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Engine

WM 130

WM 170

WM 270

OPERATOR'S MANUAL



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CALIFORNIA

Proposition 65 Warning:



Engine exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

1. Foreword

This manual provides information and procedures to safely operate and maintain this Wacker model. For your own safety and protection from injury, carefully read, understand and observe the safety instructions described in this manual.

Keep this manual or a copy of it with the machine. If you lose this manual or need an additional copy, please contact Wacker Corporation. This machine is built with user safety in mind; however, it can present hazards if improperly operated and serviced. Follow operating instructions carefully! If you have questions about operating or servicing this equipment, please contact Wacker Corporation.

The information contained in this manual was based on machines in production at the time of publication. Wacker Corporation reserves the right to change any portion of this information without notice.

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2. 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.

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

The U.S. and California Clean Air Acts

EPA and California regulations require all manufacturers to furnish written instructions describing the operation and maintenance of emission control systems.

The following instructions and procedures must be followed in order to keep the emissions from your Wacker engine within the emissions standards.

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 speed-adjusting mechanism to cause the engine to operate outside its design parameters.

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 Wacker engine were designed, built, and certified to conform with EPA and California emissions regulations. We recommend the use of genuine Wacker 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. 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.

OXYGENATED FUELS

Some conventional gasolines are being blended with alcohol or an ether compound. These gasolines are collectively referred to as oxygenated fuels. To meet clean air standards, some areas of the United States and Canada use oxygenated fuels to help reduce emissions.

If you use an oxygenated fuel, be sure it is unleaded and meets the minimum octane rating requirement.

Before using an oxygenated fuel, try to confirm the fuel's contents. Some States / Provinces require this information to be posted on the pump.

The following are EPA-approved percentages of oxygenates:

ETHANOL - (ethyl or grain alcohol) 10% by volume. You may use gasoline containing up to 10% ethanol by volume. Gasoline containing ethanol may be marketed under the name "Gasohol".

MTBE - (methyl tertiary butyl ether) 15% by volume. You may use gasoline containing up to 15% MTBE by volume.

METHANOL - (methyl or wood alcohol) 5% by volume. You may use gasoline containing up to 5% methanol by volume, as long as it contains cosolvents and corrosion inhibitors to protect the fuel system. Gasoline containing more than 5% methanol by volume may cause starting and/or performance problems. It may also damage metal, rubber, and plastic parts of your fuel system.

If you notice any undesirable operating symptoms, try another service station, or switch to another brand of gasoline.

Fuel system damage or performance problems resulting from the use of an oxygenated fuel containing more than the percentages of oxygenates mentioned above are not covered under warranty.

EMISSIONS COMPONENT DEFECT WARRANTY COVERAGE

This emission warranty is applicable in all States, except the State of California.

Wacker Corporation, N92 W15000 Anthony Avenue, Menomonee Falls, WI 53051-1504, (herein "Wacker") warrant(s) to the initial retail purchaser and each subsequent owner, that this non-road engine (herein "engine") has been designed, built, and equipped to conform at the time of initial sale to all applicable regulations of the U.S. Environmental Protection Agency (EPA), and that the engine is free of defects in materials and workmanship which would cause this engine to fail to conform with EPA regulations during its warranty period.

For the components listed under PARTS COVERED, the service dealer authorized by Wacker will, at no cost to you, make the necessary diagnosis, repair, or replacement necessary to ensure that the engine complies with applicable U.S. EPA regulations.

EMISSION COMPONENT DEFECT WARRANTY PERIOD

The warranty period for this engine begins on the date of sale to the initial purchaser and continues for a period of 2 years.

PARTS COVERED

Listed below are the parts covered by the Emission Components Defect Warranty. Some of the parts listed below may require scheduled maintenance and are warranted up to the first scheduled replacement point for that part.

(1) Fuel Metering System

- (i) Carburetor and internal parts (and/or pressure regulator or fuel injection system).
- (ii) Air/fuel ratio feedback and control system, if applicable.
- (iii) Cold start enrichment system, if applicable.
- (iv) Regulator assembly (gaseous fuel, if applicable) .

(2) Air Induction System

- (i) Intake manifold, if applicable.
- (ii) Air filter.

(3) Ignition System

- (i) Spark plugs.
- (ii) Magneto or electronic ignition system.
- (iii) Spark advance/retard system, if applicable.

(4) Exhaust manifold, if applicable**(5) Miscellaneous Items Used in Above Systems**

- (i) Electronic controls, if applicable.
- (ii) Hoses, belts, connectors, and assemblies.
- (iii) Filter lock assembly (gaseous fuel, if applicable).

OBTAINING WARRANTY SERVICE

To obtain warranty service, take your engine to the nearest authorized Wacker service dealer. Bring your sales receipts indicating date of purchase for this engine. The service dealer authorized by Wacker will perform the necessary repairs or adjustments within a reasonable amount of time and furnish you with a copy of the repair order. All parts and accessories replaced under this warranty become the property of Wacker.

WHAT IS NOT COVERED

- Conditions resulting from tampering, misuse, improper adjustment (unless they were made by the service dealer authorized by Wacker during a warranty repair), alteration, accident, failure to use the recommended fuel and oil, or not performing required maintenance services.
- The replacement parts used for required maintenance services.
- Consequential damages such as loss of time, inconvenience, loss of use of the engine or equipment, etc.
- Diagnosis and inspection charges that do not result in warranty-eligible service being performed.
- Any non-authorized replacement part, or malfunction of authorized parts due to use of non-authorized parts.

OWNER'S WARRANTY RESPONSIBILITIES

As the engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Wacker recommends that you retain all receipts covering maintenance on your engine, but Wacker cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance. As the engine owner, you should however be aware that Wacker may deny warranty coverage if your engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

You are responsible for presenting your engine to the nearest service dealer authorized by Wacker when a problem exists.

If you have any questions regarding your warranty rights and responsibilities, you should contact the WACKER CORPORATION Product Support Department (U.S.A. 1-800-770-0957, Canada 1-877-977-0775) for the information.

THINGS YOU SHOULD KNOW ABOUT THE EMISSION CONTROL SYSTEM WARRANTY:**MAINTENANCE AND REPAIRS**

You are responsible for the proper maintenance of the engine. You should keep all receipts and maintenance records covering the performance of regular maintenance in the event questions arise. These receipts and maintenance records should be transferred to each subsequent owner of the engine. Wacker reserves the right to deny warranty coverage if the engine has not been properly maintained. Warranty claims will not be denied, however, solely because of the lack of required maintenance or failure to keep maintenance records.

MAINTENANCE, REPLACEMENT OR REPAIR OF EMISSION CONTROL DEVICES AND SYSTEMS MAY BE PERFORMED BY ANY REPAIR ESTABLISHMENT OR INDIVIDUAL; HOWEVER, WARRANTY REPAIRS MUST BE PERFORMED BY A SERVICE DEALER AUTHORIZED BY WACKER. THE USE OF PARTS THAT ARE NOT EQUIVALENT IN PERFORMANCE AND DURABILITY TO AUTHORIZED PARTS MAY IMPAIR THE EFFECTIVENESS OF THE EMISSION CONTROL SYSTEM AND MAY HAVE A BEARING ON THE OUTCOME OF A WARRANTY CLAIM.

If other than the parts authorized by Wacker are used for maintenance replacements or for the repair of components affecting emission control, you should assure yourself that such parts are warranted by their manufacturer to be equivalent to the parts authorized by Wacker in their performance and durability.

HOW TO MAKE A CLAIM

All repair qualifying under this limited warranty must be performed by a service dealer authorized by Wacker. In the event that any emission-related part is found to be defective during the warranty period, you shall notify WACKER CORPORATION Product Support Department (U.S.A. 1-800-770-0957, Canada 1-877-977-0775) and you will be advised of the appropriate warranty service dealer or service providers where the warranty repair can be performed.

**CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT
YOUR WARRANTY RIGHTS AND OBLIGATIONS**

The California Air Resources Board is pleased to explain the emission control system warranty on your 2003 and newer Wacker engine. In California, new small off-road engines must be designed, built and equipped to meet the State's stringent anti-smog standards. Wacker Corporation must warrant the emission control system on your Wacker engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your small off-road engine.

Your emission control system may include parts such as the carburetor or fuel-injection system, the ignition system, and catalytic converter. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, a Wacker authorized service center will repair your Wacker engine at no cost to you including diagnosis, parts and labor.

MANUFACTURER'S WARRANTY COVERAGE:

The 1995 and later small off-road engines are warranted for two years. If any emission-related part on your engine is defective, the part will be repaired or replaced by Wacker.

OWNER'S WARRANTY RESPONSIBILITIES:

As the Wacker engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Wacker recommends that you retain all receipts covering maintenance on your Wacker engine, but Wacker cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

As the Wacker engine owner, you should however be aware that Wacker may deny you warranty coverage if your Wacker engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

You are responsible for presenting your Wacker engine to a Wacker dealer as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, you should contact your local Wacker equipment dealer, service center or the WACKER CORPORATION Product Support Department (U.S.A. 1-800-770-0957, Canada 1-877-977-0775) for the information.

LIMITED WARRANTY
on Emission Control Systems
- California Only -

Wacker warrants to the owner of the 2003 and later engine that the engine (1) has been designed, built and equipped so as to conform at the time of manufacture with the applicable regulations of the California Air Resources Board, and (2) is free from defects in materials and workmanship that could cause it to fail to conform with those regulations as may be applicable in the terms and conditions stated below.

A. COMMENCEMENT DATE

The warranty period begins on the date the engine is delivered to a first retail purchaser.

B. LENGTH OF COVERAGE

Wacker warrants to a first retail purchaser and each subsequent purchaser that the engine is free from defects in materials and workmanship that cause the failure of a warranted emission-related part for a period of two (2) years after the date of delivery to the first retail purchaser.

C. WHAT IS COVERED:

1. REPAIR OR REPLACEMENT PARTS

Repairs and replacement of any warranted part will be performed at no charge to you by an authorized service dealer or a warranty station. You may contact your local Wacker equipment dealer, service center or the WACKER CORPORATION Product Support Department (U.S.A. 1-800-770-0957, Canada 1-877-977-0775) to obtain the name of the nearest appropriate location where your warranty repairs are performed.

2. WARRANTY PERIOD

This warranty continues for a period of two (2) years and applies only to the repair or replacement of the component parts that are not scheduled for replacement as required maintenance. Further, component parts which are scheduled only for regular inspection to the effect of "repair or replace as necessary" are warranted for the warranty period. Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time up to the first scheduled replacement point for that part.

3. DIAGNOSIS

You will not be charged for diagnostic labor that leads to the determination that a warranted part is defective, if the diagnostic work is performed at an authorized service dealer or warranty station.

4. DAMAGES

If a warranted part failed causing damage to other engine components, consult a warranty station.

D. WHAT IS NOT COVERED

1. This limited warranty does not cover any part which malfunctions, fails or is damaged due to failure to follow the maintenance and operating instructions set forth in the 2003 and later Owner's Manual including:

- (1) improper maintenance of any warranted parts
- (2) improper installation, adjustment or repair of the engine or of any warranted part unless performed by an authorized service dealer
- (3) failure to follow recommendations on fuel use contained in the 2003 and later Owner's Manual
- (4) repairs performed outside of the authorized warranty service dealers
- (5) use of parts which are not authorized by Wacker.

2. Add-on or modified parts

This warranty does not cover any part that malfunctions, fails or is damaged due to alterations by changing, adding to or removing parts from the engine.

3. Expenses incurred by processing warranty claims

Wacker, any authorized service dealer and warranty station shall not be liable for any loss of use of the engine, for any alternative usage, for any damage to goods, loss of time or inconvenience.

E. HOW TO FILE A CLAIM

All repairs qualifying under this Limited Warranty must be performed by a dealer who sold you the engine or warranty station authorized by Wacker. In the event that any emission-related part is found to be defective during the warranty period, you must notify your local Wacker equipment dealer, service center or the WACKER CORPORATION Product Support Department (U.S.A. 1-800-770-0957, Canada 1-877-977-0775) and you will be advised of the appropriate warranty service facilities where the warranty repair is to be performed.

F. WHERE TO OBTAIN WARRANTY SERVICE

It is recommended that warranty service be performed by the authorized dealer who sold you the engine, although warranty service will be performed by any authorized service dealers or warranty stations anywhere in the United States or Canada. When warranty repair is needed, the engine must be brought to an authorized service dealer or warranty station's place of business during normal business hours. In all cases, a reasonable time must be allowed for the warranty repair to be completed after the engine is received by the authorized service dealer or warranty station.

G. MAINTENANCE, REPLACEMENT AND REPAIR OF EMISSION-RELATED PARTS

Only warranted engine replacement parts approved by Wacker should be used in the performance of any warranty maintenance or repairs on emission-related parts. If other than authorized parts are used for maintenance, replacement or repair of components affecting emission control, you should assure yourself that such parts are warranted by their manufacturer to be equivalent to authorized parts in performance and durability. Wacker, however, assumes no liability under this warranty with respect to parts other than authorized parts. The use of non-authorized replacement parts does not invalidate the warranty on other components unless the non-authorized parts cause damage to warranted parts.

H. PARTS COVERED UNDER THE CALIFORNIA EMISSIONS WARRANTY**(1) Fuel Metering System**

- (i) Carburetor and internal parts (and/or pressure regulator or fuel injection system).
- (ii) Air/fuel ratio feedback and control system, if applicable.
- (iii) Cold start enrichment system, if applicable.
- (iv) Regulator assembly (gaseous fuel, if applicable).

(2) Air Induction System

- (i) Intake manifold, if applicable.
- (ii) Air filter.

(3) Ignition System

- (i) Spark plugs.
- (ii) Magneto or electronic ignition system.
- (iii) Spark advance/retard system, if applicable.

(4) Exhaust manifold, if applicable**(5) Miscellaneous Items Used in Above Systems**

- (i) Electronic controls, if applicable.
- (ii) Hoses, belts, connectors, and assemblies.
- (iii) Filter lock assembly (gaseous fuel, if applicable)

I. MAINTENANCE STATEMENTS

It is your responsibility to have all scheduled inspection and maintenance services performed at the times recommended in the 2003 and later Owner's Manual and to retain proof that inspection and maintenance services are performed at the times when recommended. Wacker will not deny a warranty claim solely because you have no record of maintenance; however, Wacker may deny a warranty claim if your failure to perform required maintenance resulted in the failure of warranted part. The proof which you maintain should be given to each subsequent owner of the engine. You are responsible for performing the scheduled maintenance described below based on the procedures specified in the 2003 and later Owner's Manual. The scheduled maintenance below is based on a normal engine operating schedule.

PROCEDURE	INTERVAL
1) Change engine oil	Initial 20 hours and every 100 hours afterward
2) Clean air cleaner (element)	Check air filter daily. Clean and change as needed.
3) Replace air cleaner element	Every 200 hours or as needed
4) Clean and adjust spark plug and electrodes	Every 200 hours or as needed

Note: More frequent maintenance may be necessary under dusty, dirty or severe conditions.

AIR INDEX

To show compliance with California emission regulations, a hangtag has been provided displaying the Air Index level and durability period of this engine.

The Air Index level defines how clean an engine's exhaust is over a period of time. A bar graph scaled from "0" (most clean) to "10" (least clean) is used to show an engine's Air Index level. A lower Air Index level represents cleaner exhaust from an engine.

The period of time (in hours) that the Air Index level is measured is known as the durability period. Depending on the size of the engine, a selection of time periods can be used to measure the Air Index level (see below).

<u>Descriptive Term</u>	<u>Applicable to Emissions Durability Period</u>
Moderate	50 hours (engine from 0 to 65 cc)
	125 hours (engine greater than 65 cc)
Intermediate	125 hours (engine form 0 to 65 cc)
	250 hours (engine greater than 65 cc)
Extended	250 hours (engine from 0 to 65 cc)
	500 hours (engine greater than 65 cc)

Notice: The hang tag must remain on this engine or piece of equipment, and only be removed by the ultimate purchaser before operation.

3. Safety Information

This manual contains DANGER, WARNING, CAUTION, and NOTE callouts which must be followed to reduce the possibility of personal injury, damage to the equipment, or improper service.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION: Used without the safety alert symbol, CAUTION indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Note: *Contains additional information important to a procedure.*

3.1 Laws Pertaining to Spark Arresters

Notice: State Health Safety Codes and Public Resources Codes specify that in certain locations spark arresters be used on internal combustion engines that use hydrocarbon fuels. A spark arrester is a device designed to prevent accidental discharge of sparks or flames from the engine exhaust. Spark arresters are qualified and rated by the United States Forest Service for this purpose.

In order to comply with local laws regarding spark arresters, consult the engine distributor or the local Health and Safety Administrator.

3.2 Operating Safety

**WARNING**

Familiarity and proper training are required for the safe operation of equipment! Equipment operated improperly or by untrained personnel can be dangerous! Read the operating instructions contained in this manual and familiarize yourself with the location and proper use of all controls. Inexperienced operators should receive instruction from someone familiar with the equipment before being allowed to operate the machine.

- 3.2.1 NEVER allow anyone to operate this equipment without proper training. People operating this equipment must be familiar with the risks and hazards associated with it.
- 3.2.2 NEVER touch the engine or muffler while the engine is on or immediately after it has been turned off. These areas get hot and may cause burns.
- 3.2.3 NEVER use accessories or attachments that are not recommended by Wacker. Damage to equipment and injury to the user may result.
- 3.2.4 NEVER leave machine running unattended.
- 3.2.5 NEVER operate machine in snow, rain, or standing water.
- 3.2.6 ALWAYS be sure operator is familiar with proper safety precautions and operation techniques before using machine.
- 3.2.7 ALWAYS wear protective clothing appropriate to the job site when operating equipment.
- 3.2.8 ALWAYS wear hearing protection when operating equipment.
- 3.2.9 ALWAYS close fuel valve on engines equipped with one when machine is not being operated.
- 3.2.10 ALWAYS store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children.
- 3.2.11 ALWAYS operate machine with all safety devices and guards in place and in working order. DO NOT modify or defeat safety devices. DO NOT operate machine if any safety devices or guards are missing or inoperative.
- 3.2.12 ALWAYS read, understand, and follow procedures in Operator's Manual before attempting to operate equipment.

3.3 Operator Safety while using Internal Combustion Engines



DANGER

Internal combustion engines present special hazards during operation and fueling! Read and follow all warning instructions and safety guidelines in this manual. Failure to follow warnings and safety guidelines could result in severe injury or death.

- 3.3.1 DO NOT run machine indoors or in an enclosed area such as a deep trench unless adequate ventilation, through such items as exhaust fans or hoses, is provided. Exhaust gas from the engine contains poisonous carbon monoxide gas; exposure to carbon monoxide can cause loss of consciousness and may lead to death.
- 3.3.2 DO NOT smoke while operating machine.
- 3.3.3 DO NOT smoke when refueling engine.
- 3.3.4 DO NOT refuel hot or running engine.
- 3.3.5 DO NOT refuel engine near open flame.
- 3.3.6 DO NOT spill fuel when refueling engine.
- 3.3.7 DO NOT run engine near open flames.
- 3.3.8 ALWAYS refill fuel tank in well-ventilated area.
- 3.3.9 ALWAYS replace fuel tank cap after refueling.
- 3.3.10 ALWAYS check fuel lines and fuel tank for leaks and cracks before starting engine. Do not run machine if fuel leaks are present or fuel lines are loose.
- 3.3.11 ALWAYS keep machine at least one meter (three feet) away from structures, buildings and other equipment during use.

3.4 Service Safety

**WARNING**

Poorly maintained equipment can become a safety hazard! In order for the equipment to operate safely and properly over a long period of time, periodic maintenance and occasional repairs are necessary.

- 3.4.1 DO NOT attempt to clean or service machine while it is running. Rotating parts can cause severe injury.
- 3.4.2 DO NOT crank a flooded engine with the spark plug removed on gasoline-powered engines. Fuel trapped in the cylinder will squirt out the spark plug opening.
- 3.4.3 DO NOT test for spark on gasoline-powered engines, if engine is flooded or the smell of gasoline is present. A stray spark could ignite fumes.
- 3.4.4 DO NOT use gasoline or other types of fuels or flammable solvents to clean parts, especially in enclosed areas. Fumes from fuels and solvents can become explosive.
- 3.4.5 ALWAYS keep area around muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite them, starting a fire.
- 3.4.6 ALWAYS replace worn or damaged components with spare parts designed and recommended by Wacker.
- 3.4.7 ALWAYS disconnect spark plug on machines equipped with gasoline engines, before servicing, to avoid accidental start-up.
- 3.4.8 ALWAYS keep machine clean and labels legible. Replace all missing and hard-to-read labels. Labels provide important operating instructions and warn of dangers and hazards.

3.5 Safety Labels

Wacker machines use international pictorial labels where needed. These labels are described below:

Label	Meaning
	<p>Read the operator's manual for machine information.</p>
	<p>WARNING! Hot surface!</p>
	<p>DANGER! Engines emit carbon monoxide; operate only in well-ventilated area.</p>
	<p>Shut off engine before refueling.</p>
	<p>DANGER! No sparks, flames or burning objects near machine.</p>

4. Technical Data

		WM 130	WM 170	WM 270
Engine				
Type		4-stroke, overhead valve, single cylinder		
Engine Make		Wacker		
Rated Power	kW (Hp)	3.2 (4.3)	4.2 (5.7)	6.6 (9.0)
Displacement	cm ³ (in ³)	126 (7.69)	169 (10.31)	265 (16.17)
Engine Speed - max.	rpm	4000		
Engine Speed - idle	rpm	1400 ± 100		
Spark Plug	type	NGK BR6HS (Champion RL86C)		
Electrode Gap	mm (in.)	0.6–0.7 (0.024–0.028)		
Air Cleaner	type	Dual element		
Engine Lubrication	oil grade	SAE 10W30, SE or higher		
Engine Oil Capacity	l (oz.)	0.6 (20)		1.1 (37)
Fuel	type	Automotive unleaded gasoline		
Fuel Tank Capacity	l (qts.)	2.7 (2.8)	3.6 (3.8)	6.0 (6.4)
Valve Clearance (cold)	mm (in.)	0.12–0.15 (0.005–0.006)		
Dimensions (L x W x H)	mm (in.)	297x341x318 (11.7x13.4x12.5)	304x354x335 (12x13.9x13.2)	355x420x410 (14x16.5x16.1)
Dry Weight	kg (lbs.)	14 (31)	15 (33)	21 (46)
Emissions Durability Period (California Only)		500 hours		

5. Operation

5.1 Recommended Fuel

This engine is certified to operate on automotive unleaded gasoline. Use only fresh, clean gasoline. Gasoline containing water or dirt will damage fuel system.

5.2 Before Starting

- 5.2.1 Read and understand safety and operating instructions at beginning of this manual.
- 5.2.2 Check:
 - Oil level in engine.
 - Fuel level.
 - Condition of air cleaner.
 - Tightness of external fasteners.

5.3 To Start

See Graphic: *wc_gr000655*

- 5.3.1 Open fuel valve by moving lever down (**a1**).

Note: If engine is cold, move choke lever to close position (**d2**). If engine is hot, set choke to open position (**d1**).

- 5.3.2 Turn engine switch to “ON” (**b2**).

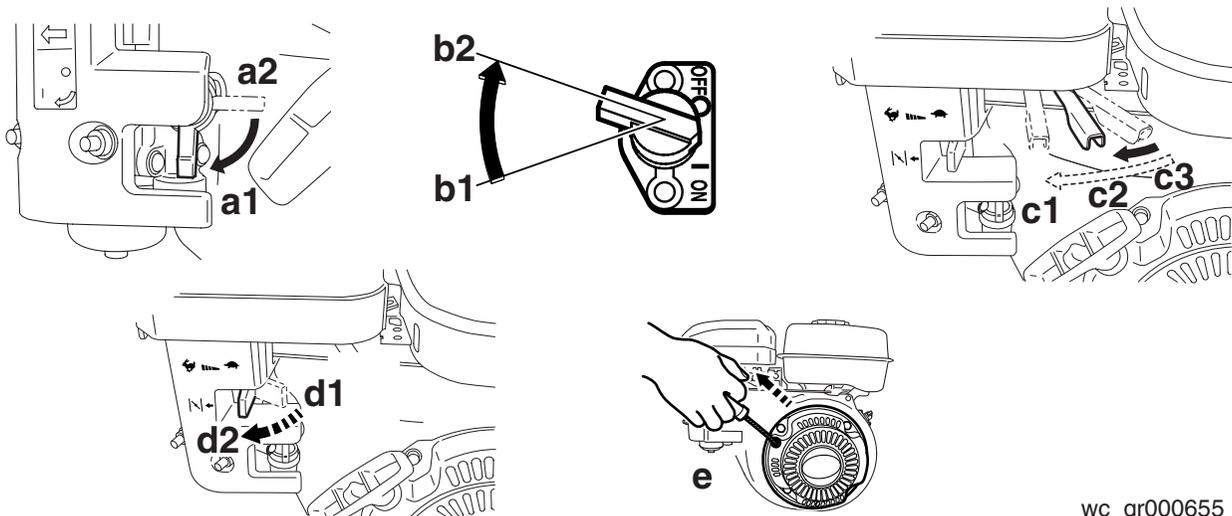
- 5.3.3 Open throttle by moving it slightly to left (**c2**).

- 5.3.4 Pull starter rope (**e**).

Note: If the oil level in the engine is low, the engine will not start. If this happens, add oil to engine.

- 5.3.5 Open choke as engine warms (**d1**).

- 5.3.6 Open throttle fully to operate (**c1**).



wc_gr000655

5.4 To Stop

See Graphic: *wc_gr000655*

- 5.4.1 Reduce engine RPM to idle by moving throttle completely to right (**c3**).

- 5.4.2 Turn engine switch to “OFF” (**b1**).

- 5.4.3 Close fuel valve (**a2**).

6. Maintenance

6.1 Periodic Maintenance Schedule

	Daily before starting	After first 20 hours	Every 2 weeks or 50 hrs.	Every month or 100 hrs.	Every year or 300 hrs.	Every 500 hrs.
Check fuel level.	•					
Check engine oil level.	•					
Inspect fuel lines.	•					
Inspect air filter. Replace as needed.	•					
Check and tighten external hardware.	•					
Clean air cleaner elements.			•			
Change engine oil.		•		•		
Clean sediment cup / fuel filter.				•		
Check and clean spark plug.				•		
Check and adjust valve clearance.					•	
Replace spark plug.						•

Maintenance, replacement or repair of emission control devices and systems may be performed by any repair establishment or individual.

6.2 Spark Plug

See Graphic: *wc_gr000028*

Clean or replace spark plug as needed to ensure proper operation.



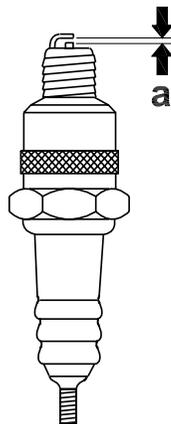
WARNING

The muffler becomes very hot during operation and remains hot for a while after stopping the engine. Do not touch the muffler while it is hot.

Note: Refer to the Technical Data for the recommended spark plug type and the electrode gap setting.

- 6.2.1 Remove spark plug and inspect it.
- 6.2.2 Replace plug if the insulator is cracked or chipped.
- 6.2.3 Clean spark plug electrodes with a wire brush.
- 6.2.4 Set the electrode gap (**a**).
- 6.2.5 Tighten spark plug securely.

CAUTION: A loose spark plug can become very hot and may cause engine damage.



wc_gr000028

6.3 Engine Oil

See Graphic: *wc_gr000087*

6.3.1 Drain oil while engine is still warm.

Note: *In the interests of environmental protection, place a plastic sheet and a container under the machine to collect any liquid which drains off. Dispose of this liquid in accordance with environmental protection legislation.*

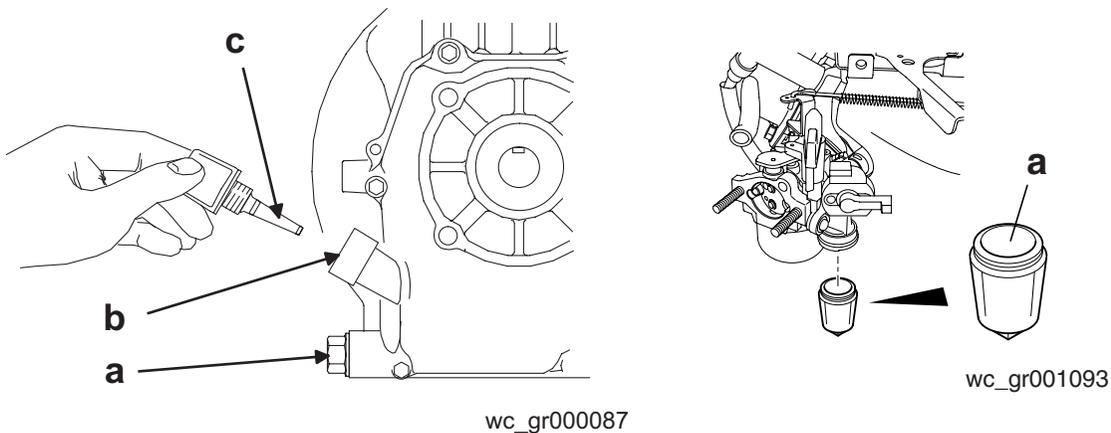
6.3.2 Remove the oil drain plug (**a**).

6.3.3 Allow the oil to drain.

6.3.4 Install the drain plug.

6.3.5 Fill the engine crankcase through the oil filler opening (**b**), to the upper mark on the dipstick (**c**). Do not thread in the dipstick to check the level. See *Technical Data* for oil quantity and type.

6.3.6 When the crankcase is full, reinstall the dipstick.



6.4 Cleaning Fuel Strainer

See Graphic: *wc_gr001093*

6.4.1 To remove water and dirt, close the fuel lever and remove the fuel strainer.

6.4.2 Inspect fuel strainer (**a**) for water and dirt.

6.4.3 After removing dirt and water, wash the fuel cup with kerosene or gasoline.

6.4.4 Reinstall securely to prevent leakage.

6.5 Air Cleaner

See Graphic: *wc_gr000656*

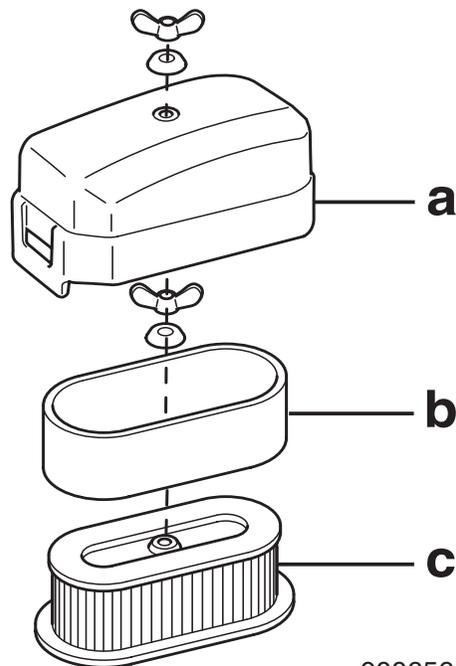


NEVER use gasoline or other types of low flash point solvents for cleaning the air cleaner. A fire or explosion could result.

CAUTION: NEVER run engine without air cleaner. Severe engine damage will occur.

The engine is equipped with a dual element air cleaner. Under normal operating conditions, elements should be cleaned once every week. Under severe, dry and dusty conditions, the elements should be maintained daily. Replace an element when saturated with dirt that cannot be removed.

- 6.5.1 Remove the air cleaner cover (**a**). Remove both elements and inspect them for holes or tears. Replace damaged elements.
- 6.5.2 Wash the foam element (**b**) in a solution of mild detergent and warm water. Rinse it thoroughly in clean water. Allow the element to dry thoroughly.
- 6.5.3 Tap the paper element (**c**) lightly to remove excess dirt or blow compressed air through the filter from the inside out. Replace the paper element if it appears heavily soiled.



6.6 Storage

If machine is being stored for more than 30 days:

- 6.6.1 Drain fuel from tank. Start engine and run until remaining fuel is used.
- 6.6.2 Remove spark plug. Pour approximately 5 cc of clean SAE 10W30 engine oil into cylinder through spark plug opening. Pull starter rope slowly to distribute oil in engine. Reinstall spark plug.
- 6.6.3 Change oil.
- 6.6.4 Cover engine and store in a clean, dry area.

