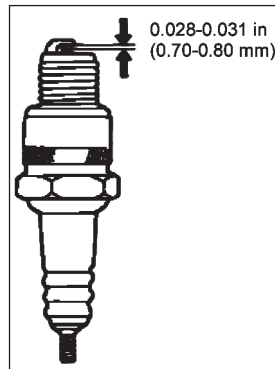


Figure 4: Spark plug

5. Install the spark plug carefully, by hand, to avoid cross-threading.
6. After the spark plug seats, tighten with a spark plug wrench to compress the water. If reinstalling the used spark plug, tighten 1/8 - 1/4 turn after the spark plug seats. If installing a new spark plug, tighten 1/2 turn after the spark plug seats.

NOTE: 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.

⚠ WARNING

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.

⚠ CAUTION

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.

⚠ CAUTION

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.

⚠ CAUTION

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.

AIR CLEANER

Remove the air cleaner cover and inspect the filter. Clean or replace dirty filter elements. Always replace damaged filter elements. If equipped with an oil-bath air cleaner, also check the oil level.

Inspection

1. Press the latch tabs on the air cleaner cover or remove the cap nuts, and remove the cover. Check the filter to be sure it is clean and in good condition.
2. Reinstall the filter and air cleaner cover.

Cleaning

1. Tap the filter several times on a hard surface to remove dirt, or blow compressed air (not exceeding 30 psi [207kPa, 2.1kg/cm²]) through the filter from the clean side that faces the engine. Never try to brush off dirt. Brushing will force dirt into the fibers.
2. Tap the filter outer several times on a hard surface to remove dirt. Clean. If the filter outer is very dirty, replace the filter outer.
3. Wipe dirt from the air cleaner body and cover using a moist rag. Be careful to prevent dirt from entering the air duct that leads to the carburetor.

⚠ CAUTION

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.

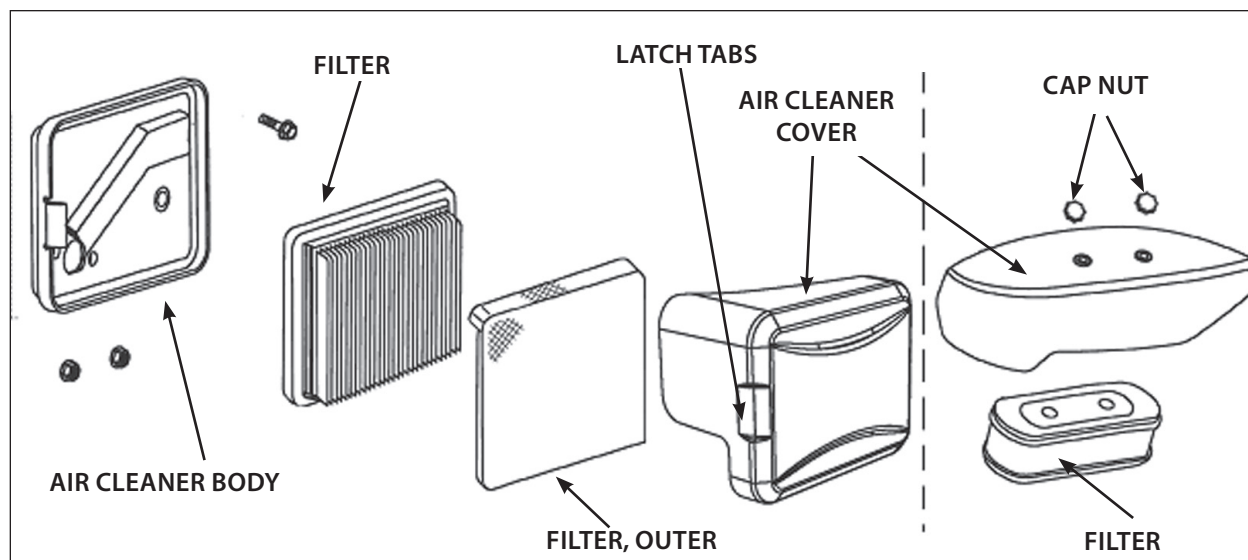


Figure 22: Cleaning the foam filter element

STORAGE/TRANSPORTING

STORING YOUR ENGINE

Storage Preparation

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.

NOTE: 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.

NOTE: 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.

⚠ CAUTION

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.

⚠ WARNING

FAILURE TO FOLLOW MAINTENANCE INFORMATION CAN CAUSE DEATH OR SERIOUS INJURY.

DO NOT REMOVE FUEL WHILE SMOKING, NEAR OPEN FLAME, OR OTHER POTENTIAL HAZARDS.

AVOID INJURY! NEVER STORE ENGINE WITH FUEL IN THE TANK INSIDE A BUILDING. POTENTIAL SPARKS MAY BE PRESENT CAUSING IGNITION OF FUEL AND FUEL VAPORS.

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 sealing washer, and then move the fuel valve lever to the ON position.
3. After all the fuel has drained into the container, reinstall the drain bolt and sealing washer. Tighten them securely.

STORAGE PRECAUTIONS

1. Change the engine oil.
2. Remove the spark plugs.
3. Pour a tablespoon (1-2 teaspoons) 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 plugs.
6. Pull the starter rope slowly until resistance is felt. This will close the valves so moisture cannot enter the engine cylinder. Return the starter rope gently.

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.

7. 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.

If equipped with a battery for an electric starter, recharge the battery once a month while the engine is in storage. This will help to extend the service life of the battery.

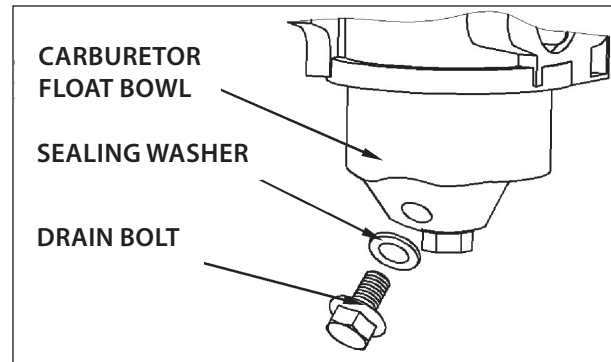


Figure 22: Draining the fuel tank and carburetor

REMOVAL FROM STORAGE

Check your engine as described in the OPERATION section.

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 cylinders were 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.

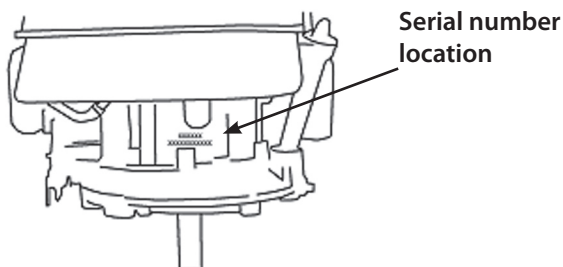
TROUBLESHOOTING

Engine will not start	Possible Cause	Correction
1) Check Control Positions	Choke OPEN	Move lever to CLOSE unless engine is warm
	Engine switch OFF	Turn engine switch to ON
2) Check fuel	Out of fuel	Refuel
	Bad fuel; engine started without treating or draining gasoline, or engine has been refueled with bad gasoline	Drain fuel tank and carburetor. Refuel with fresh gasoline
3) Remove and inspect spark plugs	Spark plugs faulty, fouled or improperly gapped	Gap, or replace spark plugs.
	Spark plugs wet with fuel (flooded engine)	Dry and reinstall spark plugs. Start engine with control lever in FAST position
4) Take engine to authorized servicing dealer, or refer to manual	Fuel filter clogged, carburetor malfunction, ignition malfunction, valve 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)
2) Check fuel	Out of fuel	Refuel
	Bad fuel; engine started without treating or draining gasoline, or engine has been refueled with bad gasoline	Drain fuel tank and carburetor. Refuel with fresh gasoline
3) Take engine to authorized servicing dealer, or refer to manual	Fuel filter clogged, carburetor malfunction, ignition malfunction, valve stuck, etc.	Replace or repair faulty components as necessary

Engine operates erratically	Possible Cause	Correction
1) Check spark plug	Spark plug is defective	Install new, correctly gapped plug
	Spark plug gap is incorrect	Set gap between electrodes at 0.7 to 0.8 mm
2) Check air cleaner	Air cleaner element is dirty	Clean air cleaner element

TECHNICAL & CONSUMER INFORMATION



SERIAL NUMBER LOCATION

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.

Engine serial number: _____

MAINTENANCE

Follow the maintenance schedule. 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.

ENGINE TUNE-UP

ITEM	SPECIFICATION
Spark plug gap	0.028-0.031 in. (0.70-0.80 mm)
Valve clearance	IN: 0.10± 0.02 mm (cold)
Other specifications	No other adjustments needed

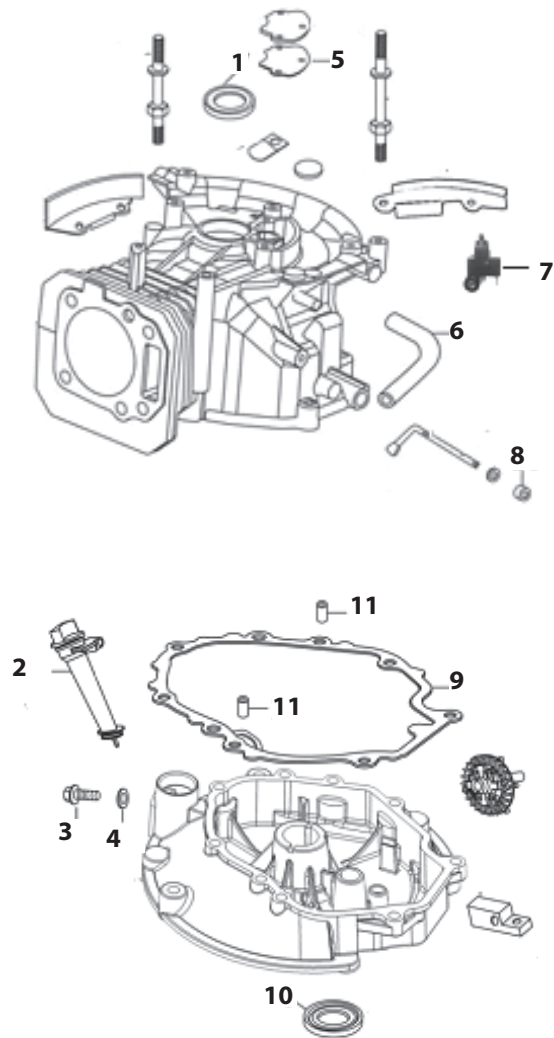
QUICK REFERENCE INFORMATION

Engine Oil	Type	SAE 10w-30, API Se or SF, for general use
	Capacity	.055L (0.146 US Gal.)
Spark plug	Type	F7RTC or other equivalent
	Gap	0.028-0.031 inches (0.7-0.8 MM)
Carburetor	Idle speed	1800 ± 150 RPM
Maintenance	Each use	Check engine oil; check air filter
	First 5 hours	Change engine oil
	Subsequent	refer to maintenance schedule

ENGINE SPECIFICATIONS

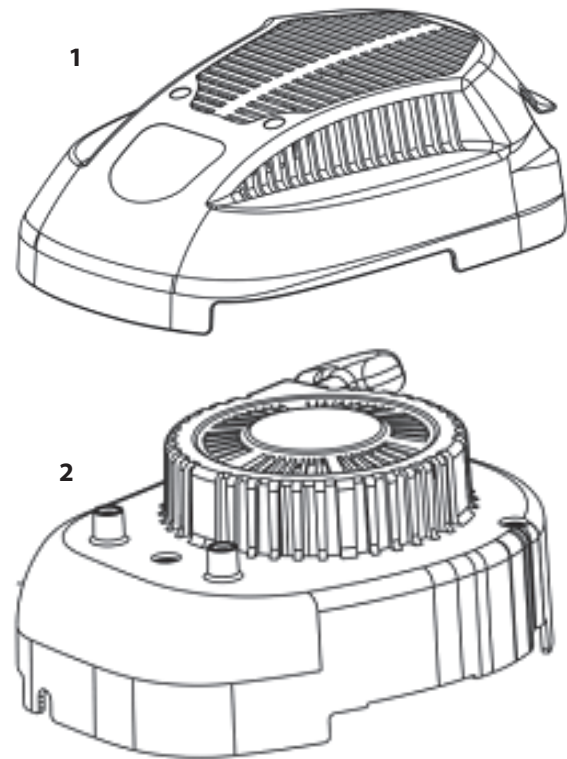
Model	60005072
Type	Single cylinder, four-stroke, forced air cooling, OHV
Rated Power (kw/3600rpm)	3.7
Max torque	8.8/2500
Fuel consumption (g/kW·h)	≤395
Idle speed	1800±150
Bore x Stroke (mm)	65x48
Displacement (cc)	159
Compression ration	8:1
Lubricating mode	Splash
Starting mode	Recoil start
Rotation	Counter-clockwise (from P.T.O side)
Valve clearance	Input valve: 0.10±0.02 mm, output valve: 0.15±0.02 mm
Spark plug clearance	0.7~0.8mm
Igniting mode	Transistorized magneto ignition
Air cleaner	Semi-dry, oil bath, foam filter
Dimension (LxWxH)	430x380x380
Net weight (kg)	12

SERVICE PARTS



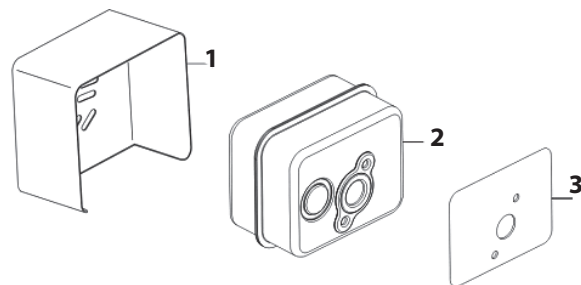
CRANKCASE/CRANKCASE COVER

KEY #	PART #	DESCRIPTION	QTY.
1	60005073	OIL SEAL, 25X38X7	1
2	60005083	OIL FILL TUBE ASSEMBLY	1
3	60005081	DRAIN BOLT	1
4	60005082	DRAIN WASHER	1
5	60005074	BREATHER GASKET	1
6	60005076	BREATHER TUBE	1
7	60005075	ENGINE STOP SWITCH ASSEMBLY	1
8	60005077	OIL SEAL, 6X11X4	1
9	60005079	CRANK CASE COVER GASKET	1
10	60005078	OIL SEAL	1
11	60005080	PIN DOWEL	1



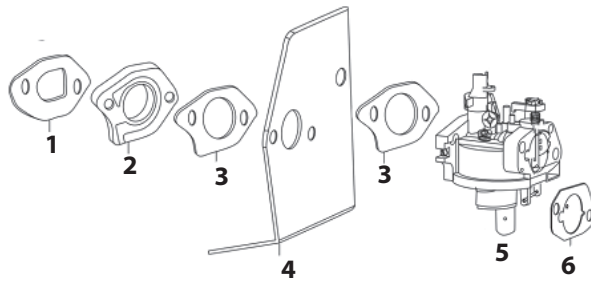
STARTER

KEY #	PART #	DESCRIPTION	QTY.
1	60005085	RECOIL HOUSING	1
2	60005084	RECOIL ASSEMBLY	1



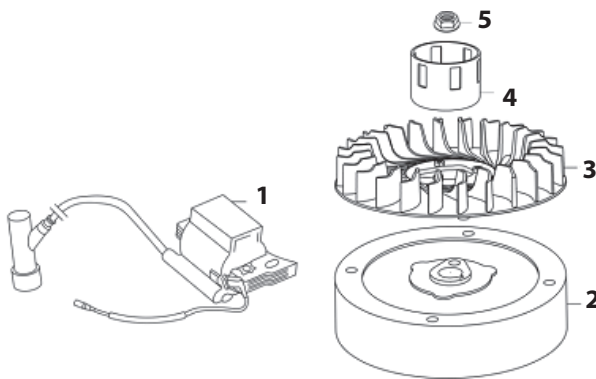
MUFFLER

KEY #	PART #	DESCRIPTION	QTY.
1	600050106	MUFFLER SHIELD	1
2	600050107	MUFFLER ASSEMBLY	1
3	600050108	MUFFLER GASKET	1



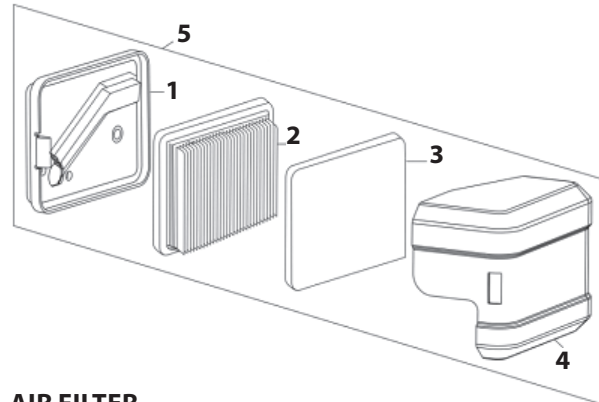
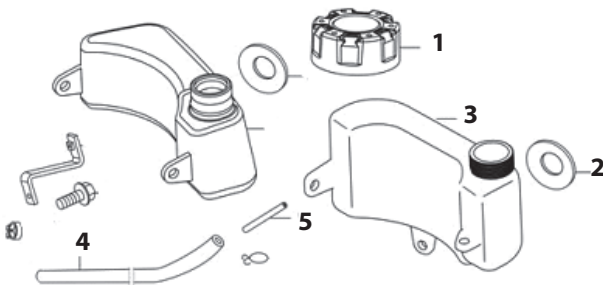
CARBURETOR

KEY #	PART #	DESCRIPTION	QTY.
1	60005086	INSULATOR GASKET	1
2	60005087	GASKET SPACER	1
3	60005089	CARBURETOR GASKET	2
4	60005090	CARBURETOR HEAT SHIELD	1
5	60005091	CARBURETOR ASSEMBLY	1
6	60005092	AIR FILTER GASKET,	1



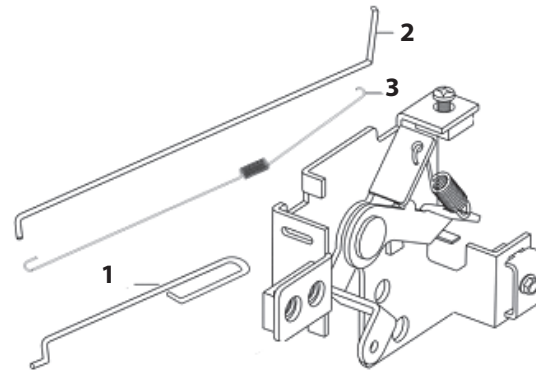
FLYWHEEL

KEY #	PART #	DESCRIPTION	QTY.
1	60005093	IGNITION COIL ASSEMBLY	1
2	60005094	FLYWHEEL	1
3	60005095	FLYWHEEL FINS	1
4	60005096	STARTER PULLEY	1
5	60005097	FLYWHEEL NUT	1



AIR FILTER

KEY #	PART #	DESCRIPTION	QTY.
1	60005099	FILTER BASE	1
2	600050100	FILTER ELEMENT	1
3	600050101	OUTER FILTER	1
4	600050102	FILTER COVER	1
5	60005098	FILTER ASSEMBLY	1



CONTROL

KEY #	PART #	DESCRIPTION	QTY.
1	600050103	THROTTLE ROD	1
2	600050104	THROTTLE RETURN SPRING	1
3	600050105	GOVERNOR ROD	1

FUEL TANK

KEY #	PART #	DESCRIPTION	QTY.
1	600050109	FUEL CAP	1
2	600050110	FUEL TANK WASHER	1
3	600050111	FUEL TANK	1
4	600050112	FUEL LINE	1
5	600050113	FUEL FILTER	1



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