



Husqvarna®



CRT 48-33K
CRT 48-33K DF

Husqvarna, 2019-12-01

Operator's manual, EN

Dear customer,

Thank you for choosing a Husqvarna quality product. We hope that you will genuinely enjoy it.

Please note that the enclosed manual contains Wacker Neuson references.

The Husqvarna Group is vouching for the quality of this product.

If you have any questions, please do not hesitate to contact Discount-equipment

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Operator's Manual

Ride-On Trowel

CRT48-33K CRT48-33K DF



Type

CRT48-33K, CRT48-33K DF

Document

5200004710

Date

0918

Revision

09

Language

EN



5 2 0 0 0 0 4 7 1 0

CALIFORNIA Proposition 65 Warning



WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.



WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.



WARNING

Cancer and Reproductive Harm -
www.P65Warnings.ca.gov.



WARNING

Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. WASH HANDS AFTER HANDLING.

CALIFORNIA Proposition 65 Warning

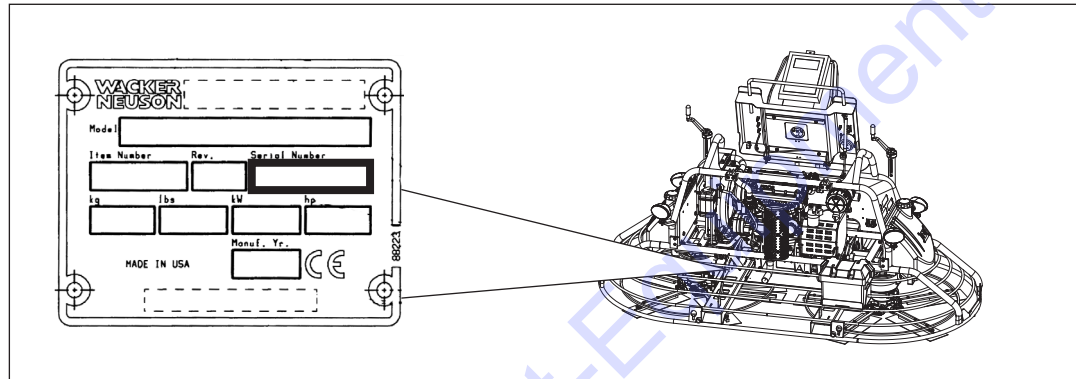
Notes

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Foreword

SAVE THESE INSTRUCTIONS—This manual contains important instructions for the machine models below. These instructions have been written expressly by Wacker Neuson Production Americas LLC and must be followed during installation, operation, and maintenance of the machines.

Machine	Item Number
CRT 48-33K	5200002353, 5200002354
CRT 48-33K DF	5200007686, 5200007687



wc_gr010110

Machine identification

A nameplate listing the model number, item number, revision number, and serial number is attached to this machine. The location of the nameplate is shown above.

Serial number (S/N)

For future reference, record the serial number in the space provided below. You will need the serial number when requesting parts or service for this machine.

Serial Number:

Machine documentation

- From this point forward in this documentation, Wacker Neuson Production Americas LLC will be referred to as Wacker Neuson.
- Keep a copy of the Operator’s Manual with the machine at all times.
- For spare parts information, please see Discount-equipment
- When ordering parts or requesting service information, be prepared to provide the machine model number, item number, revision number, and serial number.

Expectations for information in this manual

- This manual provides information and procedures to safely operate and maintain the above Wacker Neuson model(s). For your own safety and to reduce the risk of injury, carefully read, understand, and observe all instructions described in this manual.
- Wacker Neuson expressly reserves the right to make technical modifications, even without notice, which improve the performance or safety standards of its machines.

- The information contained in this manual is based on machines manufactured up until the time of publication. Wacker Neuson reserves the right to change any portion of this information without notice.
- The illustrations, parts, and procedures in this manual refer to Wacker Neuson factory-installed components. Your machine may vary depending on the requirements of your specific region.

**CALIFORNIA
Proposition
65 Warning**

Combustion 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.

**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.

**Manufacturer's
approval**

This manual contains references to *approved* parts, attachments, and modifications. The following definitions apply:

- **Approved parts or attachments** are those either manufactured or provided by Wacker Neuson.
- **Approved modifications** are those performed by an authorized Wacker Neuson service center according to written instructions published by Wacker Neuson.
- **Unapproved parts, attachments, and modifications** are those that do not meet the approved criteria.

Unapproved parts, attachments, or modifications may have the following consequences:

- Serious injury hazards to the operator and persons in the work area
- Permanent damage to the machine which will not be covered under warranty

Contact Discount-equipment immediately if you have questions about approved or unapproved parts, attachments, or modifications.

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1 Safety Information

1.1 Signal Words Used in this Manual

This manual contains DANGER, WARNING, CAUTION, *NOTICE*, and NOTE signal words 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 hazards.

- ▶ Obey all safety messages that follow this symbol.



DANGER

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

- ▶ To avoid death or serious injury from this type of hazard, obey all safety messages that follow this signal word.



WARNING

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

- ▶ To avoid possible death or serious injury from this type of hazard, obey all safety messages that follow this signal word.



CAUTION!

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

- ▶ To avoid possible minor or moderate injury from this type of hazard, obey all safety messages that follow this signal word.

NOTICE: Used without the safety alert symbol, NOTICE indicates a situation which, if not avoided, could result in property damage.

Note: A Note contains additional information important to a procedure.

1.2 Machine Description and Intended Use

This machine is a ride-on concrete finishing trowel. The Wacker Neuson Ride-On Trowel consists of a frame onto which are mounted a gasoline or diesel engine, a fuel tank, a water tank, two gearboxes joined by a drive shaft, and an operator's platform with controls and a seat. A set of metal blades is connected to each gearbox. A ring guard surrounds the blades. The engine rotates the blades via the gearboxes and a clutch mechanism. The rotating blades ride on the surface of curing concrete, creating a smooth finish. The operator, who sits on the operator's platform, uses the controls and the throttle pedal to control speed and direction of the machine.

This machine is intended to be used for floating and burnishing curing concrete.

This machine has been designed and built strictly for the intended use described above. Using the machine for any other purpose could permanently damage the machine or seriously injure the operator or other persons in the area. Machine damage caused by misuse is not covered under warranty.

The following are some examples of misuse:

- Using the machine as a ladder, support, or work surface
 - Using the machine to carry or transport passengers or equipment
 - Using the machine to finish inappropriate materials such as slurries, sealers, or epoxy finishes
 - Operating the machine outside of factory specifications
 - Operating the machine in a manner inconsistent with all warnings found on the machine and in the Operator's Manual
-

This machine has been designed and built in accordance with the latest global safety standards. It has been carefully engineered to eliminate hazards as far as practicable and to increase operator safety through protective guards and labeling. However, some risks may remain even after protective measures have been taken. They are called residual risks. On this machine, they may include exposure to:

- Heat, noise, exhaust, and carbon monoxide from the engine
- Chemical burns from the curing concrete
- Fire hazards from improper refueling techniques
- Fuel and its fumes, fuel spillage from improper lifting technique
- Personal injury from improper lifting techniques
- Cutting hazards from sharp or worn blades

To protect yourself and others, make sure you thoroughly read and understand the safety information presented in this manual before operating the machine.

1.3 Operating Safety



WARNING

Machines operated improperly or by untrained personnel can be hazardous.

- ▶ Read the operating instructions contained in both this Operator's Manual and the engine owner's manual.
- ▶ Familiarize yourself with the location and proper use of all controls.
- ▶ Inexperienced operators should receive instruction from someone familiar with the machine before being allowed to operate it.

Operator qualifications

Only trained personnel are permitted to start, operate, and shut down the machine. They also must meet the following qualifications:

- have received instruction on how to properly use the machine
- are familiar with required safety devices

The machine must not be accessed or operated by:

- children
- people impaired by alcohol or drugs

Personal Protective Equipment (PPE)

Wear the following Personal Protective Equipment (PPE) while operating this machine:

- Close-fitting work clothes that do not hinder movement
- Safety glasses with side shields
- Hearing protection
- Safety-toed footwear

Operating safety

To increase operating safety while running this machine:

- Do not touch the engine or muffler while the engine is on or immediately after it has been stopped. These areas get hot and may cause burns.
- Do not use accessories or attachments that are not recommended by Wacker Neuson. Damage to equipment and injury to the user may result.
- Do not leave the machine running unattended.
- Do not use a cell phone or send text messages while operating this machine.

Always do the following:

- Operate the machine with all safety devices and guards in place and in working order.
- Remain aware of moving parts and keep hands, feet, and loose clothing away from the moving parts of the machine.

Dust precaution

Dust created by construction activities may cause silicosis or respiratory harm. To reduce the risk of exposure:

- Work in a well ventilated area.
- Use a dust control system.
- Wear an approved dust/particle respirator.

Storing the machine

- Store the machine properly when it is not being used. The machine should be stored in a clean, dry location out of the reach of children.
- Close the fuel valve when the machine is not being operated.

1.4 Lifting and Transport Safety

Requirements Before lifting the machine:

- refer to *Technical Data* for the operating weight of the machine
 - make sure the lifting devices have sufficient capacity to lift the machine safely
 - make sure the winch, forklift, or crane to be used for lifting the machine is in operable condition and designed for such work
-

Lifting and transporting

- Refer to *Lifting and Transporting The Machine* for detailed instructions.

1.5 Operator Safety while Using Internal Combustion Engines

WARNING



Internal combustion engines present special hazards during operation and fueling. Failure to follow the warnings and safety standards could result in severe injury or death.

- ▶ Read and follow the warning instructions in the engine owner’s manual and the safety guidelines below.
-

DANGER



Exhaust gas from the engine contains carbon monoxide, a deadly poison. Exposure to carbon monoxide can kill you in minutes.

- ▶ NEVER operate the machine inside an enclosed area, such as a tunnel, unless adequate ventilation is provided through items such as exhaust fans or hoses.
-

Operating safety

When running the engine:

- Keep the area around the exhaust pipe free of flammable materials.
- Check the fuel lines and the fuel tank for leaks and cracks before starting the engine. Do not run the machine if fuel leaks are present or the fuel lines are loose.

When running the engine:

- Do not smoke while operating the machine.
 - Do not run the engine near sparks or open flames.
 - Do not touch the engine or muffler while the engine is running or immediately after it has been turned off.
 - Do not operate a machine when its fuel cap is loose or missing.
 - Do not start the engine if fuel has spilled or a fuel odor is present. Move the machine away from the spill and wipe the machine dry before starting.
-

Refueling safety

When refueling the engine:

- Clean up any spilled fuel immediately.
- Refill the fuel tank in a well-ventilated area.
- Re-install the fuel tank cap after refueling.
- Use suitable tools for refueling (for example, a fuel hose or funnel).

When refueling the engine:

- Do not smoke.
 - Do not refuel a hot or running engine.
 - Do not refuel the engine near sparks or open flames.
-

Radiator Safety

Do not remove the radiator cap when the engine is running or hot. The radiator fluid is hot and under pressure and may cause severe burns!

1.6 Liquid Propane (LP) Safety



WARNING

Fire, asphyxiation, chemical burn, and explosion hazards. Liquid propane (LP) presents special hazards during operation and fueling. Failure to follow the warnings and safety standards could result in serious injury or death.

- ▶ Read and follow the safety instructions in the engine owner's manual and the safety guidelines below.
-

Handling LP

Observe the following safety instructions when handling LP.

- Use proper lifting techniques to prevent stress or strain injuries.
 - LP cylinders are pressurized. To vent excess pressure, two relief valves exist in the fueling system for this machine. Read and understand the topic "Relief Valves" in the *Operation* chapter before operating the machine.
 - Pressurized LP is extremely cold. Vapors can instantly freeze bare skin and eyes. Always wear gloves and eye protection when handling LP cylinders.
 - LP vapors are heavier than air. LP vapors may settle around you, reducing the amount of oxygen necessary for breathing. Always handle LP cylinders in a well-ventilated area.
 - Do not use an LP cylinder if there is visible damage to the tank or valves.
 - Use only LP cylinders that have been filled by a trained and authorized person.
-

Responding to hazardous situations

Follow the safety instructions below if a hazardous situation occurs while you are operating this machine (for example: a fire, explosion, severe weather, etc.).

- Stop the engine.
 - Remove the starting key.
 - Leave the work area.
 - Notify local emergency response services.
-

Storing and Transporting LP Cylinders

Follow the safety instructions below when storing and transporting LP cylinders.

- Store and transport LP cylinders in the upright position only.
- Do not drop LP cylinders or allow them to roll or bounce in transit.
- Do not store or transport LP cylinders in environments where the temperature may reach 51°C (125°F), for example, in a closed truck bed.
- Empty LP cylinders may contain residual pressurized gas and must be stored and transported under the same conditions as full LP cylinders.

This topic continues on the next page.

Continued from the previous page.

Replacing Empty LP Cylinders

Follow the safety instructions below when replacing empty LP cylinders.

- Only a person familiar with the process should replace empty LP cylinders.
- Replace empty LP cylinders only in a well-ventilated area.
- Do not replace empty LP cylinders near sparks or open flames.
- Do not replace empty LP cylinders while the engine is running.
- Do not allow LP cylinders to remain in direct sunlight for extended periods during the replacement process.
- Ensure that the full LP cylinder is properly seated and fastened in the tank clamps.
- Ensure that all hose connections are tight, and perform a leak test, before opening the discharge valve.

1.7 Service Safety

A poorly maintained machine can become a safety hazard. Periodic maintenance and occasional repairs are necessary in order for the machine to operate safely and properly over a long period of time.

Personal Protective Equipment (PPE)

Wear the following Personal Protective Equipment (PPE) while servicing or maintaining this machine:

- Close-fitting work clothes that do not hinder movement
- Safety glasses with side shields
- Hearing protection
- Safety-toed footwear

In addition, before servicing or maintaining the machine:

- Tie back long hair.
 - Remove all jewelry (including rings).
-

Requirements

- Stop the machine and remove the key from machine before performing maintenance or making repairs.
 - Disconnect the battery before adjusting or maintaining the electrical equipment.
-

Servicing safety

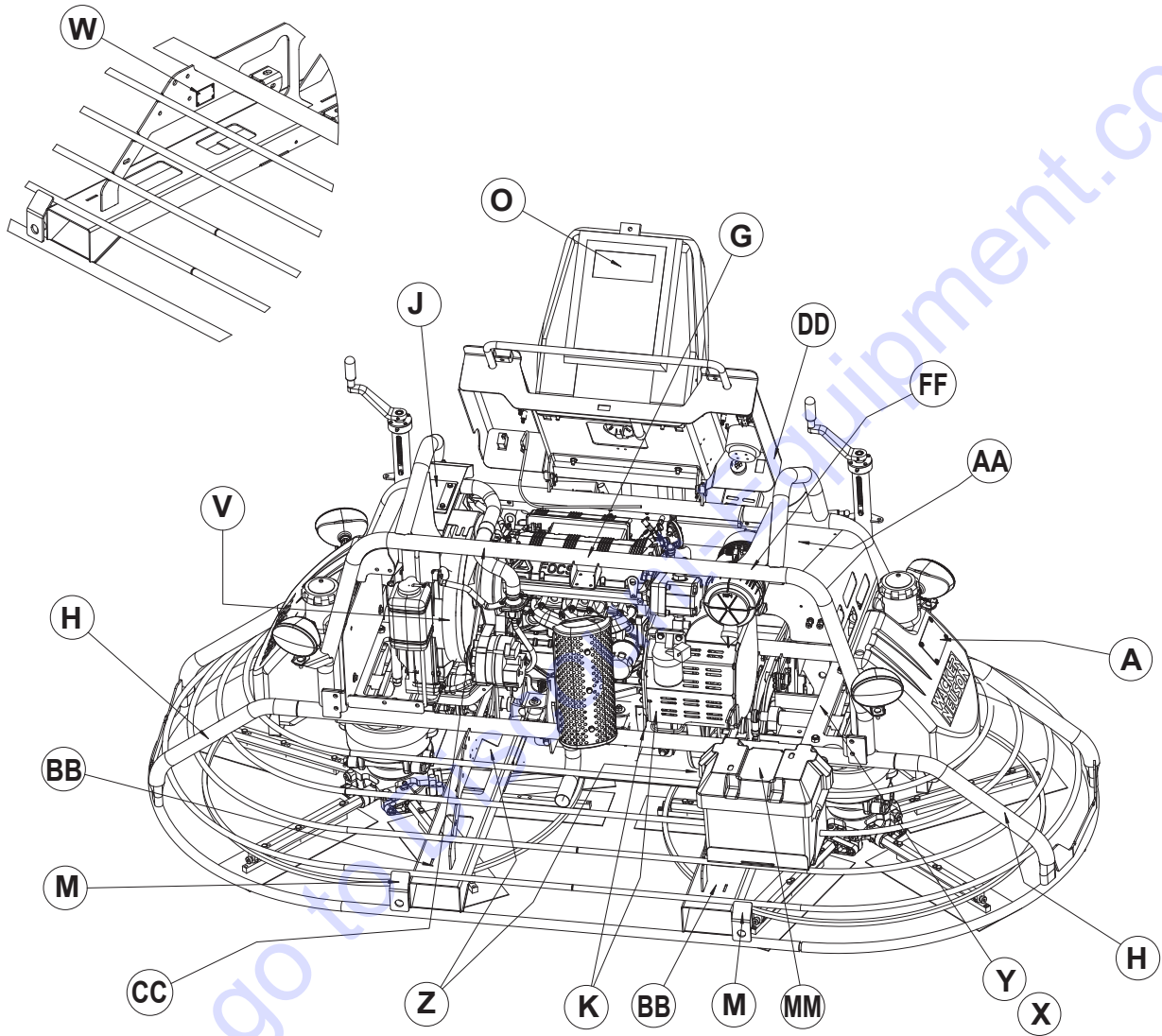
- Do not use gasoline or other types of fuels or flammable solvents to clean parts, especially in enclosed areas. Fumes from fuels and solvents can become explosive.
 - Handle blades carefully. The blades can develop sharp edges which can cause serious cuts.
 - Keep the area around the muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite the debris and start a fire.
-

Replacing parts

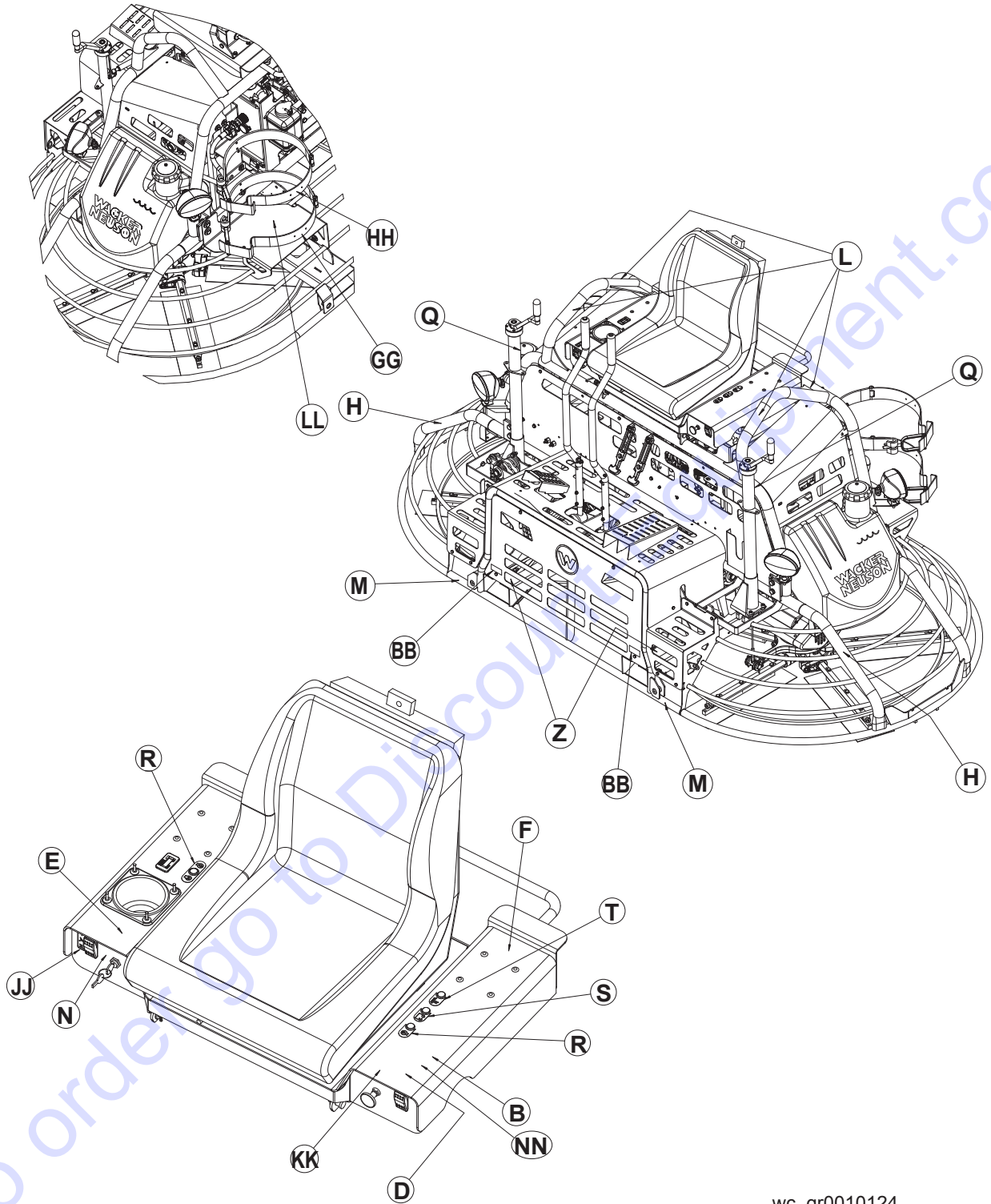
- When replacement parts are required for this machine, use only Wacker Neuson replacement parts or those parts equivalent to the original in all types of specifications, such as physical dimensions, type, strength, and material.
- Keep the machine clean and labels legible. Replace all missing and hard-to-read labels. Labels provide important operating instructions and alert the user to dangers and hazards.

2 Labels

2.1 Label Locations



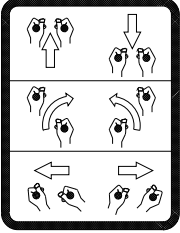
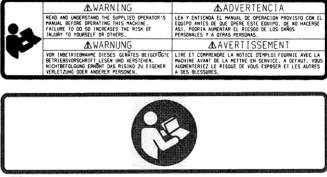

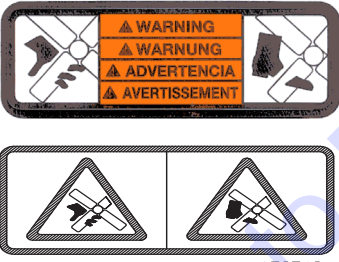


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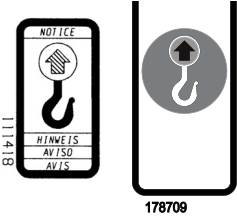


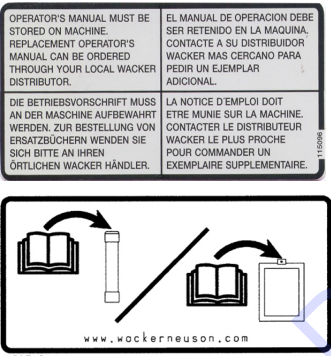



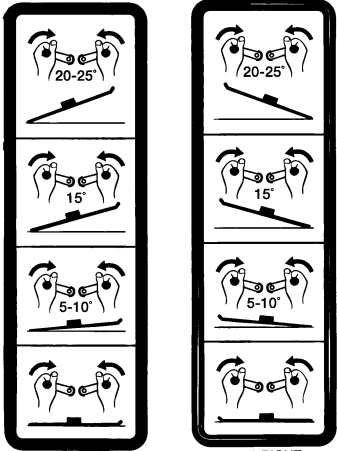
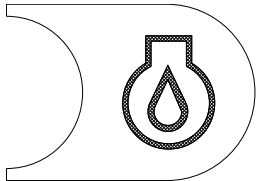
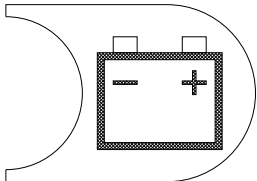
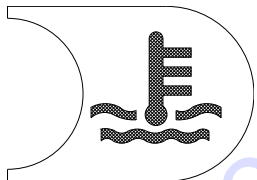
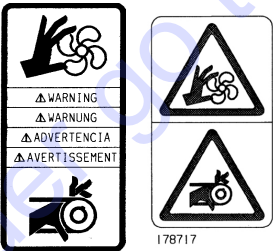
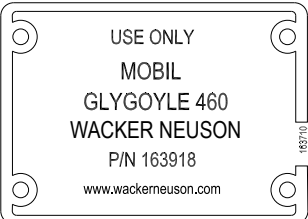
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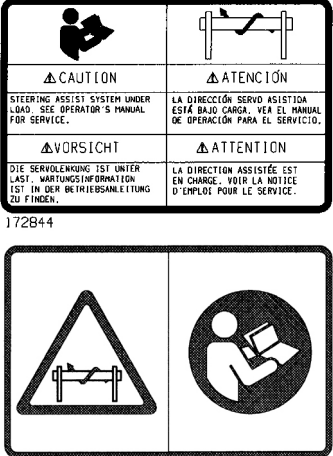
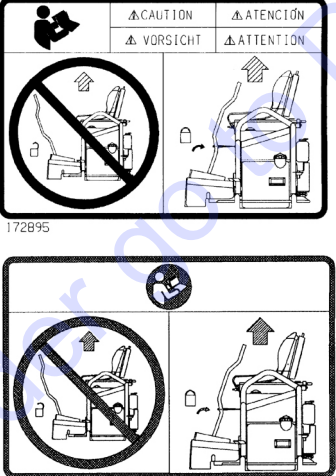
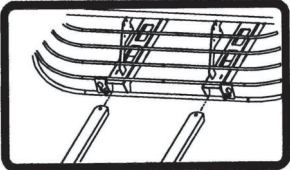
2.2 Label Meanings

<p>A</p>		<p>DANGER Asphyxiation hazard</p> <ul style="list-style-type: none"> Engines emit carbon monoxide. Do not run the machine indoors or in an enclosed area unless adequate ventilation, through such items as exhaust fans or hoses, is provided. Read the Operator's Manual. No sparks, flames, or burning objects near the machine. Stop the engine before refueling. <p>Use only clean, filtered gasoline fuel.</p>
<p>B</p>		<p>WARNING Hot surface</p>
<p>C</p>		<p>Water tank fill. Use only clean water or water-based retardants.</p>
<p>D</p>		<p>WARNING Always wear hearing and eye protection when operating this machine.</p>

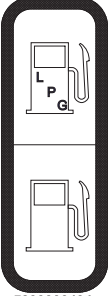
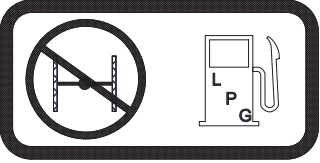

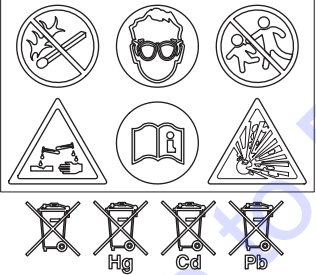

<p>E</p>		<p>Steering control. Refer to topic <i>Steering</i>.</p>
<p>F</p>		<p>Read and understand the supplied Operator's Manual before operating the machine. Failure to do so increases the risk of injury to yourself and others.</p>
<p>G</p>		<p>WARNING Hot surface</p>
<p>H</p>		<p>WARNING Cutting hazard. Always replace blade guard.</p>
<p>J</p>		<p>WARNING Pressurized contents. Do not open when hot!</p>
<p>K</p>		<p>WARNING Hand injury if caught in moving belt. Always replace beltguard.</p>

<p>L</p>	 <p>178709</p>	<p>NOTICE Lifting point</p>
<p>M</p>		<p>Tie-down point</p>
<p>N</p>		<p>Key switch, engine start: Off On Start</p>
<p>O</p>	 <p>180562</p>	<p>Operator's Manual must be stored on machine. Replacement Operator's Manual can be ordered through your local Wacker Neuson distributor.</p>
<p>P</p>		<p>WARNING Remove pan from trowel before lifting machine overhead. Pans can fall and cause death or serious injury if a person is hit. (Label is located on top side of float pan.)</p>

<p>Q</p>		<p>Blade pitch control. Turn both controls inward to increase blade pitch. Refer to section <i>Pitch Adjustment</i>.</p>
<p>R</p>		<p>CAUTION! Engine oil pressure is low! Stop the engine and check the oil level.</p>
<p>S</p>		<p>CAUTION! Low voltage! Stop the engine and check the charging system.</p>
<p>T</p>		<p>CAUTION! Coolant temperature is too high. Stop the engine and check the coolant level.</p>
<p>V</p>		<p>WARNING Pinching hazard. Rotating machinery.</p>
<p>W</p>		<p>Use only Glygoyle 460 gear oil in gearbox.</p>

<p>X</p>		<p>Industry Canada ICES-002 Compliance Label: CAN ICES-2/NMB-2</p>
<p>Y</p>		<p>This machine may be covered by one or more patents.</p>
<p>Z</p>	 <p>172844</p> <p>178792</p>	<p>Steering system components are under load. See <i>Steering</i> section or a trained service technician for adjustments.</p>
<p>AA</p>	 <p>172895</p>	<p>CAUTION! Engage manual steering handle lock before lifting.</p>
<p>BB</p>		<p>Fork lift pockets</p>

<p>CC</p>		<p>WARNING Avoid crushing area.</p>
<p>DD</p>		<p>Emission Control Information This equipment meets U.S. EPA EVAP standards.</p>
<p>FF</p>		<p>WARNING Explosion hazard. Do not use evaporative starting fluids such as ether on this engine. The engine is equipped with a cold starting aid. Using evaporative starting fluids can cause an explosion which can cause engine damage, personal injury, or death. Read and follow the engine starting instructions in this Operator's Manual.</p>
<p>GG</p>		<p>WARNING!</p> <ul style="list-style-type: none"> ■ Flammable LPG (Liquid Propane Gas). ■ Close the fuel valve on the tank when the machine is not in use. ■ Do not store the tank or leave the machine near heat or ignition sources. ■ Follow filling and operating instructions. ■ Frost on tank, valves, hoses, or an LPG odor indicates a leak. Trained personnel should inspect and repair the leak immediately. Do not start the engine if there is a leak.
<p>HH</p>		<p>DANGER! Asphyxiation hazard.</p> <ul style="list-style-type: none"> ■ Engines emit carbon monoxide. ■ Do not run the machine indoors or in an enclosed area unless adequate ventilation, through such items as exhaust fans or hoses, is provided. ■ Read the Operator's Manual. No sparks, flames, or burning objects near the machine. Stop the engine before refueling. ■ Use only liquid propane gas (LPG).

<p>JJ</p>	 <p>5200008434</p>	<p>Dual fuel: Liquid Propane (LP) Gas or Unleaded Gasoline</p>
<p>KK</p>	 <p>5200008436</p>	<p>Do not close the choke when running the engine on Liquid Propane (LP) Gas</p>
<p>LL</p>	 <p>179212</p>	<p>Not a step</p>
<p>MM</p>	 <p>0183198</p>	<p>WARNING</p> <ul style="list-style-type: none"> ■ Keep all sparks and open flames away from the battery. ■ Wear eye protection. ■ Keep away from children. ■ Battery acid is poisonous and corrosive. ■ Read the Operator's Manual. ■ Explosion hazard. <p>Dispose of waste batteries in accordance with local environmental regulations. Battery contains mercury (Hg), cadmium (Cd), or lead (Pb).</p>
<p>NN</p>	 <p>5100045462</p>	<p>California Proposition 65 Warning Cancer and Reproductive Harm - www.P65Warnings.ca.gov.</p>

3 Lifting and Transporting

3.1 Lifting the Machine

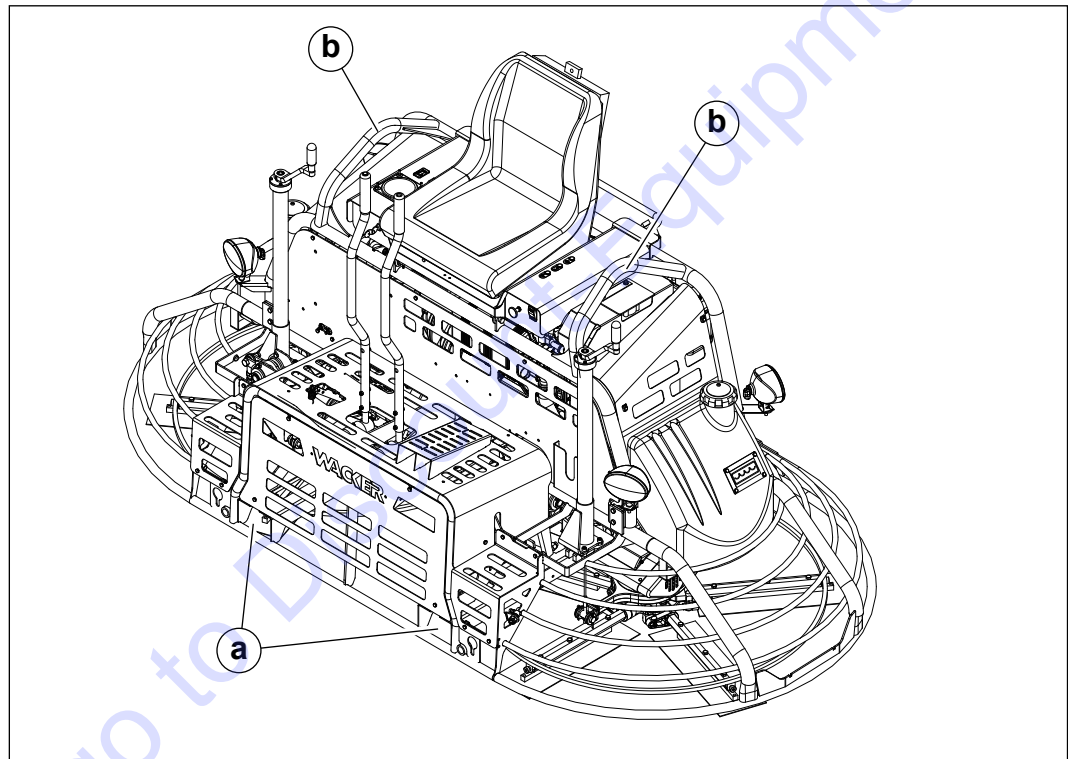
**CAUTION!**

Possibility of injury or equipment damage. Unlocked steering handles can swing forward unexpectedly.

- ▶ Engage manual steering handle lock before lifting.

Overview

The machine is equipped with fork lift pockets (a) on the front and back, and two lifting bars (b).



wc_gr003774

- Requirements**
- Make sure the lifting devices have enough weight-bearing capacity to lift and move the machine safely. See *Technical Data*.
 - Keep people away from the machine as it is being lifted. Do not allow anyone to stand beneath the machine.

This procedure continues on the next page.

Continued from the previous page.

Lifting the machine

To lift the machine:

- use a fork lift and the designated fork lift pockets
- attach a sling or chains to the lifting bars



WARNING

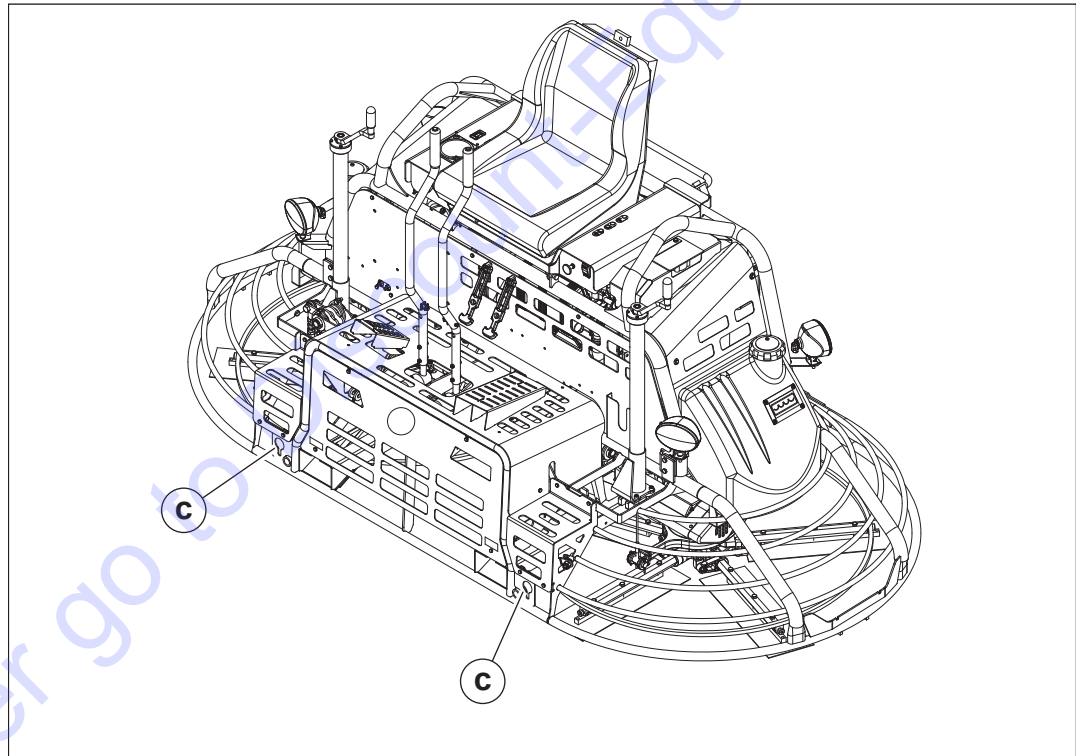
Crushing hazard. The machine can drop if it is lifted by the guard rings or any other part of the frame. These components are not designed to support the weight of the machine.

- ▶ Use only the designated lifting locations to lift the machine.

3.2 Transporting the Machine

Overview

The machine is equipped with tie-down points (c) for securing the machine on a transport vehicle.



wc_gr009273

Requirements

Before moving or transporting the machine:

- Ensure that bystanders are out of the way.
- Make sure that the manual steering lock is engaged.

Transporting the machine

- If the machine is to be transported on a flat-bed vehicle, make sure the transporting vehicle has enough weight-bearing capacity to move the machine safely. See *Technical Data*.
- Ensure that the transporting vehicle has appropriate tie-down connection.

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4 Operation

4.1 Preparing the Machine for First Use

1. Make sure all loose packaging materials have been removed from the machine.
2. Check the machine and its components for damage. If there is visible damage, do not operate the machine. Contact Discount-equipment immediately for assistance.
3. Take inventory of all items included with the machine and verify that all loose components and fasteners are accounted for.
4. Attach component parts not already attached.
5. Add fluids as needed and applicable, including fuel, engine oil, and battery acid.
6. Move the machine to its operating location.

4.2 Break-in Period

Overview

New engines require a break-in period to ensure maximum efficiency. During the break-in period, the internal components of the engine wear slightly and develop a tight seal.

The engine in this machine has a 50 hour break-in period.

Operating during the break-in period

Follow the recommendations below while operating the machine during the break-in period.

- Allow the engine to warm up completely before operating the machine in cold weather.
- Change the engine oil and oil filter after 50 hours of operation. See topic *Engine Oil and Filter* in the “Maintenance” chapter.

4.3 Recommended Fuel

Use of oxygenated fuels

The engine requires regular grade unleaded gasoline. Use only fresh, clean gasoline. Gasoline containing water or dirt will damage the fuel system. Consult the engine owner's manual for complete fuel specifications.

Some conventional gasolines are blended with alcohol. These gasolines are collectively referred to as oxygenated fuels. If you use an oxygenated fuel, be sure it is unleaded and meets the minimum octane rating requirement.

Before using an oxygenated fuel, confirm the fuel's contents. Some states and provinces require this information to be posted on the fuel pump.

The following is the Wacker Neuson approved percentage of oxygenates:

ETHANOL - (ethyl or grain alcohol) 10% by volume. You may use gasoline containing up to 10% ethanol by volume (commonly referred to as E10). Gasoline containing more than 10% ethanol (such as E15, E20, or E85) may not be used because it could damage the engine.

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.



4.4 Recommended Fuel (Liquid Propane)

Description The dual-fuel engine on this machine can be run on Liquid Propane (LP) gas. LP is a petroleum-based product that exists as a liquid inside a pressurized cylinder. As the pressure is released, the liquid vaporizes and becomes a combustible gas.

Cylinder specifications

- In the United States, LP cylinders used on this machine must conform to US DOT specifications 4BA, 4BW, and 4E. These specifications originate in Title 49 of the US Code of Federal Regulations which governs the safe transportation of hazardous gases.
- In Canada, LP cylinders are regulated by the Compressed Gas Association (CGA) and must conform to Transport Canada specifications 4BAM, 4BWM, and 4EM.
- In Europe, LP cylinders must be manufactured in accordance with EN-1442 and instruction 1999/36/WE. LP cylinders must also be certified by TUV with appropriate labeling to indicate compliance.
- In areas where US, Canadian, or European regulations do not apply, check with your local fuel supplier for assistance with selecting an LP cylinder of the appropriate size and specification.

The required LP cylinder size is:

	Capacity	Weight ¹	Diameter	Length
US Machines	24.6 L (6.5 gal) 15 kg (33 lb)	Empty: 10.4 kg (23 lb) Filled: 25.4 kg (56 lb)	317.5 mm (12.5 in.)	723.9 mm (28.5 in.)
Non-US Machines	21.6 L (5.7 gal) 11 kg (24.3 lb)	Empty: 6.7 kg (15 lb) Filled: 17.7 kg (39 lb)	300 mm (11.8 in.)	585 mm (23 in.)

¹Listed weights are for aluminum cylinders.

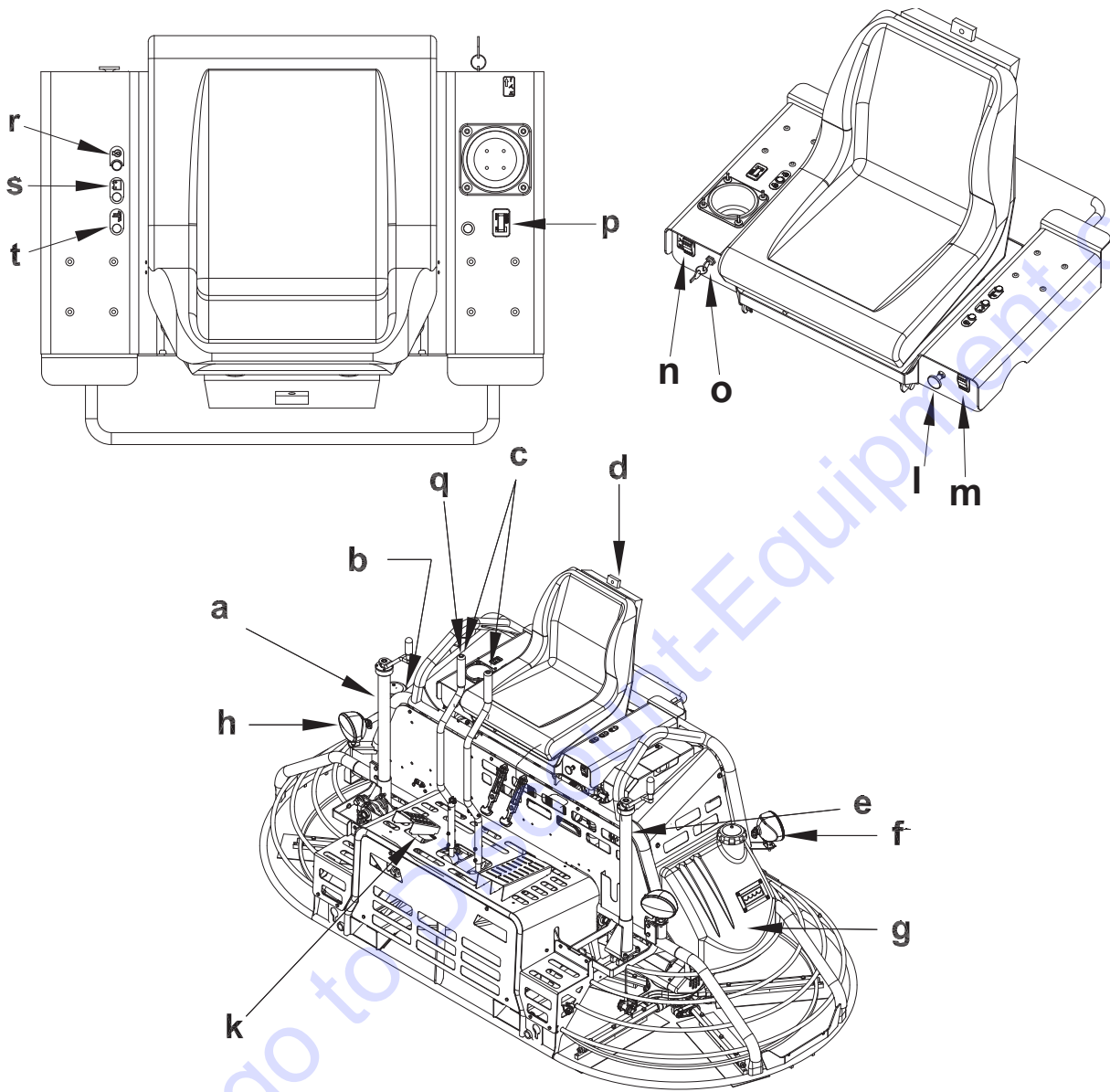
4.5 Position of the Operator

Safe and efficient use of this machine is the operator’s responsibility. Full control of the machine is not possible unless the operator maintains the proper working position at all times.

While operating this machine the operator must:

- be seated in the operator’s seat facing forward
- have both feet on the control deck
- have both hands on the controls

4.6 Control / Component Locations



wc_gr010112

Ref.	Description	Ref.	Description
a	Right pitch control	l	Engine choke control (used only when operating with gasoline)
b	Fuel tank	m	Work light switch
c	Control arms	n	LP/gas selector switch
d	Operator's seat with "operator presence" switch	o	Engine keyswitch
e	Left pitch control	p	Hour meter
f	Rear work light (one each side)	q	Water spray control
g	Water tank	r	Oil pressure indicator light
h	Work light (one each side)	s	Alternator charging indicator light
k	Foot pedal (throttle control)	t	Coolant temperature indicator light

4.7 Operator Presence System

Description This machine features a seat with an integrated "operator presence" system which works in conjunction with a throttle-mounted switch. The system allows the engine to remain running (idling) with no operator in the seat, as long as the foot pedal throttle control is not depressed.

The operator presence system meets safety requirements published by organizations such as OSHA, ANSI, and ISO. The system also eliminates the need for a foot-operated "kill switch."

4.8 Refueling the Machine

- Requirements**
- Machine shut down
 - Engine cool
 - Machine/fuel tank level with the ground
 - Fresh, clean fuel supply

Procedure Perform the procedure below to refuel the machine.

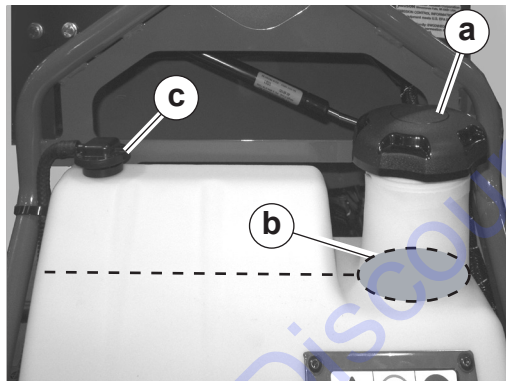


WARNING

Fire hazard. Fuel and its vapors are extremely flammable. Burning fuel can cause severe burns.

- ▶ Keep all sources of ignition away from the machine while refueling.
- ▶ Refuel only when the machine is outdoors.
- ▶ Clean up spilled fuel immediately.

1. Remove the fuel cap (a).



2. Fill the fuel tank until the fuel level reaches level point (b) at the base of the fuel tank opening. An expansion cavity above level point (b) is provided for proper operation of the venting port (c).



CAUTION

Fire and health hazard. Fuel expands when heated. Expanding fuel in an over-filled tank can lead to spills and leaks.

- ▶ Do not modify, bypass, or remove the venting port.

3. Reinstall the fuel cap.

Result

The procedure to refuel the machine is now complete.

4.9 Installing the Liquid Propane (LP) Cylinder



WARNING

Fire, asphyxiation, chemical burn, and explosion hazards. Liquid propane (LP) presents special hazards during operation and fueling. Failure to follow the warnings and safety standards could result in serious injury or death.

- ▶ Read and follow all instructions and safety information regarding LP usage presented in this Operator’s Manual

Introduction

A LP cylinder is not provided with this machine. It is the owner’s responsibility to purchase and install LP cylinders. See topic *Recommended Fuel (LP)* for the appropriate size and specifications.

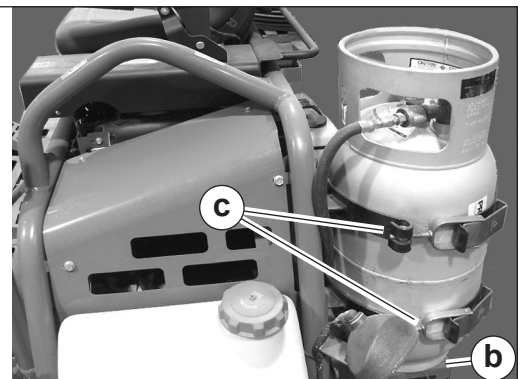
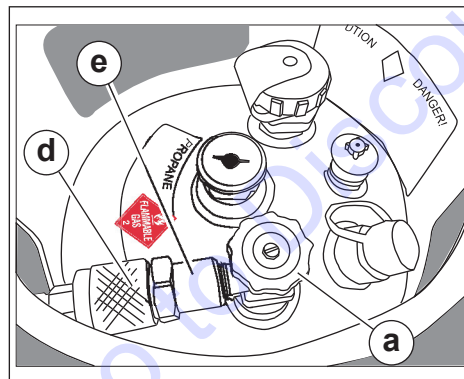
Requirements

- Engine stopped
- Fuel change switch in LPG position
- Full LP cylinder
- Personal Protective Equipment (gloves and eye protection)

Procedure

Perform the procedure below to install the LP cylinder.

1. Locate the discharge valve (**a**) on the LP cylinder. Rotate the knob clockwise to make sure that the discharge valve is fully closed.



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2. Lift the LP cylinder and place it on the tank mount (**b**). Orient the cylinder as shown. Snap the clamps (**c**) to hold the cylinder in place.
3. The gas supply hose on the machine is equipped with a female coupling (**d**). Thread the female coupling onto the male coupling (**e**) on the discharge valve. Tighten the female coupling securely by hand until the hose connection is tight.

This procedure continues on the next page.

Continued from the previous page.

4. Apply a commercial leak test solution or a mixture of dishwashing liquid and water to the hose connection.
5. Slowly rotate the knob on the discharge valve counterclockwise until the valve is fully open.
6. Watch and listen carefully for indications of leaking LP. If a leak exists, bubbles will form at the hose connection. Stop the leak before proceeding:
 - a. Close the discharge valve.
 - b. Disconnect and re-connect the hose, making sure the connection is tight.
 - c. Spray the hose connection with more leak test solution.
 - d. Slowly open the discharge valve and check again for leaks.
7. If there are no leaks, start the engine and run it for a few minutes to make sure that LP is flowing smoothly.

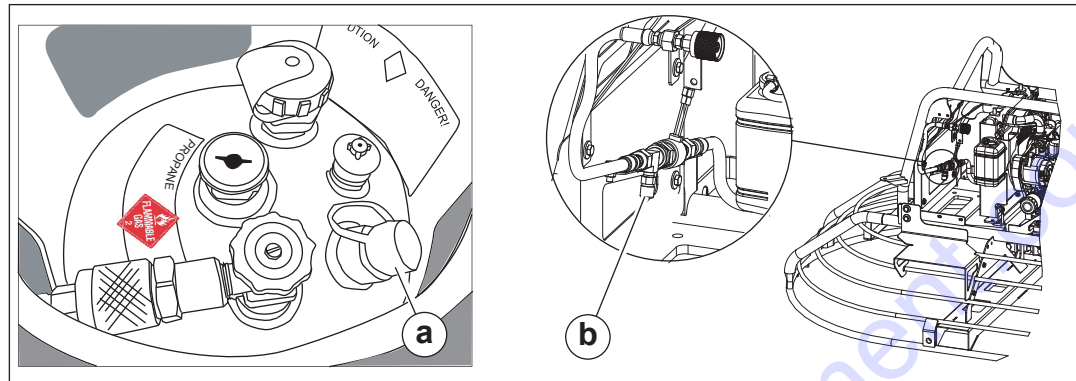
Note: *Do not use the choke when starting or operating the machine with LPG.*

The LP cylinder has now been installed and the machine is ready for use.



4.10 Pressure Relief Valves

Locations The primary pressure relief valve **(a)** is located on the LP cylinder.



The secondary pressure relief valve **(b)** is located on the gas supply hose.

Function LP system pressure varies depending on the ambient temperature in which the machine is being operated. Normal LP system pressure will range from about 2.76–12.41 bar (40–180 psi). If the pressure in the LP tank reaches 24.13 bar (350 psi), the primary pressure relief valve **(a)** will open automatically. Excess LP gas is then released (vented) into the atmosphere. Venting continues until the system pressure returns to normal.

The secondary pressure relief valve **(b)** is set at 27.58 bar (400 psi). This valve functions as an emergency backup in case the primary pressure relief valve does not open. It is rotated downward so that excess LP gas vents away from the operator.



WARNING

Asphyxiation and chemical burn hazards.

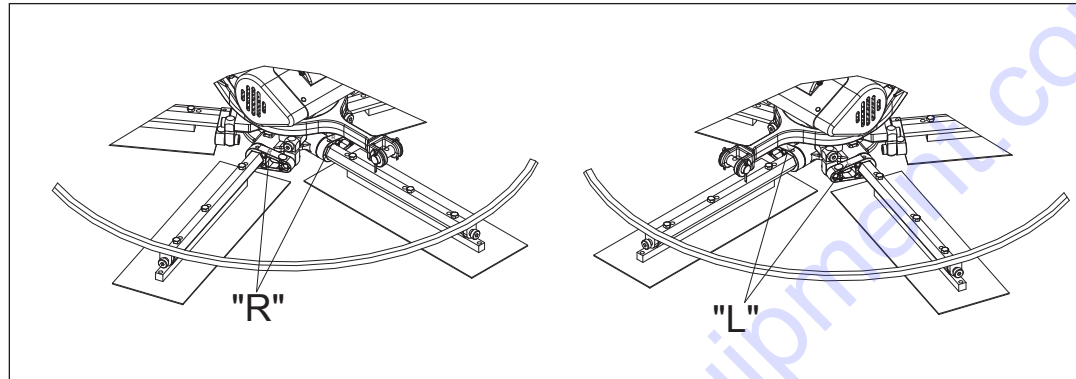
- ▶ If either relief valve is venting, do not inhale or touch released LP gas.

4.11 Breaking In New Machines

Verify pitch link assembly

Verify that the horizontal blade pitch links are properly assembled.

While seated on the machine, look at the right rotor. There should be an "R" designation on the upper portion of the pitch link. The left rotor should have an "L" on the pitch link.



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Break in gearboxes

To break in the gearboxes, run the engine at 50% of full throttle for the first 2–4 hours. This will prevent premature wear and extend gear life.

NOTICE: Running the engine at full throttle during the break-in period could result in premature gear failure.

4.12 Before Starting

Requirement Operator must be familiar with the location and function of all controls.

- Checklist** Check the following items before starting the trowel:
- fuel level—add fuel as needed
 - oil level in the engine—add oil as needed
 - air filter—element is clean and undamaged
 - trowel arms and blades—functional and undamaged
 - wiring and electrical connections—check every 50 hours

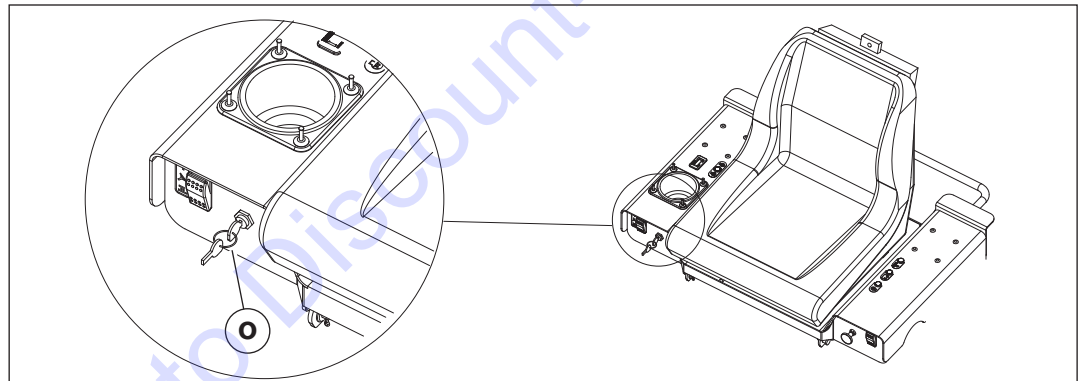
4.13 Starting the Machine

- Requirements**
- Fuel change switch in the correct position (LPG or gasoline)
 - Choke closed (only if running the engine on gasoline)

Note: Do not use the choke if running the engine on LPG.

Procedure Perform the procedure below to start the machine.

1. Sit in the operator's seat.



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2. Turn the engine key switch (o) clockwise and hold it until the engine starts.
 3. Allow the engine to idle for 5 minutes.
- You may now begin operating the trowel.

NOTICE: Cranking the engine for more than five seconds can cause starter damage.

- If the engine fails to start, release the key switch and wait 10 seconds before operating the starter again.
- If the engine still will not start after multiple attempts, see *Troubleshooting*.

4.14 Stopping the Machine

- Procedure** Perform the procedure below to stop the machine.
1. Return the control levers to their neutral positions.
 2. Release pressure on the foot pedal.
- To stop the engine, turn the key switch to "O" (off).

4.15 Operating Guidelines

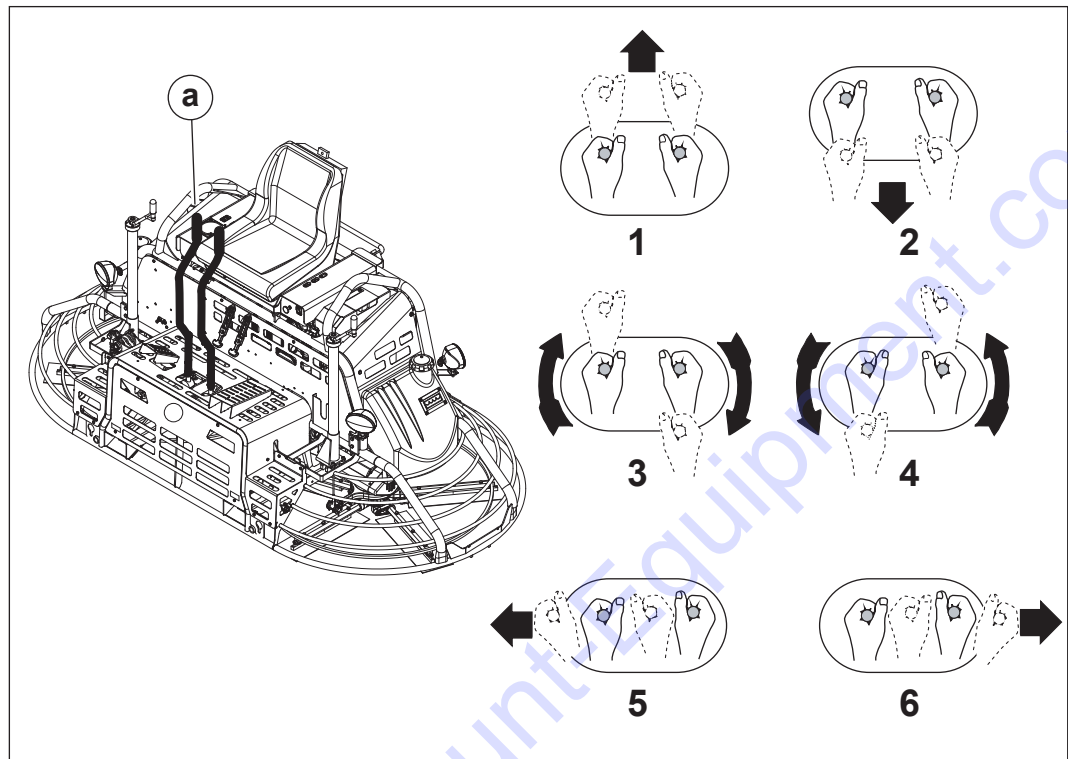
- Operating guidelines** Follow the guidelines below to use your Ride-On Trowel to its fullest capacity.
- During the break-in period, run the engine at 50% of full throttle. See topic "Breaking In New Machines."
 - Move the machine in the direction that the operator is facing. This will finish the widest possible area, while giving the operator an excellent view of the slab surface to be troweled.
 - When the machine reaches the end of the slab, make a 180° U-turn and repeat the straight line of direction to the other end of the slab.
 - Alternatively, move the machine laterally (sideways) and then travel backward to the other end of the slab.
 - The best control of the Ride-On Trowel is achieved at full engine RPM.
-

- Steps for new operators** Follow the steps below to familiarize a new operator with the Ride-On Trowel.
1. With the operator in the seat, show him or her the functions of the control arms and how to start the machine.
 2. Have the operator practice steering the trowel. A hard concrete slab slightly wetted with water is an ideal surface on which to practice.
 - a. Pitch the blades up approximately 6.35 mm (0.25 in.) on the leading edge.
 - b. Start the engine, and begin by holding ("hovering") the machine in place.
 - c. Practice moving the machine forward, backward, and laterally (sideways) in straight lines, then make a series of 180° turns.
-

- NOTICE**
- Only experienced concrete finishers should operate the trowel.
 - Do not use excessive pressure on the control levers. Excessive pressure does not improve the response time of the machine and can damage the steering controls.
 - Attempting to use the trowel too early in the curing state of the concrete may result in an undesirable finish.

4.16 Steering

Overview The control levers (a) control the travel direction and rotation of the machine.



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Hand motions Refer to the illustration for the necessary hand motions to move the trowel in the desired direction.

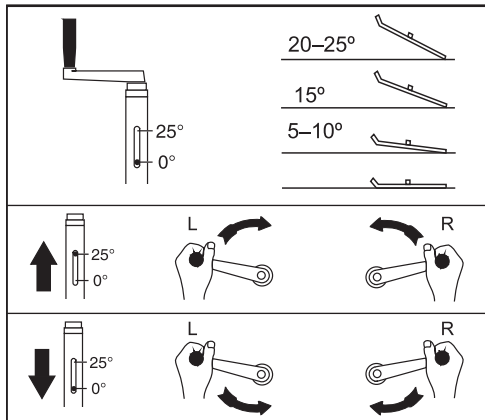
- 1 — forward
- 2 — reverse
- 3 — rotate counter-clockwise
- 4 — rotate clockwise
- 5 — move left sideways
- 6 — move right sideways

4.17 Pitch Adjustment

When changing or setting the pitch (angle) of the trowel blades, slow the machine, set the desired pitch on the left side of the machine, then adjust the right side to match.

To increase pitch: Rotate the left pitch control (L) clockwise, rotate the right pitch control (R) counterclockwise.

To decrease pitch: Rotate the left pitch control (L) counterclockwise, rotate the right pitch control (R) clockwise.



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Working Conditions of Concrete	Suggested Working Pitch
1. Wet surface working stage	Flat (No Pitch)
2. Wet to plastic working stage	Slight Pitch
3. Semi-hard working stage	Additional Pitch
4. Hard finishing stage (burnishing)	Maximum Pitch

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4.18 Using the Retardant Spray System

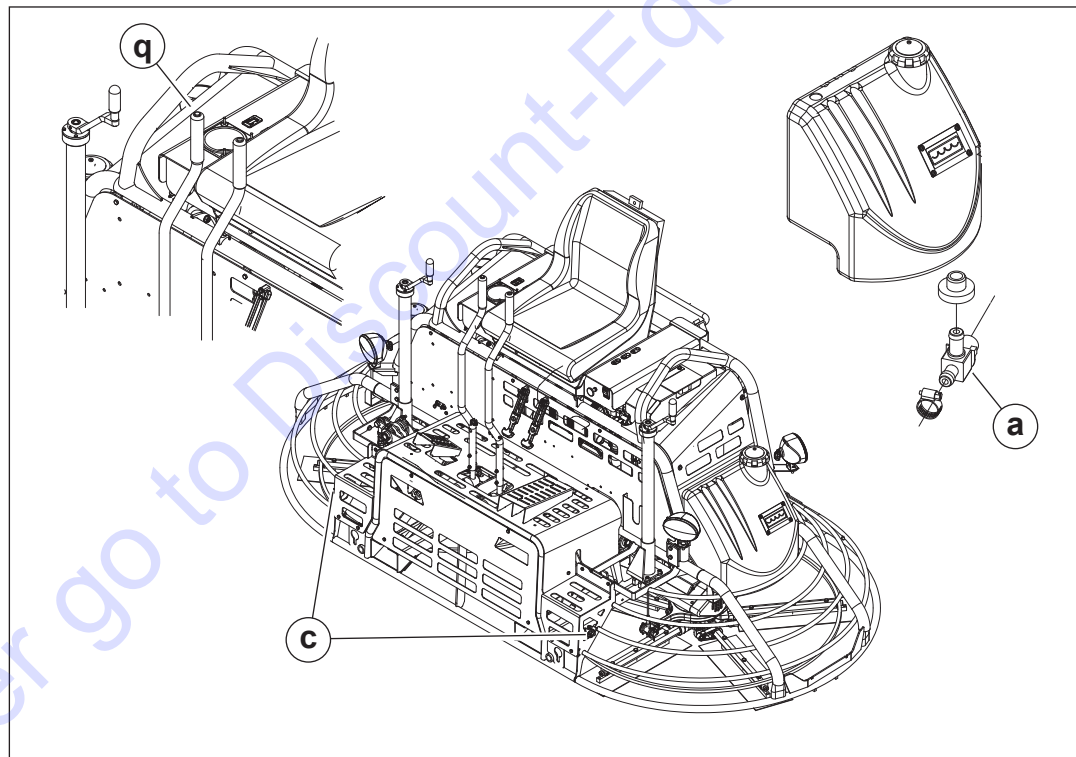
Description Certain atmospheric conditions (low humidity, high winds, direct sunlight, or hot weather) may cause wet concrete to dry too fast during the curing and finishing process. To keep the concrete moist, this machine is equipped with a retardant spray system consisting of a water tank and two spray nozzles. The operator can spray the work surface with clean water or water-based retardant as needed.

- Requirements**
- Water/retardant in water tank
 - Ambient temperature above freezing

Overview The retardant spray system is controlled by a switch located on the right control lever handle.

Procedure Follow the procedure below to operate the retardant spray system.

1. Fill the water tank with clean water or water-based retardant.
2. Open the valve (a).



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3. Press and hold the water spray switch (q) to activate the pump. The water/retardant will spray from the two nozzles (c).

NOTICE: Drain the retardant spray system if the machine will be subject to temperatures below freezing. Frozen water or frozen retardant may damage the retardant spray system.

4.19 Replacing an Empty Liquid Propane (LP) Cylinder



WARNING

Fire, asphyxiation, chemical burn, and explosion hazards. Liquid propane (LP) presents special hazards during operation and fueling. Failure to follow the warnings and safety standards could result in serious injury or death.

- ▶ Read and follow all instructions and safety information regarding LP usage presented in this Operator's Manual.

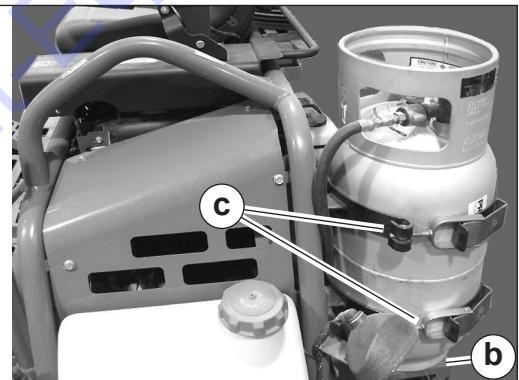
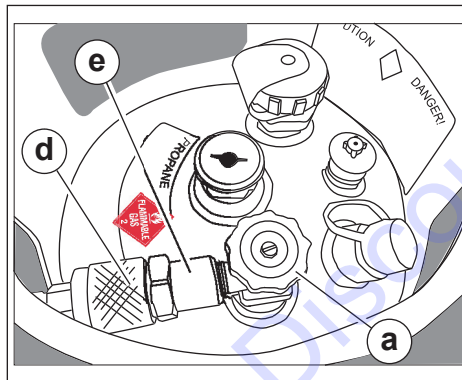
Requirements

- Engine stopped
- Fuel change switch in LPG position
- Full LP cylinder
- Personal Protective Equipment (gloves and eye protection)

Procedure

Perform the procedure below to replace an empty LP cylinder.

1. Locate the discharge valve **(a)** on the empty LP cylinder. Rotate the knob clockwise to make sure that the discharge valve is fully closed.



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2. Attempt to start the engine. If the engine starts, allow it to run until it stops. This process will burn any LP remaining in the fuel lines. Turn off the key.
3. With the engine stopped, unscrew and remove the female coupling **(d)** from the male coupling **(e)** on the discharge valve. Move the fuel supply hose away from the empty LP cylinder.
4. Open the clamps **(c)** holding the empty LP cylinder in place. Lift the empty LP cylinder off the tank mount **(b)**. Return the empty LP cylinder to your gas supplier for refilling.



WARNING

Possibility of fire or explosion. LP cylinders may contain residual pressurized gas even though the fuel gauge indicates that the cylinder is empty.

- ▶ Handle, store, and transport empty LP cylinders under the same conditions as full LP cylinders.

This procedure continues on the next page.

Continued from the previous page.

5. Install a full LP cylinder on the tank mount and fasten the clamps.
6. Connect the female hose coupling to the discharge valve on the full LP cylinder.
7. Apply leak test solution to the hose connection.
8. Slowly rotate the knob on the discharge valve counterclockwise until the valve is fully open.
9. Watch and listen carefully for indications of leaking LP. If there are no leaks, start the engine and run it for a few minutes to make sure that LP is flowing smoothly.

The LP cylinder has now been replaced and the machine is ready for use.

4.20 Emergency Shutdown Procedure

Procedure If a breakdown or accident occurs while the machine is operating, follow the procedure below:

1. Stop the engine.
2. Close the fuel valve.
3. Remove the machine from the job site.
4. Clean concrete from the blades and the machine.
5. Contact Discount-equipment.

5 Maintenance

5.1 Maintaining the Emission Control System

For machines sold in North America:

Normal 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 dealer/service center authorized by Wacker Neuson. The use of service 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.

5.2 Periodic Maintenance—LP System

The table below lists basic machine maintenance. Tasks designated with check marks may be performed by the operator. Tasks designated with square bullet points require special training and equipment.

	Daily or before each use	Every 1000 hours, or annually (whichever occurs first)
Check LP fuel system for leaks.	✓	
Verify that LP tank is securely mounted in place and latched.	✓	
Maintain LP fuel system. ¹		■
Replace LP lockoff / filter cartridge.		■
¹ See Kubota engine owner's manual.		

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5.3 Periodic Maintenance Schedule

The table below lists basic machine maintenance. Tasks designated with check marks may be performed by the operator. Tasks designated with square bullet points require special training and equipment.

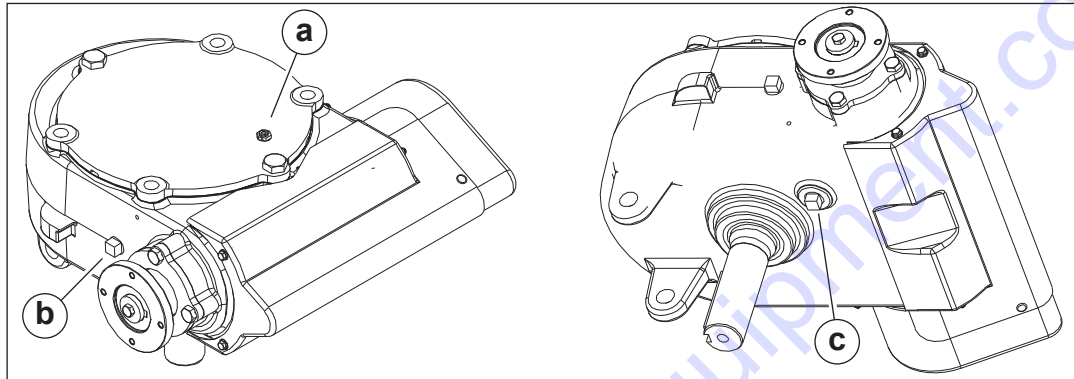
	Daily	Every 20 hrs.	Every 50 hrs.	Every 100 hrs.	Every 200 hrs.	Every 300 hrs.	Every 1000 hrs.
Grease trowel arms.	✓						
Check fuel level.	✓						
Check engine oil level.	✓						
Inspect air filter. Replace as needed.	✓		✓			✓	
Check external hardware.	✓						
Pressure wash all surfaces until free of concrete.	✓						
Check coolant level.	✓						
Check oil level in gearboxes.		✓					
Grease gearbox input shaft fitting		■					
Grease control linkage. ¹		■					
Check drive belt for wear.			✓				
Change engine oil. ²			■		■		
Check fuel filter.				✓			
Clean and check spark plug.				■			
Replace oil filter. ²			■		■		
Check fan belt.				✓			
Replace spark plug.							■
Replace fuel filter.				■			
Replace oil in gearboxes.						■	
Change coolant. ³							■
¹ Manual steering models only.	² Perform initially after first 50 hours of operation.						
³ Change at 1000 hours, or yearly, whichever comes first.							

5.4 Maintaining the Gearboxes

When Check the gearboxes for the correct oil level after every 20 hours of operation. Change the gearbox oil every 300 hours.

Checking the oil level To check the oil level, do the following steps:

1. Each CRT gearbox is equipped with two oil fill plugs (**b**).



wc_gr003781

2. Remove one gearbox oil fill plug.
3. If the oil level is below the threads of the oil fill plug hole, add synthetic gear oil through the opening.
4. Wipe the threads dry on both the gearbox and the oil fill plug. Apply Loctite 545 or equivalent to the oil fill plug threads and re-install the oil fill plug. Torque to 16–20 Nm (12–15 ft.lbs.).

NOTICE: Do not mix types of gear oil, or overfill the gearbox with oil. Damage to the gearbox may occur. See *Technical Data* for oil quantity and type.

Changing the gearbox oil

To change the gearbox oil, do the following steps:

1. Place a container of sufficient capacity (approximately 3.8 L [1 gallon]) under each gearbox.
2. Remove the gearbox oil drain plug (**c**) and allow the oil to drain out. It may be necessary to remove the gearbox oil fill plug(s) to facilitate draining. After most of the oil has drained out, tip the back of the trowel upwards to allow the remaining oil to drain out.
3. After all the oil has drained out, wipe the threads dry on both the gearbox and the oil drain plug. Apply Loctite 545 or equivalent to the oil drain plug threads, and re-install the gearbox oil drain plug.

Note: *Dispose of used gear oil in accordance with environmental protection legislation.*

This procedure continues on the next page.

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4. With the trowel level, fill the gearbox with approximately 1.83 L (62 oz.) synthetic gear oil through the oil fill plug as described above.
5. Wipe the threads dry on both the gearbox and the oil fill plug. Apply Loctite 545 or equivalent to the oil fill plug threads, and re-install the oil fill plug. Torque all plugs to 16-20 Nm (12–15 ft.lbs.).

NOTICE: Each gearbox has a pressure relief valve **(a)** which can become clogged over time. Check or replace as needed. Failure to replace the valve can result in oil leakage from the gearbox shaft seals.

5.5 Control Linkage Lubrication

The drive system, gearbox and pitch posts are equipped with several grease fittings. Grease these fittings once a week, or every 20 hours, to prevent wear.

Use a general purpose grease and add one to two shots of grease at each fitting.

5.6 Control Arm Adjustment (Forward or Backward)

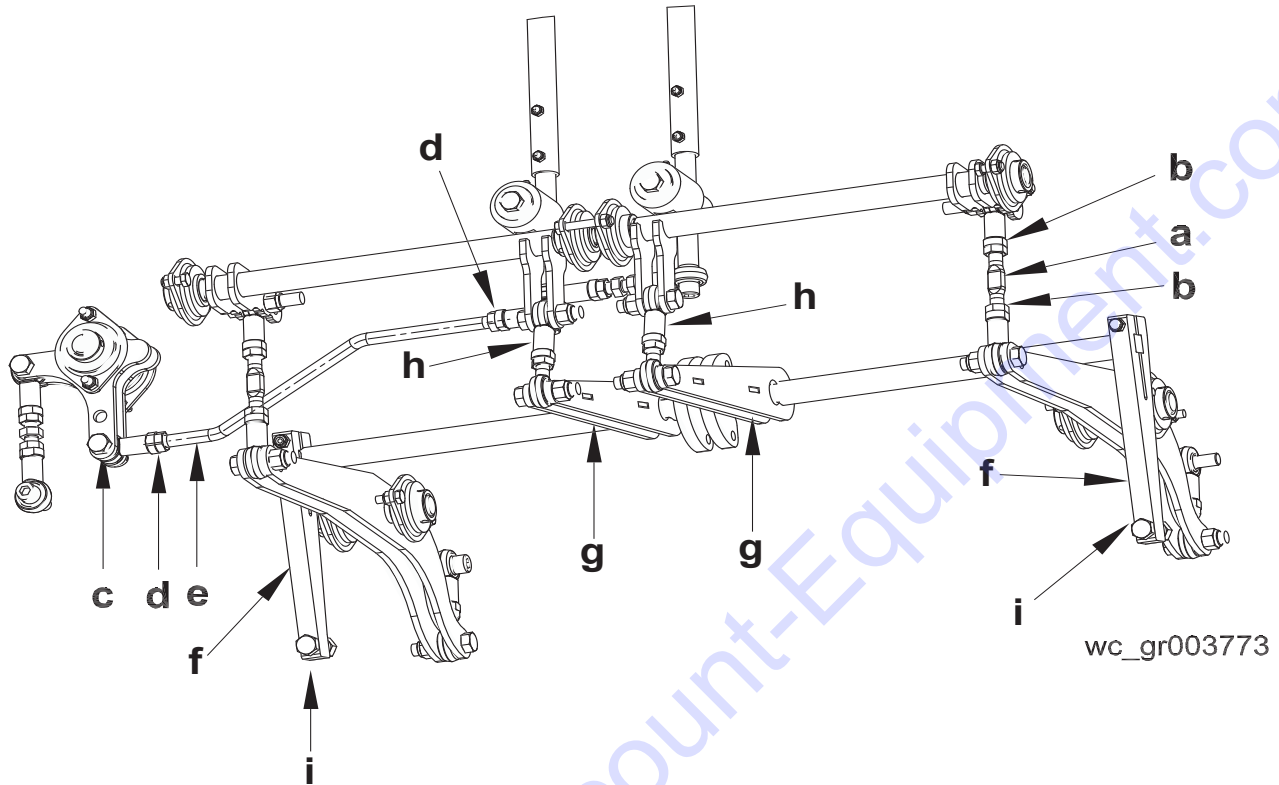
The control arms should line up evenly. If arms appear out of adjustment, they can be re-adjusted forward or backward as follows:

1. Loosen jam nuts **(b)**.
2. Turn the vertical linkage **(a)** as follows:
 - Extend the linkage to adjust control levers forward. See section 4.5 before extending linkage.
 - Shorten the linkage to adjust control levers backward.
3. After the arms have been adjusted to the desired position, tighten jam nuts **(b)**.

NOTICE: Control arms are adjusted as part of the steering assist system. Changing orientation of the control arms may affect steering effort.

5.7 Steering Assist System

The steering assist system is comprised of the torsion lever (**f**), the torsion lever assembly (**g**), and the assist link (**h**).



The system preload must be removed before any other steering components can be removed or separated. Remove the 1/2-20 x 3.5-inch bolts (**i**) to unload the system.

To re-apply system preload, re-attach and tighten bolts (**i**) to the factory setting.

5.8 Right-hand Control Arm Adjustment (Right or Left)

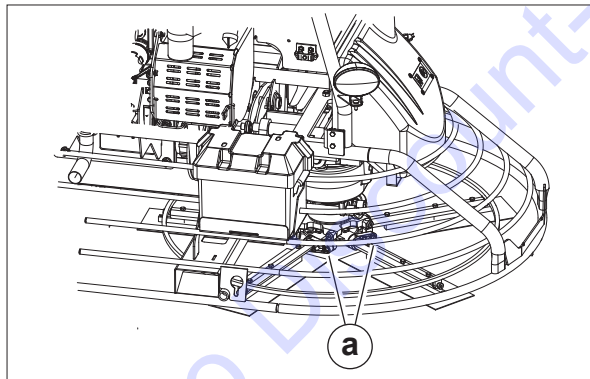
The arms should be set to be perfectly vertical. Should the arms come out of adjustment, adjust as follows:

1. Loosen the jam nuts **(d)**.
2. Drop the horizontal linkage **(e)** down to clear the bracket.
3. Shorten the linkage to move the control arms to the left.
4. Extend the linkage to move the control arms to the right.
5. After the control lever has been adjusted to the desired position, reassemble the nut and the bolt **(c)** and tighten the jam nuts **(d)**.

5.9 Adjusting the Blade Arms

When Adjust the blade arms if the machine is noticeably wobbling during operation.

- Requirements**
- Machine is stopped
 - Machine has been lifted with a hoist.
 - Support the frame with blocks while the machine is elevated



wc_gr009292

Procedure Perform the procedure below to adjust the blade arms.

1. Use the pitch adjusters to pitch the blades to a setting between 1/2 and full pitch.
2. Measure the distance from the ground to the raised edge of each blade.
3. Adjust pitch links **(a)** so that measured distances on all blades vary by no more than 4.58 mm (0.180 in.).

5.10 Installing or Changing the Blades

Introduction There are two types of blades available for the trowel:

- Combination blades can be used throughout the entire concrete working process, from floating to finishing stages. They are designed for rotation in one direction only.
- Finish blades are used only in the final stages of the concrete working process. While in use, these blades are pitched at progressively steeper angles to burnish the concrete. Finish blades are symmetrical and can be installed to rotate in either direction.

Perform the procedure below to install replacement blades or to change blades as needed to suit jobsite requirements.

- Requirements**
- Machine is stopped
 - Battery is disconnected to prevent unintentional start-up
 - Machine has been lifted via a hoist, or raised on the wheel kit.
 - Frame is supported on blocks while the machine is elevated.
 - Combination blades or finish blades for installation
 - Protective gloves
 - Bearing grease



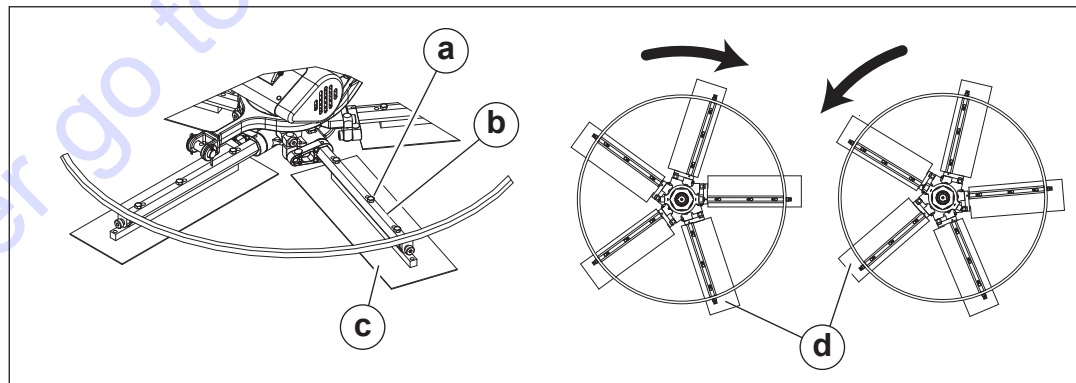
WARNING

Cutting hazard. Trowel blade edges are extremely sharp, especially if worn.

- ▶ Always wear protective gloves when changing blades.

Procedure Perform the procedure below to install or change the blades.

1. Remove the screws (a) from the trowel arms (b) and detach the existing blades (c). Set the existing blades aside for future use or dispose of them properly if they have reached the end of their service life.



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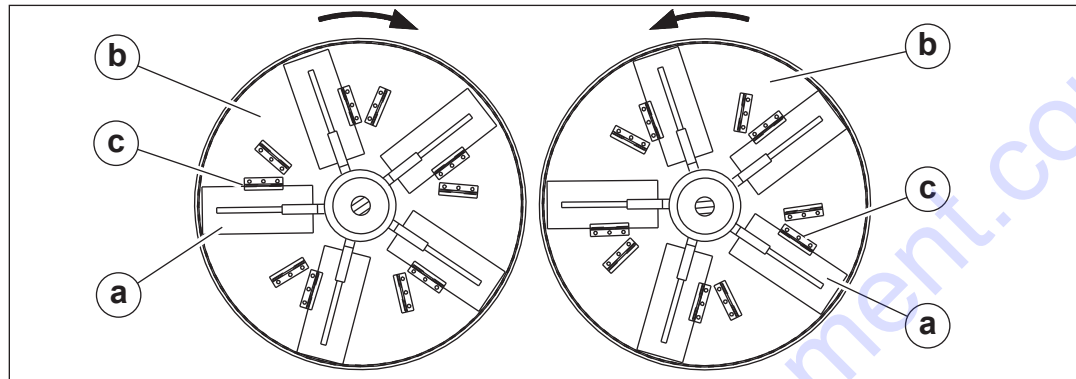
2. Position and align the blades.
 - If installing combination blades (**d**), orient the blades as shown in the diagram and align the screw holes. This positions the raised edge of each blade correctly for the rotation of each rotor.
 - If installing finish blades, simply align the screw holes. Blade orientation is not critical with finish blades.
 3. Coat the screw threads with bearing grease. A grease coating will prevent wet concrete from cementing the screws in place. This step will also make blade removal easier in the future.
 4. Install the screws and tighten securely. Do not overtighten.
-

Result

The blades have now been changed.

5.11 Mounting Float Pans

Overview Certain applications may require the use of float pans. Optional float pans are available from your Wacker Neuson dealer.



wc_gr009298

Procedure Perform the procedure below to mount the float pans.

1. Stop the engine.
2. Lift the trowel to access the blades **(a)**. (See *Lifting The Machine.*)
3. Support the frame with blocks while the machine is elevated.
4. Position each pan **(b)** against the blades. Turn the pans either left or right to engage clip angles **(c)** as shown.

Note: *Right-hand trowel blades turn counter-clockwise; left-hand trowel blades turn clockwise.*

5. Lower the trowel.



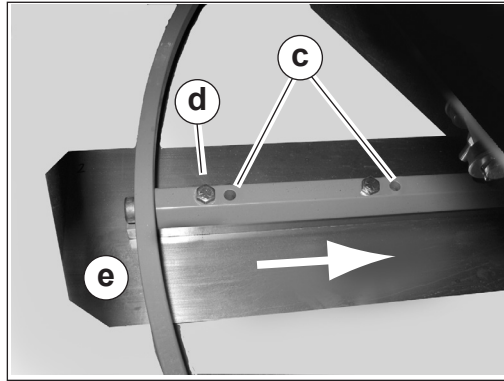
WARNING

Float pans can fall off a raised trowel, striking nearby personnel.

- ▶ Do not lift the trowel overhead after float pans have been mounted.

Mounting a smaller pan

The blade arms on the CRT 48 are designed to accommodate either a standard 48" lip-style float pan or an optional smaller 46" pan. An alternative set of blade mounting holes (c) is provided for mounting a 46" pan.



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Mounting a 46" pan

To mount a 46" pan:

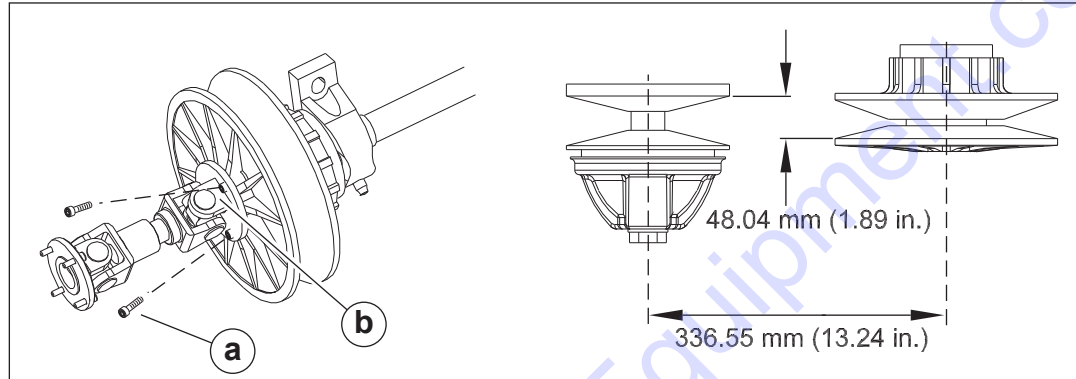
1. Loosen and remove the bolts (d) that attach each blade (e).
2. Move the blades inward to align with mounting holes (c).
3. Replace and tighten the bolts in mounting holes (c).
4. Attach the 46" pan to the blades.

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5.12 Replacing the Drive Belt

Procedure To replace the drive belt, do the following steps.

1. Place the trowel on a flat, level surface with the blades pitched flat.
2. Disconnect battery.
3. Remove the beltguard.
4. Remove the 3 bolts **(a)** holding the universal joint **(b)** to the drive pulley.



wc_gr003775

5. Remove the old belt and install a new one.
6. Reverse the procedure for assembly. Align the bearings and shaft as straight as possible. Adjust pulley offset and center distance to values as shown.
7. Torque the universal joint bolts **(a)** to $14 \pm 1,4$ Nm (10 ± 1 ft.lbs.).

5.13 Jump-Starting the Machine

Overview Jump-starting may occasionally be required if a battery is discharged. If jump-starting is necessary, the following procedure is recommended to prevent starter damage, battery damage, and personal injuries.



WARNING

Jump-starting a battery incorrectly can cause battery to explode, resulting in severe personal injury or death.

- ▶ Do not smoke or allow ignition sources near the battery, and do not jump-start a frozen battery.



WARNING

Battery fluid is poisonous and corrosive.

- ▶ In the event of ingestion or contact with skin or eyes, seek medical attention immediately.

NOTICE

Observe the following precautions to prevent serious damage to the electrical system.

- Do not disconnect the battery while the machine is running.
- Do not attempt to operate the machine without a battery.
- In the event that the machine has a discharged battery, either replace the battery with a fully charged battery or charge the battery using an appropriate battery charger.

Procedure

Perform the procedure below to jump-start the battery.

1. Disconnect engine load.
2. Use a booster battery of the same voltage (12V) as is used with your engine.
3. Attach one end of the positive booster cable (red) to the positive (+) terminal of the booster battery. Attach the other end to the positive terminal of your engine battery.
4. Attach one end of the negative booster cable (black) to the negative (-) terminal of the booster battery. Attach other end of negative cable to a solid chassis ground on your engine.



WARNING

Electrical arcing can cause severe personal injury.

- ▶ Do not allow positive and negative cable ends to touch.

This procedure continues on the next page.

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5. Turn the engine key switch and hold it until the engine starts.

NOTICE: Cranking the engine for more than five seconds can cause starter damage. If the engine fails to start, release the key switch and wait 10 seconds before operating the starter again. If the engine still fails to start, see *Basic Troubleshooting*.

6. When using lights or high amperage draw accessories, idle the engine for a period of 20 minutes to bring the battery to a charged state.
-

Dispose of waste batteries in accordance with local environmental regulations.



5.14 Maintaining the Spark Plugs

When Clean the spark plugs and check the electrode gaps every 200 hours of operation (monthly).

Requirement Engine is stopped and cool to the touch



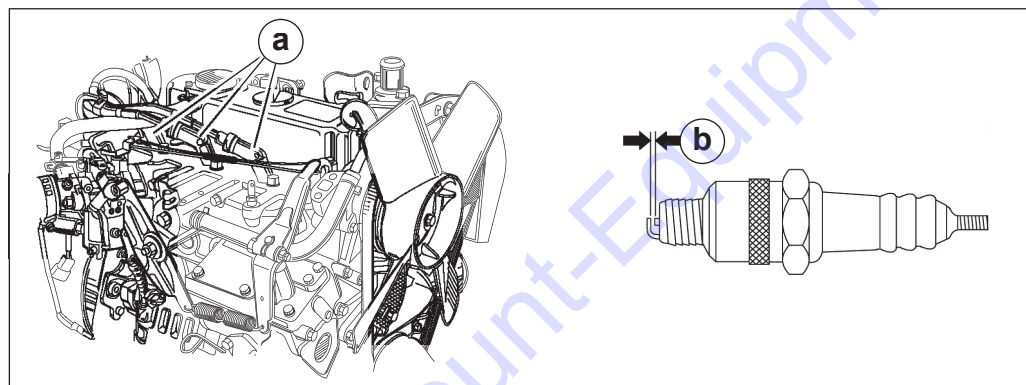
WARNING

Burn hazard. Engine and exhaust pipe become extremely hot during operation.

? Stop the engine and allow the machine to cool before cleaning and adjusting the spark plugs.

Removing and cleaning the spark plug

There are three spark plugs (a) located on top of the engine.



wc_gr009290

Follow the procedure below to remove and clean each spark plug.

1. Disconnect the spark plug cap from the spark plug.
2. Unscrew and remove the spark plug.
3. If the electrode is covered with carbon deposits, use a wire brush or spark plug cleaner to remove the carbon.

NOTICE: If the spark plug is cracked or damaged, replace it. See *Technical Data*.

Checking the electrode gap

4. The electrode gap (b) should measure between 0.6 to 0.7 mm (0.024 to 0.028 in.). Adjust the gap if necessary.

Re-installing the spark plug

5. Reinstall the spark plug and tighten it securely.

NOTICE: A loose spark plug can become very hot and may cause engine damage. Make sure that the spark plug is properly seated and tightened.

6. Reconnect the spark plug cap.

5.15 Servicing the Air Cleaner

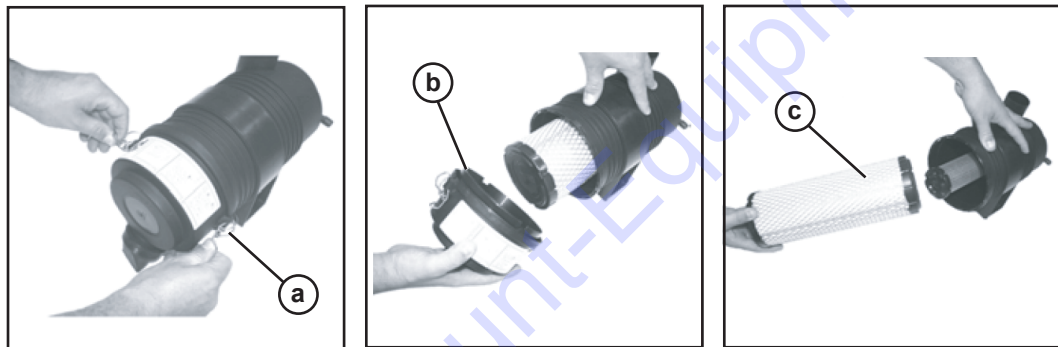
When Clean the air cleaner every 50 hours or as needed. Service more frequently in dusty or dirty conditions.

NOTICE: Never operate the machine without the air cleaner or a filter element. Severe engine damage will occur.

- Requirements**
- Engine is stopped and machine is cool
 - Compressed air source
 - Replacement filter element (as needed)

Procedure To service the air cleaner, do the following steps:

1. Unlock the clamps **(a)** and remove the cover **(b)**.



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2. Remove the filter element **(c)** from the air cleaner body.
3. Clean the filter element using one of two methods:
 - Blow compressed air sideways outside and inside the filter element, at a pressure not greater than 4.9 bar (70 psi).
 - Tap the front of the filter element several times against a flat surface.



WARNING

Fire and explosion hazards.

- ▶ Do not use gasoline or other types of low flash point solvents for cleaning the air cleaner.

4. Replace the filter element if it appears heavily soiled or damaged.
5. Carefully clean out the cover.
6. Re-install filter in body.
7. Re-install the cover, and lock the clamps.

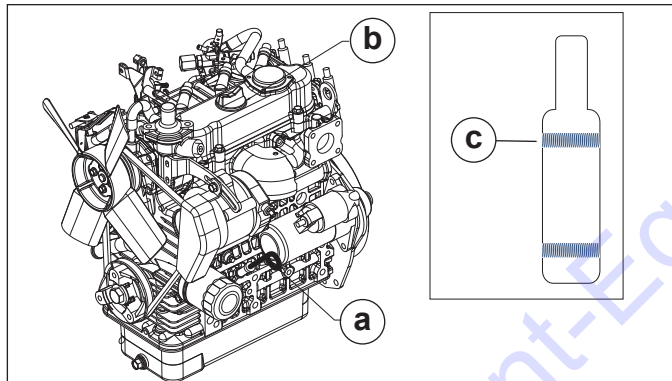
5.16 Checking the Engine Oil

- Requirements**
- Park the machine on a level surface
 - Shut down the machine

When Every 10 hours of service or daily

Procedure Perform the procedure below to check the engine oil.

1. Clean around the dipstick **(a)**.
2. Extract the dipstick and check the oil level. Maintain the oil level between the two markings on the dipstick.



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3. Remove the oil filler cap **(b)** and add oil as needed. When full, the oil level will reach the upper mark on the dipstick **(c)**.

NOTICE: Do not overfill the machine with oil. Overfilling the engine with oil may lead to excessively high operating temperatures.

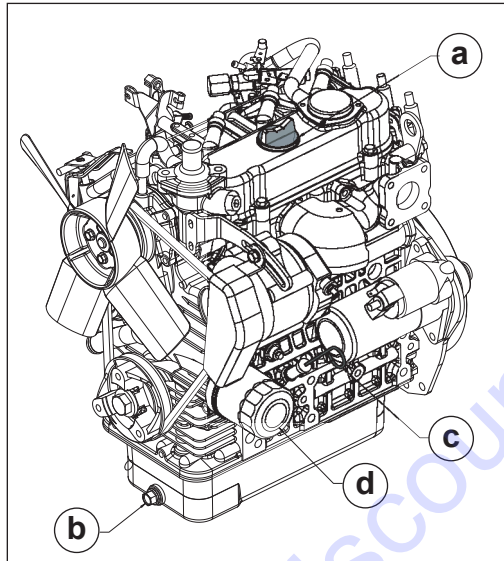
4. Re-install the oil filler cap after adding oil.

5.17 Engine Oil and Filter

When Change oil and oil filter (**d**) every 200 hours.
On new machines, change oil after first 50 hours of operation.

- Requirements**
- Engine stopped, but still warm.
 - Plastic sheet
 - Container of suitable size to collect drained oil
 - Fresh engine oil (see *Technical Data*)
-

Procedures Follow the procedure below to change the engine oil.



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1. Remove oil fill cap (**a**) and drain plug (**b**) to drain oil.
 2. Re-install drain plug and torque to 35 Nm (25.5 ft.lbs.).
 3. Fill engine crankcase with recommended oil until the level reaches the upper line on the dipstick (**c**).
 4. Re-install oil fill cap.
-

Follow the procedure below to replace the oil filter (**d**).

1. Drain the engine oil.
2. Remove the installed oil filter.
3. Apply a thin coat of oil to the rubber gasket of the replacement oil filter.

This procedure continues on the next page.

Continued from the previous page.

4. Screw the filter on until it just contacts the filter adapter, then turn it an additional $\frac{1}{2}$ turn.
 5. Refill with oil as described above.
-

Note: Dispose of drained oil in accordance with environmental protection legislation.



WARNING

Most used oil contains small amounts of materials that can cause cancer and other health problems if inhaled, ingested, or left in contact with skin for prolonged periods of time.

- ▶ Take steps to avoid inhaling or ingesting used engine oil.
 - ▶ Wash skin thoroughly after exposure to used engine oil.
-

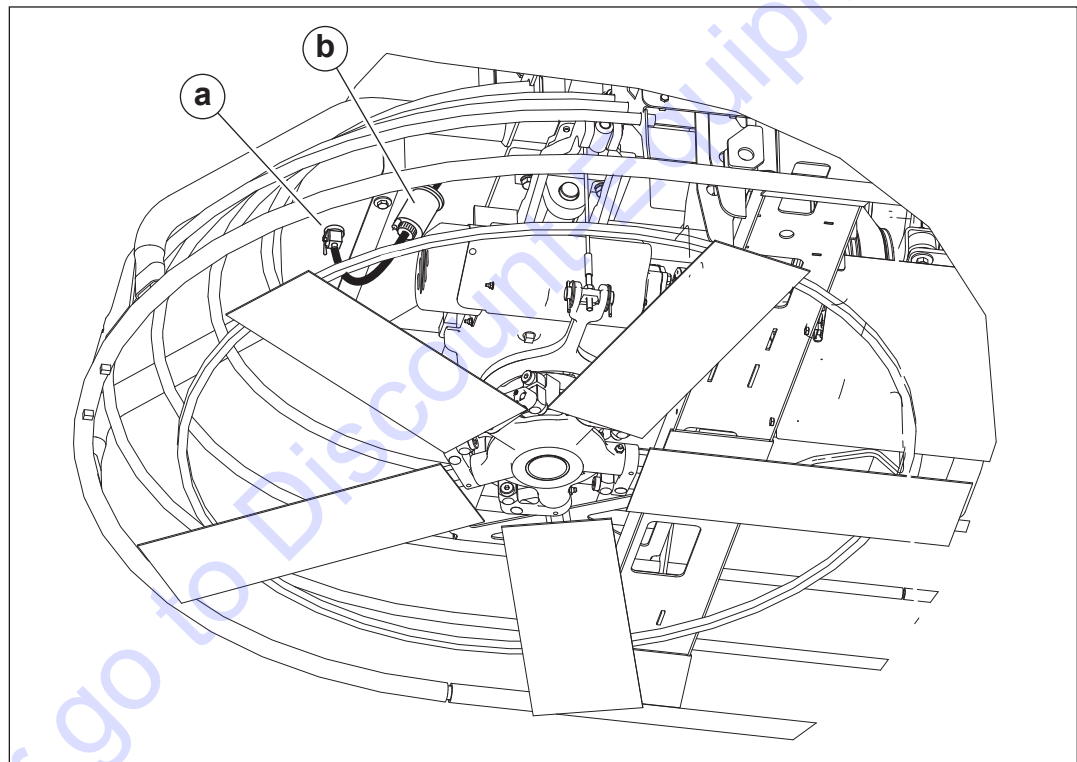
5.18 Maintaining the Fuel Filter

- When**
- Check the condition of the fuel filter every 100 hours.
 - Replace the fuel filter every year, or more often if it is damaged or full of sediment.

- Requirements**
- Machine shut down
 - New fuel filter cartridge
 - Plastic cloth and a container of sufficient volume to collect drained fuel and discarded fuel filter cartridge

Note: *Collect, store and dispose of drained fuel and filter cartridge in accordance with current environmental protection regulations.*

Location The fuel filter **(b)** is located beneath the operator's platform.



wc ar009293

Changing the fuel filter

Perform the procedure below to change the fuel filter.

1. Bleed air from the fuel system. (See engine owner's manual.)
2. Close the fuel valve **(a)**.
3. Place a plastic cloth and container beneath the fuel filter to collect drained fuel.
4. Loosen the hose clamps above and below the fuel filter. Remove and discard the old fuel filter.
5. Install the new fuel filter, and tighten the hose clamps.
6. Open the fuel valve.

Result The fuel filter has now been changed.

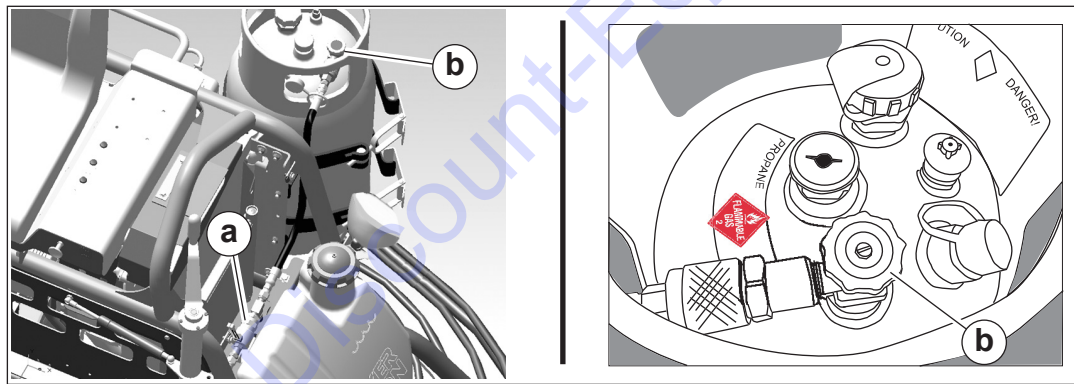
5.19 Replacing the LP Lockoff / Filter Cartridge

Description The LP lockoff / filter cartridge is an in-line safety valve that prevents LP gas from flowing to the vaporizer when the system is not in use. As with a gasoline fuel filter or oil filter, the cartridge is disposable and must be replaced at the interval specified below.

When Replace the LP lockoff / filter cartridge every 1000 hours or yearly (whichever occurs first).

- Requirements**
- Hand tools (wrench, screwdriver, etc.)
 - Leak test solution
 - Replacement LP lockoff / filter cartridge
 - Thread sealant for LP connections (Loctite® 565 Pipe Sealant or equivalent)
 - Protective gloves

Location The LP lockoff / filter cartridge (**a**) is part of the fuel supply hose assembly. The LP tank and LP tank mount must be removed to access the cartridge.



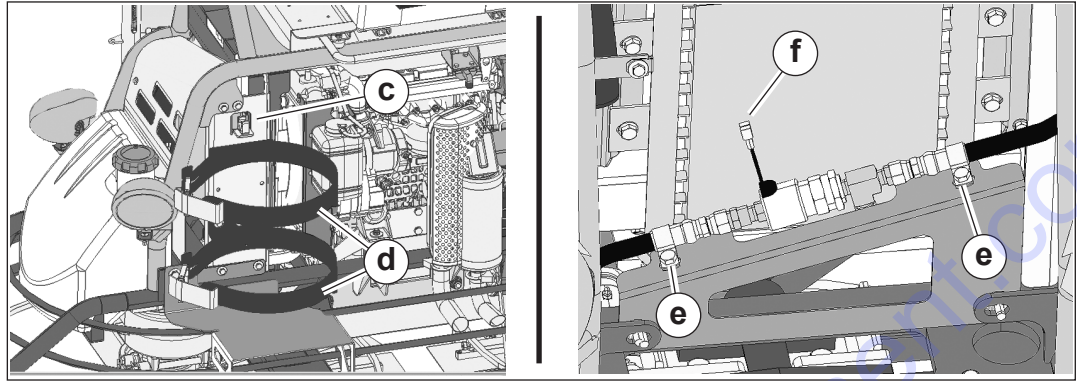
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- Removing the cartridge** Perform the procedure below to remove the LP lockoff / filter cartridge.
1. Close the discharge valve (**b**) on the LP cylinder.
 2. Start the engine and run the machine until the engine stops. This action purges residual LP from the fuel system. Turn the starting key to the “off” position when the engine stops.

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3. Disconnect and remove the LP tank from the LP mounting bracket (c).

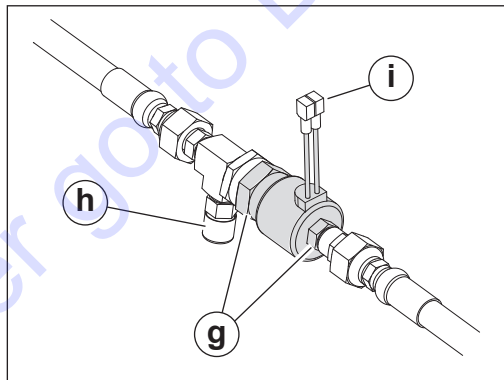


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4. Remove the LP mounting bracket, keeping the clamps (d) attached.
5. Loosen the P-clips (e) holding the LP hoses.
6. Disconnect the wiring harness (f) from the LP lockoff / filter cartridge.
7. Unscrew and remove the LP lockoff / filter cartridge from the fuel supply hose.

Installing the replacement cartridge

1. Clean the fittings (g) to remove residual thread sealant. Apply a fresh coat of thread sealant.
2. Install the replacement LP lockoff / filter cartridge. Tighten by hand, and then use a wrench to rotate the cartridge an additional 2–3 turns.
3. Re-install the P-clips. Make sure the in-line relief valve (h) is oriented as shown.
4. Re-connect the wiring harness, making sure that the connectors (i) are fully engaged.



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This procedure continues on the next page.

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5. Apply leak test solution to the fittings.
6. Re-install the LP mounting bracket.
7. Re-install the LP cylinder on the tank mount, fasten the clamps, and re-connect the fuel supply hose to the discharge valve.
8. Slowly rotate the knob on the discharge valve counterclockwise until the valve is fully open.
9. Watch and listen carefully for indications of leaking LP. If there are no leaks, start the engine and run it for a few minutes to make sure that LP is flowing smoothly.

The LP lockoff / filter cartridge has now been replaced.

5.20 Cleaning the Machine

When Clean the machine after each use.

Overview Regular cleaning is essential for keeping the trowel in serviceable condition. It is important to remove uncured concrete, dust and dirt from the trowel as soon as possible after work has been completed.

-
- Requirements**
- Engine stopped and machine cool to the touch
 - Fresh, clean water supply
 - Pressure washer
 - Clean, soft cloths

Procedure Perform the procedure below to clean the machine.

1. Use a pressure washer to remove concrete and debris from the trowel blades and ring guards.
2. Keeping a minimum distance of 1 meter (3 feet) away, use the pressure washer to rinse the trowel body.

NOTICE: Direct, high water pressure at close range will damage certain components on the machine. The following components should be wiped clean by hand using a damp, clean cloth. Do not apply high pressure spray to these components:

- Operator’s station including the seat, control switches, key switch, and indicator lights.
- Electrical connectors

5.21 Long-Term Storage

When Follow the procedures below if the machine is to be stored for more than 30 days.

Maintaining the machine

To prepare the machine for long-term storage:

1. Drain the fuel tank and the water tank.
 2. If equipped, remove the LP tank and cap the LP tank fitting.
 3. Change the engine oil.
 4. Maintain the engine (see below).
 5. Clean the entire trowel and engine compartment.
 6. Remove dirt from the cooling fins on the engine cylinders and on the blower housing.
 7. Remove the battery from the machine and charge it periodically.
 8. Cover the entire machine and place it in a dry protected area.
-

Maintaining the engine

Consult your engine owner's manual for maintenance instructions.



5.22 Machine Disposal / Decommissioning

Introduction This machine must be properly decommissioned at the end of its service life. Responsible disposal prevents toxic chemicals and materials from harming the environment. This machine contains several components that may be considered hazardous waste in many areas:

- Operating fluids, including fuel, engine oil, and grease
- Batteries
- Electronic components, such as control panels and LEDs

Before decommissioning this machine, read and follow local safety and environmental regulations pertaining to the disposal of construction equipment.

Preparation Perform the following tasks to prepare the machine for disposal.

- Move the machine to a protected location where it will not pose any safety hazards and cannot be accessed by unauthorized individuals.
- Ensure that the machine cannot be operated from the time of final shutdown to disposal.
- Drain all fluids, including fuel, engine oil, and hydraulic fluid.
- Seal any fluid leaks.
- Remove the battery.

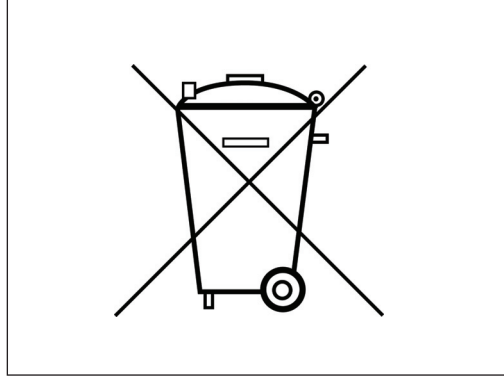
Disposal Perform the following tasks to dispose of the machine.

- Disassemble the machine and separate all parts by material type.
- Dispose of recyclable parts as specified by local regulations.
- Dispose of all non-hazardous components that cannot be recycled.
- Dispose of waste fuel, engine oil, and hydraulic fluid in accordance with local environmental protection regulations.

5.23 Battery Disposal

For customers in EU countries

This device contains one or more batteries or rechargeable batteries (hereafter referred to as "batteries"). This battery is subject to the European Directive 2006/66/EC on (waste) batteries, as well as the corresponding national legislation. The battery directive outlines the procedure for handling batteries across the EU.



wc_gr009230

The battery is labeled with the symbol of a crossed out dustbin shown here. Below this symbol is a list of all the harmful substances it contains, namely "Pb" for lead, "Cd" for cadmium and "Hg" for mercury.

Batteries may not be disposed of with normal household waste. As the end user, only dispose of waste batteries via the manufacturer, the dealer or special collection points for this purpose (legal obligation to return), which is free of charge. Dealers and manufacturers are obliged to accept the return of the batteries and to use them properly or to dispose of them as hazardous waste (legal obligation to accept). You can also return any used batteries you obtained from us free of charge. If you do not return the batteries to one of our branches personally, make sure you have paid sufficient postage for its return. Please also note any information in the sales contract and the general terms and conditions from the point of sales.

The proper disposal of the battery prevents the occurrence of any negative effects on people or the environment, follows the specific procedures for handling harmful substances and enables valuable raw materials to be recycled.

For customers in non-EU countries

This device contains one or more batteries or rechargeable batteries (hereafter referred to as "batteries"). The proper disposal of the battery prevents the occurrence of any negative effects on people or the environment, follows the specific procedures for handling harmful substances and enables valuable raw materials to be recycled. Therefore, we recommend that this battery is disposed of in a separate, environmentally-friendly waste collection and not with normal household waste. In some cases, national legislation stipulates the separate disposal of batteries. Please ensure you dispose of this battery in accordance with the valid regulations in your country.

6 Troubleshooting

6.1 Troubleshooting the Machine

Problem	Reason	Remedy
Machine out of balance; wobbling excessively.	Operator is over-steering.	The movement of each gearbox is controlled by “stops” to provide the correct relationship of the control arm movement to machine movement. Excessive pressure on control arms in any direction does not improve reaction time and can damage steering controls causing machine to wobble.
	Trowel arm(s) bent.	Replace trowel arm(s).
	Trowel blade(s) bent.	Replace trowel blade(s).
	Main shaft(s) bent due to machine being dropped.	Replace main shafts(s).
Poor handling; excessive range in control lever movement.	Worn bushings due to lack of lubrication.	Replace bushings and lubricate at least every 20 hours.
	Control arm lever adjustment has moved or control arm has been bent.	Reset control arm lever.
	Lower control arm(s) bent. This can be caused by dropping machine.	Replace lower control arm(s). Use lifting brackets and/or forklift pockets provided on machine for lifting.
Machine does not move.	Drive belt broken.	Replace drive belt.
	Vacuum between bottom of blades and surface of concrete.	Change pitch on blades to break suction.
	Key sheared in the main shaft.	Replace damaged key.
Machine does not respond correctly to control lever movement.	Sheared key.	Check all keys in drive system.
Trowel noisy.	Trowel blades have become misaligned and are contacting each other during rotation.	Replace damaged blades. Align blades so that one set represents a (+) and the other an (x) when viewed from above.
	Sheared key.	Check all keys in drive system.
	Loose clutch.	Tighten clutch.

Problem	Reason	Remedy
Engine does not crank.	Discharged battery.	Check light function. If lights do not illuminate with the key in the "on" position, replace or recharge the battery.
	Engine problem.	Consult engine manufacturer's service manual
Gasoline operation only: Engine cranks, but does not start. (See "Troubleshooting the LP System" for engine starting problems using LP fuel.)	Inadequate choke	Fully choke engine and attempt to re-start.
	Engine not receiving fuel.	While engine is cranking, verify that fuel valve at tank is open, fuel filter is not clogged, and fuel pump is operating.

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6.2 Troubleshooting the LP System

Problem	Reason	Remedy
Engine cranks, but does not start	Empty LP cylinder	Replace.
	Discharge valve on LP cylinder closed	Open the discharge valve.
	LPG / gas selector switch in wrong position	Make sure the LPG / gas selector switch is set to LPG.
	Lock-off valve not operating	<ul style="list-style-type: none"> ■ Check electrical connections to lock-off valve ■ Consult engine owner's service manual—see procedure for checking engine carburetor fuel solenoids.
Engine starts, but operation is sluggish	Cold ambient temperature	Allow engine to warm up for a few minutes before operating the trowel.
Engine starts, but stops running after a short time	LP not flowing to combustion chamber. Reasons may be: <ul style="list-style-type: none"> ■ Discharge valve partly closed ■ LP gas leak ■ Fuel hose partly blocked ■ Clogged or damaged LPG vaporizer 	<ul style="list-style-type: none"> ■ Open the valve fully. ■ Determine source of leak; repair. ■ Check for kinks or obstructions; repair. ■ Check vaporizer for obstructions. If there are none, consult the engine owner's manual for service information.

7 Technical Data

7.1 Engine

Engine power rating CRT 48-33K: Gross power rating per SAE J1995.

Part No.		CRT 48-33K	CRT 48-33K DF
Engine			
Engine make		Kubota	
Engine model		WG972-GL-E3	
Max. rated power @ rated speed	kW (hp)	24.2 (33) @ 3600 rpm	
Displacement	cm ³ (in. ³)	962 (58.7)	
Spark plug	type	NGK BKR4E	
Electrode gap	mm (in.)	0.6–0.7 (.024–.028)	
Operating speed	rpm	3850	
Engine speed - idle	rpm	1350	
Battery	V / size	12 / BCI G24	
Fuel	type	Regular unleaded gasoline	Liquid propane gas or Regular unleaded gasoline
Fuel tank capacity	—	24.6 L (6.5 gal)	LP: 15 kg (33 lb) Gasoline: 24.6 L (6.5 gal)
Fuel consumption	—	11.6 L (3.1 gal) / hr	LP: 7.5 kg (16.5 lb) / hr Gasoline: 11.6 L (3.1 gal) / hr
Running time	hr	2.1	2.0
Clutch	type	Variable speed	
Engine oil capacity	L (qt)	3.4 (3.6)	
Engine lubrication	oil grade	SAE 10W30	

7.2 Machine

Machine		CRT 48-33K	CRT 48-33K DF
Trowel			
Operating weight	kg (lb)	579 (1280)	607 (1343)
Dimensions (L x W x H)	mm (in.)	2566 x 1295 x 1473 (101 x 51 x 58)	
Rotor speed (range)	rpm	25–165	
Blade pitch (range)	degrees	0–25	
Gearbox	type	Heavy duty, fan cooled	
Gearbox lubrication	type	Mobil Glygoyle 460	
	L (oz.)	1.83 (62) each	
Driveshaft	type	Splined universal joint	

Operation		
Troweling width with pans (non-overlapping) without pans (non-overlapping)	mm (in.)	2465 (97)
		2413 (95)
Troweling area with pans (non-overlapping) without pans (non-overlapping)	m ² (ft ²)	3 (32)
		2.8 (30)

7.3 Sound and Vibration Specifications

The required sound specifications, per Annex VIII, Directive 2000/14/EC of the EC-Machine Regulations, are:

- the sound pressure level at operator’s location (L_{pA}): 89.1 dB(A)
- the guaranteed sound power level (L_{WA}): 109.0 dB(A)

These sound values were determined according to ISO 3744 for the sound power level (L_{WA}) and ISO 11204 for the sound pressure level (L_{pA}) at the operator’s location.

The weighted effective acceleration value, determined according to ISO 5349-1 and ISO 2631, is:

- for whole body: 0.3 m/s² at the seat; 0.6 m/s² at the footrest
- for hand/arm: 1.4 m/s²

The sound and vibration specifications were obtained with the unit operating on fully cured, water wetted concrete at nominal engine speed.

Vibration Uncertainties

Hand-transmitted vibration was measured per ISO 5349-1. This measurement includes an uncertainty of 1.5 m/sec².

Whole body vibration was measured per ISO 2631-1. This measurement includes an uncertainty of 0.3 m/sec².

To order go to DiscountEquipment.com

8 Emission Control Systems Information and Warranty—Gasoline

The Emission Control Warranty and associated information is valid only for the U.S.A., its territories, and Canada.

8.1 Emission Control System Background Information

Introduction

Wacker Neuson spark-ignited engines/equipment must conform with applicable Environmental Protection Agency (EPA) and the State of California emissions regulations. There are two types of emissions that fall under these regulations: 1) exhaust, and 2) evaporative. These regulations require that manufacturers warrant the emission control systems for defects in materials and workmanship.

Furthermore, EPA and California regulations require all manufacturers to furnish written instructions describing how to operate and maintain the engines/equipment including the emission control systems. This information is provided with all Wacker Neuson engines/equipment at the time of purchase.

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

Evaporative emissions

Evaporative emissions are fuel emissions and generally include emissions that result from permeation of fuel through the fuel-system materials or from ventilation of the fuel system.

Wacker Neuson utilizes low-permeation fuel lines and fuel tanks where applicable to reduce evaporative emissions.

Problems that may affect emissions

If any of the following symptoms arise, have the engine/equipment inspected and repaired by a Wacker Neuson dealer/service center.

- Hard starting or stalling after starting
 - Rough idling
 - Misfiring or backfiring under load
 - Afterburning (backfiring)
 - Presence of black exhaust smoke during operation
 - High fuel consumption
-

Emission Control Systems Information and Warranty—Gasoline

Tampering and altering

Tampering with or altering the emission control system may increase emissions beyond the legal limit. If evidence of tampering is found, Wacker Neuson may deny a warranty claim. Among those acts that constitute tampering are:

- Removing or altering of any part of the air intake, fuel, or exhaust systems.
- Altering or defeating the speed-adjusting mechanism causing the engine to operate outside its design parameters.

8.2 Limited Defect Warranty for Exhaust Emission Control System

See the supplied engine owner's manual for the applicable emission warranty statement.

8.3 Limited Defect Warranty for Wacker Neuson Evaporative Emission Control Systems

The Emission Control Warranty is valid only for the U.S.A., its territories, and Canada.

Wacker Neuson Sales Americas, LLC, N92 W15000 Anthony Avenue, Menomonee Falls, WI 53051, (hereinafter "Wacker Neuson") warrants to the initial retail purchaser and each subsequent owner, that this engine/equipment, including all parts of its evaporative emission control system, have been designed, built, and equipped to conform at the time of initial sale to all applicable evaporative emission regulations of the U.S. Environmental Protection Agency (EPA), and that the engine/equipment is free of defects in materials and workmanship which would cause this engine/equipment to fail to conform to EPA regulations during its warranty period.

Wacker Neuson is also liable for damages to other engine/equipment components caused by a failure of any warranted parts during the warranty period.

Limited defect warranty period for Wacker Neuson evaporative emission control systems

The warranty period for this engine/equipment begins on the date of sale to the initial purchaser and continues for a minimum of two (2) years. For the warranty terms for your specific engine/equipment, visit wackerneuson.com.

Any implied warranties are limited to the duration of this written warranty.

What is covered

Wacker Neuson recommends the use of genuine Wacker Neuson parts, or the equivalent, whenever maintenance is performed. The use of replacement parts not equivalent to the original parts may impair the effectiveness of the engine/equipment emission controls systems. If such a replacement part is used in the repair or maintenance of the engine/equipment, assure yourself that such part is warranted by its manufacturer to be equivalent to the parts offered by Wacker Neuson in performance and durability. Furthermore, if such a replacement part is

Emission Control Systems Information and Warranty—Gasoline

used in the repair or maintenance of the engine/equipment, and an authorized Wacker Neuson dealer/service center determines it is defective or causes a failure of a warranted part, the claim for repair of the engine/equipment may be denied. If the part in question is not related to the reason the engine/equipment requires repair, the claim will not be denied.

For the components listed in the following table, an authorized Wacker Neuson dealer/service center will, at no cost to you, make the necessary diagnosis, repair, or replacement necessary to ensure that the engine/equipment complies with the applicable EPA regulations. All defective parts replaced under this warranty become property of Wacker Neuson.

System Covered	Components
Evaporative emissions	Fuel tank (if applicable)
	Fuel tank cap (if applicable)
	Fuel line (if applicable)
	Fuel line fittings (if applicable)
	Clamps (if applicable)
	Carbon canister (if applicable)
	Purge port connector (if applicable)
Miscellaneous parts associated with the evaporative emission control system	Clamps
	Gaskets
	Mounting brackets

What is not covered

- Failures other than those resulting from defects in material or workmanship.
- Any systems or parts which are affected or damaged by owner abuse, tampering, neglect, improper maintenance, misuse, improper fueling, improper storage, accident and/or collision; the incorporation of, or any use of, add-on or modified parts, or unsuitable attachments, or the alteration of any part.
- Replacement of expendable maintenance items made in connection with required maintenance services after the item's first scheduled replacement as listed in the maintenance section of the engine/equipment operator's manual, such as spark plugs and filters.
- Incidental or consequential damages such as loss of time or the use of the engine/equipment, or any commercial loss due to the failure of the engine/equipment.
- 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 responsibility

The engine/equipment owner, is responsible for the performance of the required maintenance listed in the Wacker Neuson engine/equipment operator's manual. Wacker Neuson recommends that all receipts covering maintenance on the engine/equipment be retained, but Wacker Neuson cannot deny warranty

Emission Control Systems Information and Warranty—Gasoline

coverage solely for the lack of receipts or for the failure to ensure the performance of all scheduled maintenance.

Normal 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 an authorized Wacker Neuson dealer/service center.

How to make a claim

In the event that any emission-related part is found to be defective during the warranty period, you shall notify Wacker Neuson Product Support Department (1-800-770-0957, or technical.support@wackerneuson.com, or wackerneuson.com), and you will be advised of the appropriate dealer/service center where warranty repair can be performed. All repairs qualifying under this limited warranty must be performed by an authorized Wacker Neuson dealer/service center.

You must take your Wacker Neuson engine/equipment along with proof of original purchase date, at your expense, to the authorized Wacker Neuson dealer/service center during their normal business hours.

For owners located more than 100 miles from an authorized dealer/service center (excluding the states with high-altitude areas as identified in 40 CFR Part 1068, Appendix III), Wacker Neuson will pay for pre-approved shipping costs to and from an authorized Wacker Neuson dealer/service center.

Claims for repair or adjustment found to be caused solely by defects in material or workmanship will not be denied because the engine/equipment was not properly maintained and used.

The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.



SAFETY MANUAL

FOR OPERATING AND MAINTENANCE PERSONNEL

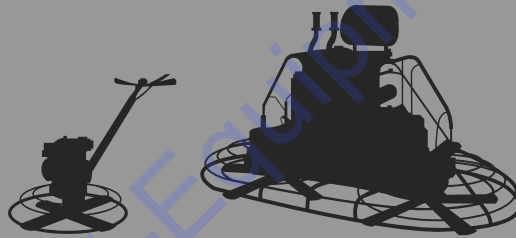


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Acknowledgment

We wish to thank the members of the Association of Equipment Manufacturers for their invaluable contributions in preparing this Safety Manual.

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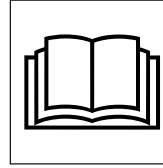
Foreword

This safety manual is intended to point out some of the basic safety situations that may be encountered during the normal operation and maintenance of your trowel and to instruct you in safety practices for dealing with these conditions. This manual is **NOT** a substitute for the manufacturer's operating manual(s).

Additional precautions may be necessary, or some instructions may not apply, depending on equipment, attachments and conditions at the job site or in the service area. The manufacturer has no direct control over equipment application, operation, inspection, or maintenance. Therefore, it is **YOUR** responsibility to use good safety practices in these areas.

The information provided in this manual supplements the specific information about your trowel that is contained in the manufacturer's operating manual(s). Other information that may affect the safe operation of your machine may be contained in the following:

- Safety signs
- Insurance requirements
- Employer safety and training programs
- Safety codes
- Local, state/provincial, and federal laws, rules, and regulations



Read and understand manuals before operating

IMPORTANT! Before you operate this machine, make sure you have the manufacturer's manual(s) for this trowel and all attachments. If the manufacturer's manual(s) are missing, obtain replacements from your employer, equipment dealer, or directly from the manufacturer. Keep this safety manual and the manufacturer's manual(s) with the machine at all times. Read and understand all manuals.

Safety videos and other training resources are available from some manufacturers and dealers. Operators are encouraged to periodically review these resources.

3

Safety Alerts

Safety Alert Symbol

This Safety Alert Symbol means:
"Attention! Stay alert! Your safety is involved!"



The Safety Alert Symbol identifies important safety messages on equipment, safety signs, in manuals, or elsewhere. When you see this symbol, be alert to the possibility of death or personal injury. Carefully read the message that follows and inform other operators. Follow instructions in the safety message.

Signal Words

Signal words are distinctive words that are typically found on safety signs on the concrete power trowels and other job site equipment. These words may also be found in this manual and the manufacturer's manual(s). These words are intended to alert the operator to a hazard and the degree of severity of the hazard.



DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.



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



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



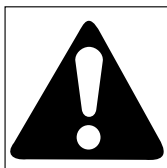
NOTICE is used to address practices not related to physical injury.

A Word to the User/Operator

It is **YOUR** responsibility to read and understand this safety manual and the manufacturer's manual(s) before operating this equipment. This safety manual takes you step by step through the working day.

Graphics have been provided to help you understand the text.

Hazard recognition and accident prevention depend upon you being alert, careful, and properly trained in the inspection, operation, transport, maintenance, and storage of this equipment.



Read and understand all safety signs – replace damaged signs

Remember that **YOU** are the key to safety. Good safety practices not only protect you but also protect the people around you. Study this manual and the manufacturer's operating manual(s) for the specific machine. Make them a working part of your safety program. Keep in mind that this safety manual is written only for concrete power trowels.

After studying the manufacturer's operating manual(s) and this safety manual, please contact Discount-equipment with any remaining questions.

Practice all usual and customary safe working precautions and remember:

Safe operation is up to you!

You can prevent death or serious injury caused by unsafe work practices!

5

Follow a Safety Program

For Safe Operation

You must be a qualified and authorized operator for safe operation of this trowel. You must clearly understand the written instructions supplied by the manufacturer, be trained—including actual operation—and know the safety rules and regulations for the job site. It is a good safety practice to point out and explain safety signs and practices to others, and to make sure they understand the importance of following these instructions.



Never operate while impaired by alcohol or drugs

⚠ WARNING! Death or serious injury could result from operating machinery while impaired by drugs or alcohol. Drugs and alcohol affect operator alertness, coordination, and the ability to safely operate the equipment. **Never operate the trowel while impaired by use of alcohol or drugs. Never knowingly allow anyone to operate the machine when their alertness or coordination is impaired.**

An operator taking prescriptions or over-the-counter medication must consult a medical professional regarding any side effects of the medication that would hinder their ability to safely operate this equipment.

Be Alert!

Know where to get assistance. Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone. Know how to use a first aid kit and fire extinguisher/fire suppression system; know their location and practice getting to them. Ensure they have been properly tested and maintained.

Let others know where you will be working, and what time you will be returning. In case of an emergency, you want others to know where to find you.

Be Aware!

Take advantage of training programs offered.

Know the proper response to a fire or chemical spill on your trowel.

Follow a Safety Program

Be Careful!

Human error is the result of many factors: carelessness, fatigue, sensory overload, preoccupation, unfamiliarity with the machine or attachments, or drugs and alcohol, to name a few. You can avoid death or serious injury caused by these and other unsafe work practices. Be careful; never assume accidents cannot happen to you.

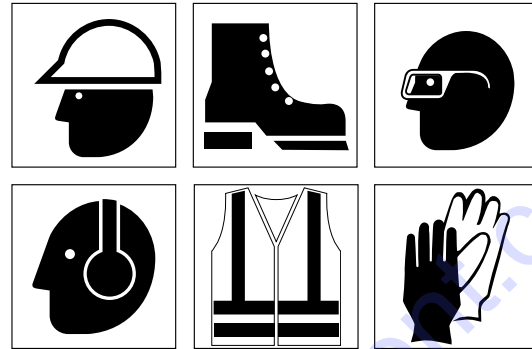
For your safety and the safety of others, act safely and encourage your fellow workers to act safely as well.

Protect Yourself

Wear all the personal protective clothing and Personal Protective Equipment (PPE) issued to you or called for by job conditions.

You may need:

- Hard hat
- Safety shoes
- Safety glasses, goggles, or face shield
- Heavy duty gloves
- Hearing protection
- Reflective clothing
- Wet weather gear
- Respirator or filter mask



Wear whatever is needed to protect yourself—don't take chances.

⚠ WARNING! Avoid death or serious injury from entanglement. **Do not wear loose or frayed clothing or accessories that could catch on moving parts.** Examples of items to avoid include flopping cuffs, dangling neckties and scarves, wallets attached to chains, jewelry and wrist watches.

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Follow a Safety Program

Know the Rules

Most job sites have rules governing equipment use and maintenance. Before you start work at a new location, check with the supervisor or safety coordinator. Ask about the rules you will be expected to obey.

OSHA enforces federal laws within the United States that apply to the safe operation, application, and maintenance of equipment on some job sites. It is the employer's responsibility to comply with these laws. A federal representative may periodically inspect a job site to see that these laws are being followed.

There may be other local, state/provincial, federal laws or international organizations that regulate the use of this equipment, along with specific job site or employer rules. It is important that you know and comply with all applicable laws and rules, **including those requiring operator training and certification.**

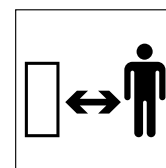
These are some of the rules you must work by:

- Only qualified and authorized individuals may operate this equipment.
- Inspect your machine and attachments before each use as specified by the manufacturer and your employer.

- Know the operating characteristics of your equipment. Do not misuse it.
- Wear proper clothing and PPE. Check that others are also wearing appropriate clothing.
- All shields, guards, air filters, access panels, and doors must be properly installed before each use.
- Know the rules regarding traffic at your job site. Know what all signs, flags, and markings mean. Know hand, flag, horn, whistle, siren, or bell signals, if used.
- Never modify or remove any part of the machine (except for qualified service personnel; then make sure the part is re-installed or replaced if defective or worn out).



Know and understand rules of operation



Keep bystanders away

8

Follow a Safety Program

- **Never allow children to play near, ride on or operate the equipment.**
- Keep bystanders away from the machine during operation.
- Know the work area before you use the equipment. Be aware of possible hazards.
- Only use attachments and parts that are approved by the manufacturer.
- Follow all safe shutdown instructions (See page 21, **Shut Down Safely**).

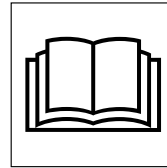
Know the Equipment

Read and understand the DANGER, WARNING, CAUTION, and NOTICE safety labels and other informational signs on the machine, the attachments, and in the manufacturer's operating manual(s). Ask your supervisor or dealer to explain any information you do not understand. Failure to obey safety instructions could result in death or serious injury.

Know the following about your equipment:

- Function, purpose, and use of all controls
- Correct operation speeds
- How to quickly stop equipment in an emergency
- Rated operating capacity

- Know the meaning of all identification symbols on the controls and gauges
- Know the location and type of emergency shut-down control the trowel is equipped with
- Never start or operate the trowel without protective guards and panels in place
- Know the capabilities and limitations of the trowel



Read and understand manuals before operating

Dust Precaution

Some dust created by construction activities may cause silicosis or respiratory harm.

Your risk of exposure varies depending on how often you do this type of work. To reduce your risk, work in a well ventilated area, use a dust control system, and wear approved personal safety equipment such as a dust/particle respirator designed to filter out microscopic particles.

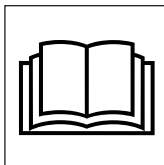
9

Prepare for Safe Operation

Load and Unload Safely

Precautions

- Power trowels are heavy and awkward to move around.
- Do not attempt to lift the ride-on trowel by the guard rings.
- Use proper heavy lifting procedures.
- Keep all non-essential personnel clear of the area.
- Never lift the trowel over areas where people are standing or working.
- Remove tools and loose items before lifting.
- Make sure the crossbars on the safety catches are in good condition if so equipped.
- Always consult the machine's operator's manual for the best and proper lifting, loading, and unloading methods.



Read and understand manuals before loading and unloading

Walk-Behind Trowels

Some walk-behind trowels can be lifted or moved by two people utilizing lifting tubes or other special attachments. Generally however, they must be lifted using lifting bales (special lifting brackets), or other specific lifting points provided by the manufacturer, and cranes, hoists, or forklifts. Be certain any lifting devices used have adequate capacity.

Ride-On Trowels

Ride-on trowels are very heavy. They require heavy-duty lifting devices such as cranes or heavy-duty hoists to lift them on and off the concrete slab.

Be certain any lifting devices used have adequate capacity. Some ride-on trowels are equipped with lifting bosses that are used with specialized apparatus to assist in moving the trowels around. Use extreme care when lifting or moving a ride-on trowel.

Prepare for Safe Operation

Check and Use All Available Safety Devices

To protect you and others around you, your machine may be equipped with the safety equipment listed below. Additional equipment may be required or some items may not apply, depending on attachments used, job site conditions, or applicable job site rules. Check that each required item is securely in place and in operating condition:

- Emergency stop switch or other “Shut-Down” devices
- Guards, Shields & Panels
- Alarms or Warning Lamps
- Drain Covers, Plugs, and Caps
- Pressure Relief Devices
- Lights
- Special enclosures or accessories required for specific applications or job site conditions
- Safety Signs

Use them! Never remove or disconnect any safety device.

Check the Machine

Before beginning your work day, inspect the machine and have all systems in good operational condition.

- Perform daily and periodic service procedures as instructed by the equipment manufacturer.
- Check for broken, missing, loose, or damaged parts. Make necessary repairs.



Inspect the machine before each work day

- Keep handholds clean and free of grease, oil, dirt, snow or ice.
- Ensure shielding is properly installed and in good condition. Repair or replace if damaged or missing.
- Ensure all tools or loose objects are removed or securely fastened before operating the machine.

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Prepare for Safe Operation

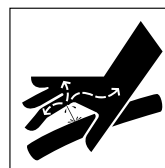
Hydraulic Fluid Injection Hazard

▲ WARNING! Accidental injection of pressurized fluid into the hands or body is dangerous and could result in death or serious injury. **Use caution when checking hydraulic leaks as pressurized hydraulic fluid has enough force to penetrate skin, causing serious personal injury.**

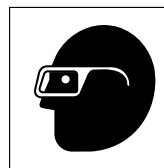
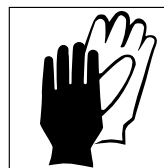
If a leak is discovered:

- Ensure engine is turned off; relieve pressure in hydraulic circuit.
- Wear proper hand and eye protection.
- Visually examine the hydraulic hose or fluid lines in the vicinity of the leak for breaks or cracks. **Do not** use your hand to check for leaks.
- Repair or replace hydraulic lines per manufacturer's recommendation.

Fluid injection injuries are not always obvious. Victims have reported such injuries feel like a bee sting or splinter under the skin. If you suspect you have a fluid injection injury, do not take chances. Seek proper medical care immediately. If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury.



Pressurized fluid can inject into the body



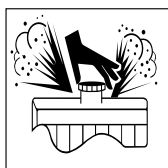
Wear proper hand and eye protection

Prepare for Safe Operation

Check the Cooling System

When checking the cooling system, make sure the engine is turned off and is cool. Remove the key to prevent fans from unexpectedly starting. Ensure the coolers and engine compartment are clean and free from debris, which could ignite and cause a fire.

If the machine is air-cooled, be sure the cooling unit has an unobstructed air flow. If it is liquid-cooled, check coolant level (at overflow tank, if provided).



Allow radiator to cool before removing cap slowly

⚠ WARNING! Allow the radiator to cool before checking the level. Hot radiator fluids could escape as steam and burn you. (See page 27, **Engine Coolant Hazards.**)

Use Caution When Fueling

⚠ WARNING! Avoid injury from fire or explosion. **Never fill the fuel tank with the engine running, while smoking or when near an open flame.**

Never overfill the tank or spill fuel. If fuel is spilled, clean it up immediately.

Be sure to use the correct type and grade of fuel.

Ground the fuel funnel or nozzle against the filler neck to prevent sparks that could ignite fuel vapors. Be sure to replace the fuel fill cap (if equipped) when you are done.



No smoking and no open flames in flammable/explosive atmospheres

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Prepare for Safe Operation

Ultra-Low Sulfur Diesel (ULSD) Fuel Hazard

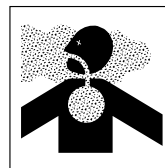
Avoid Static Electricity Risk When Fueling

⚠ WARNING! Ultra-Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations. Avoid death or serious injury from fire or explosion; **consult with your fuel or fuel system supplier to ensure the delivery system is in compliance with fueling standards for proper grounding and bonding practices.**



Static discharge during fueling can cause explosion

⚠ WARNING! Exhaust fumes from diesel, gasoline or LP gas engines can kill. **Do not breath exhaust fumes from any kind of engine.**



Ventilate work area

Operating in Flammable/Explosive Atmospheres

⚠ WARNING! A trowel must not be operated in flammable or explosive atmospheres. Use in explosive atmospheres can result in fires and/or explosions which could cause serious injury or death.



Do not operate in explosive/flammable atmosphere

Follow Safe Operating Practices

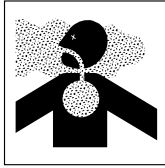
Exhaust Fumes in a Closed Space Can Kill

Vent exhaust and assure a flow of fresh air when an internal combustion engine is used in a closed space.

Prepare for Safe Operation

Avoid Crystalline Silica (quartz) Dust

⚠ WARNING! Avoid exposure to dust containing crystalline silica particles. This dust can cause serious injury to the lungs (silicosis).



Avoid silica dust

Because crystalline silica is a basic component of sand and granite, many activities at construction sites produce dust containing crystalline silica. Trenching, sawing and boring of material containing crystalline silica can produce dust containing crystalline silica.

If dust which contains crystalline silica is present there are guidelines which should be followed.

1. Be aware of the health effects of crystalline silica and that smoking adds to the damage.
2. Be aware of and follow OSHA (or other) guidelines for exposure to airborne crystalline silica.
3. Know the work operations where exposure to crystalline silica may occur.
4. Participate in air monitoring or training programs offered by the employer.
5. Be aware of and use optional equipment controls such as water sprays, local exhaust ventilation, and enclosed cabs with positive pressure air conditioning.
6. Where respirators are required, wear a respirator approved for protection against crystalline silica-containing dust. Do not alter the respirator in any way. Workers who use tight-fitting respirators cannot have beards/mustaches which interfere with the respirator seal to the face.
7. If possible, change into disposable or washable work clothes at the worksite; shower and change into clean clothing before leaving the worksite.
8. Do not eat, drink, use tobacco products, or apply cosmetics in areas where there is dust containing crystalline silica.
9. Store food, drink and personal belongings away from the work area.
10. Wash hands and face before eating, drinking, smoking, or applying cosmetics after leaving the exposure area.

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Prepare for Safe Operation

Know the Working Area

Learn as much about your working area as possible.

Check at Ground or Floor Level

Thoroughly check the area for unusual or dangerous conditions, such as tools, or items that may damage the trowel or be propelled by the trowels rotating blades. Note where pipes and forms are located. Locate and mark protrusions (rebar, anchor bolts, floor drains, etc.) in the concrete.

Plan Your Work

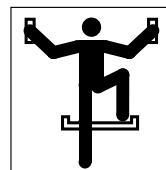
Know in advance the conditions likely to be encountered, and plan for any likely emergency.

Getting on and off a Ride-On Trowel

If operating a ride-on trowel, mount and dismount carefully. Use the steps and hand holds provided. Do not use control levers as hand holds and never use guard rings as steps. Watch for surfaces that may be slippery. Never jump off a ride-on trowel.

Operating on an Elevated Deck (Multi-Story Operation)

Consult local/state regulations before you operate equipment on an elevated deck. If operating on an elevated deck, ensure perimeter safety cabling of proper size and strength is in place. Do not operate the trowel close to the edge of the deck.

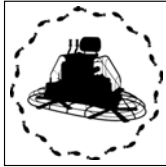


Use three points of contact when mounting and dismounting

Start Safely

Warn Personnel Before Starting

Before starting, walk completely around the machine. **Make sure no one is on it or close to it.** Let others know you are starting up and don't start until everyone is completely clear of the machine. As the equipment operator, you are responsible for the safe use of the machine, so always make sure you have communicated your work plans to others on the site.



Before starting,
walk completely
around trowel

Check the trowel thoroughly at delivery for any shipping damage.

Locate the trowel in an accessible location, as close to the work site as possible.

Secure the trowel after it is placed in its intended operating position so it does not tip, roll, slide or fall.

Starting the Engine

⚠ WARNING! Never attempt to start the engine by shorting across starter terminals. Serious injury or death may result.

Know the exact starting procedure for your machine. See the manufacturer's operating manual(s) for starting.

- Familiarize yourself with warning devices, gauges and operating controls.
- Make sure controls are in the neutral/locked position.
- Clear the area of all persons.
- Start the engine following the instructions in the manufacturer's operating manual(s).
- If necessary to run the engine or operate the machine in an enclosed area, ensure there is adequate ventilation.

⚠ WARNING! Never operate the machine without adequate ventilation. Exhaust fumes can kill. Do not breathe exhaust fumes!

For a walk-behind (pedestrian operated) trowel machine, make sure that a circular area with a minimum radius equal to the length of the machine is clear. This will ensure safety of personnel around the machine.

17

Start Safely

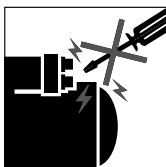
Starting Aids

If you have trouble starting the engine and need to use jumper cables, follow the instructions in manufacturer's operating manual(s). **Jump-starting is a two-person operation.** The operator must be in the operator's seat when jump-starting so the machine will be under control when the engine starts.

⚠ WARNING! Improper jump-starting procedures may cause serious injury or death from a battery explosion or a run-away machine. **Always use proper jump-starting procedure.** (See page 29, **Battery Hazards.**)



To avoid explosion,
follow proper jump-
starting procedures



Never start engine
by shorting across
starter terminals

Ether/cold start fluid is HIGHLY FLAMMABLE. Before using it, always read the instructions on the ether/cold start fluid container and the instructions in the manufacturer's operating manual(s).

⚠ WARNING! Avoid injury from explosion or fire. If the engine is equipped with a glow plug pre-heater or other intake manifold type pre-heater, follow manufacturer's instructions before using ether/cold start fluid.

After Starting Engine

Observe gauges, instruments, and warning lights to assure that they are functioning and their readings are within the operating range.

Run an Operating Check

Do not use a machine that is not in proper operating condition. It is your responsibility to check the condition of all systems and to run the check in a safe area.

Operate Safely

Walk-Behind Trowels

- Ensure that the operator is familiar with the trowel and is trained on its operation.
- Do not start or operate the trowel if the drive train will not disengage. Centrifugal force between the trowel and surface when starting can cause uncontrolled handle movement that can cause serious injury. The handle must not move while pulling the engine recoil starter.
- Visually check to be sure that the blades are free of obstructions and the area is clear for operation.
- For trowels that use this feature, ensure that the emergency stop switch is in the ON position.
- Move the throttle to the idle position.
- Switch the engine ON/OFF switch to the ON position.
- Never place your foot on the ring guard when starting the engine or severe injury can occur if your foot slips through the ring guard as the blades start to spin.
- While firmly holding the handle with one hand, start the engine following the guidelines in the engine manufacturer's instruction manual.
- Hold the handle bar firmly with both hands while the trowel is "throttled-up".

- If control of the trowel is lost, stay clear and do not attempt to regain control until the trowel has stopped moving. Depending on the engine speed, the trowel handle can swing around before it stops completely.

Ride-On Trowels

- Ensure that the operator is familiar with the trowel and is trained on its operation.
- Ensure the operator is well rested and not fatigued, is alert, and not impaired in any way (medications, drugs, alcohol, etc.).
- Adjust the seating if necessary and get into a comfortable position where all controls are accessible.
- Visually check to be sure that the blades are free of obstructions and the area is clear for operation.
- Start the trowel following the instructions in the engine manufacturer's operation manual. For diesel powered trowels, follow the instructions for glow plug and cold start operation.
- Observe any gauges and warning lights to ensure they are functioning and their readings are within the manufacturer's normal operating range.
- Check operation of controls. Make certain they operate properly.

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Operate Safely

Electrical Equipment

Some walk-behind trowels are powered by electric motors. Electric motors and components present special hazards during operation. Read the operator's manual.

- Never operate a trowel with a damaged or worn electrical cord. When using an extension cord, be sure to use one heavy enough to carry the current load. When trowel is used outdoors, use only extension cords that are marked for outdoor use.
- Use only appropriate extension cords that have grounding-type plugs and receptacles that accept the machine's plug.
- Use an electrically powered trowel that has been built in accordance with the requirements of the National Electrical Code (NFPA-70) and has been approved by a Nationally Recognized Test Lab.



- Keep all electrical cords away from rotating components, heat, oil, and sharp edges to avoid damaging them.
- Avoid body contact with grounded surfaces such as pipes, metal railings, radiators and metal ductwork.
- Always check the power supply before running the trowel. Using the wrong voltage supply will damage the motor.
- Always make sure the motor switch is OFF or in the stop position before plugging the trowel into the power supply.
- Do not operate an electric powered trowel in the rain or snow. Keep the motor, switch, and electrical cords dry.
- Never operate the trowel in areas exposed to flammable or explosive liquids or gases. Sparks could ignite fumes.

Shut Down Safely

Storage

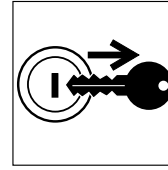
Always store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of reach of children.

⚠ WARNING! Avoid death or serious injury. **Never leave a machine unattended with the engine running.**

Safe Shutdown

The detailed shutdown procedure is given in your manufacturer's manual(s). In general, this includes:

- Stop machine.
- Position controls in neutral or locked position.
- Idle engine for short cool-down period.
- Stop engine and remove ignition key (if equipped).
- Cycle hydraulic controls to eliminate pressure.
- Lock covers and enclosures.
- Shut off master electric switch (if equipped).



Shut engine off,
remove key

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Perform Maintenance Safely

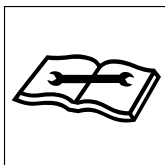
Know What You're Doing

Maintenance on this type of machine is not for inexperienced or untrained personnel. It can be hazardous unless performed properly. Be sure you have the necessary skill, information, correct tools, and proper equipment to do the job safely.

Be sure to maintain the equipment according to the manufacturer's instructions. Regularly check the operation of the protective and safety devices.

Do not perform any work on a machine unless you are authorized and qualified to do so.

If you have been authorized to perform maintenance, **read the manufacturer's operating and service manual(s)**. Study the instructions: check the lubrication charts, examine all the instruction messages on the machine.



Maintain equipment

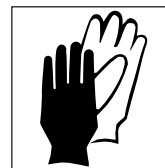
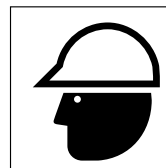
Protect Yourself

Wear all the personal protective clothing and PPE issued to you or called for by job conditions.

You may need:

- Hard hat
- Safety shoes
- Safety glasses, goggles or face shield
- Heavy duty gloves
- Hearing protection
- Reflective clothing
- Wet weather gear
- Respirator or filter mask

Wear whatever is needed to protect yourself. Do not take chances.



Perform Maintenance Safely

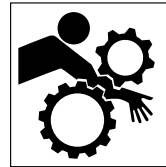
⚠ WARNING! Avoid death or serious injury from entanglement. **Do not wear loose clothing or accessories. Stay away from all rotating components when the engine is running.** Contact, wrapping or entanglement with rotating or moving parts could result in death or serious injury.

Wear a rubber apron and rubber gloves when working with corrosives. Wear gloves and safety shoes when handling wooden blocks or sharp-edged metal.

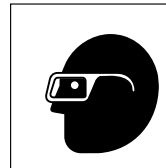
Always use safety glasses, goggles or a face shield. They provide eye protection from fluids under pressure, during grinding and while servicing batteries. Protection is also needed from flying debris, liquids and loose material produced by equipment, tools and pressurized air/water.

Wear a face shield and follow manufacturer's instructions when you disassemble spring-loaded components or work with battery acids. Keep pockets free of all objects that could fall out and drop into machinery.

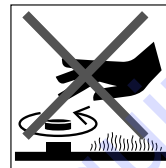
Handle tools and heavy parts sensibly, with regard for the safety of yourself and others. Lower items; don't drop them.



Avoid rotating parts



Wear eye protection



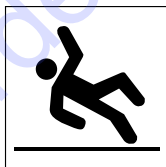
Do not loosen radiator cap until cool

23

Perform Maintenance Safely

Prepare the Work Area

- Position the machine in a level area out of the way of other working equipment.
- Make sure there is adequate light, ventilation and clearance.
- Remove oil, grease or water to eliminate any slippery surfaces.
- Clean around the area to be serviced to minimize contamination.



Avoid falls, clean slippery surfaces

Prepare the Machine

Stored energy sources (electrical, mechanical, hydraulic, pneumatic, chemical, thermal, etc.) must be controlled or reduced to a practical minimum before performing any maintenance, repair, or service procedures.

⚠ CAUTION! Load and unload machinery using proper procedures. (See page 10, **Load and Unload Safely.**)

Safety practices to prevent potential injuries from energy-releasing sources include:

- Place controls in NEUTRAL or LOCKED position before shutting off engine.
- Allow all moving parts to stop.
- Shut off engine.
- Follow your manufacturer's recommendation for relieving hydraulic system pressure.
- Lock ignition, remove key (if equipped) and take it with you.
- Look and listen for evidence of moving parts before dismounting.
- Shut off master electrical switch (if equipped).
- Securely support or block up machine before working underneath machine or other lifted components.
- Securely support, block up, or lock up other components with approved locking devices before working near or underneath them.
- Relieve pressure before disconnecting or disassembling any pressurized system.
- Block or relieve spring pressure before disassembling any spring-loaded mechanism.
- Avoid flames, sparks, or smoking near any fuel, hydraulic fluid or other flammable material such as spraying debris.

Perform Maintenance Safely

Attach a “DO NOT OPERATE” warning tag to the control levers. Lockout/tagout the unit according to the manufacturer’s operating manual(s). If there is a key, remove it and take it with you.

Install approved support device(s) when working under or near raised equipment.

Remove only guards or covers that provide access to the area being serviced. Replace all guards and covers when work is complete.

Do not operate the machine with guards removed.

⚠ WARNING! Avoid injury or death. **Never work on machinery with the engine running unless instructed by the manufacturer’s manual(s) for specific service.**

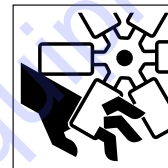
Trowel Maintenance and Repair

MAKE SURE the trowel is disconnected from the power source or the appropriate circuits are dead and OSHA Lockout/Tagout is applied before doing any maintenance or repair work on the trowel.



Trowel Blades, Pans and Attachments

- Do not attempt to clean, service or perform adjustments on the trowel while it is running.
- Do not remove blades or pans while the trowel is hanging overhead. Always support the trowel securely on a flat, level surface before changing blades or pans.
- Always handle blades and pans carefully. Worn blades or pans may develop sharp edges that can cause serious cuts.
- Always replace worn or damaged parts with service parts designated by the manufacturer.
- Replace blades and pans as a complete set – even if only one blade or pan is showing wear or damage. They can wear differently depending on different jobs, and a difference in blade size will damage the finish of the slab surface.
- Only use manufacturer approved polishing and brush attachments.



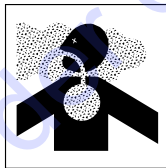
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Perform Maintenance Safely

Common Maintenance Safety Practices

Use Proper Ventilation

Never run an engine in an enclosed area without an approved ventilation system.



Ventilate work area

⚠ WARNING! Exhaust fumes contain carbon monoxide which could be deadly if inhaled. **Never operate any type of engine without proper ventilation. EXHAUST FUMES CAN KILL.**

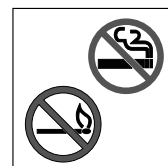
A feeling of tiredness, or nausea, is an indication of being overcome by exhaust. Shut the engine off immediately if this occurs.

Fuel Hazards

⚠ WARNING! Avoid serious injury or death. **Always use approved fuel containers and/or fuel dispensing equipment to reduce the risk of explosion or fire.**

Always observe these practices to reduce the possibility of a serious accident:

- Shut off engine and ignition during refueling.
- Turn off all electrical switches.
- Ground the fuel nozzle against the filler neck.
- Keep sparks and open flames away from fuel. Do not smoke while refueling or when handling fuel containers.
- Do not cut or weld on or near fuel lines, tanks or containers.
- Do not overfill the tank or spill fuel. Clean up spilled fuel immediately. Clean spills immediately.



No smoking and no open flames

26

Perform Maintenance Safely

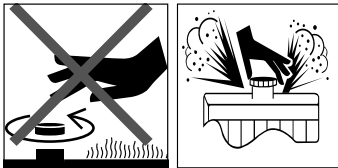
Ultra-Low Sulfur Diesel (ULSD) Hazard

⚠ WARNING! Ultra-Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations with higher sulfur content. Avoid death or serious injury from fire or explosion; **consult with your fuel or fuel system supplier to ensure the delivery system is in compliance with fueling standards for proper grounding and bonding practices.**

Engine Coolant Hazards

⚠ WARNING! Avoid serious injury or death. Liquid cooling systems build up pressure as the engine gets hot, so **use extreme caution before removing the radiator cap.**

- Stop the engine and wait for the system to cool.
- Wear protective clothing and safety glasses.
- Turn the radiator cap slowly to the first stop to allow the pressure to escape before removing completely.



Allow radiator to cool before removing cap slowly

Engine Coolant Hazards (cont.)

⚠ CAUTION! Before replacing engine coolant, refer to the manufacturer's operating manual(s) for direction. Using incorrect coolant type may cause overheating and increase safety risks.

Hydraulic System Hazards

Be sure to follow manufacturer's instructions for relieving fluid pressure before performing any maintenance. The hydraulic system is pressurized whenever the engine is on and may hold pressure even after the engine is shut off. Cycle hydraulic controls, including auxiliary hydraulic control (if equipped), after the engine is shut off.



Check for leaks and inspect hoses

27

Perform Maintenance Safely

Hydraulic System Hazards (cont.)

During inspection of the hydraulic system:

- Wait for fluid to cool before disconnecting the lines. Hot hydraulic fluid can cause **severe burns**.
- Wear appropriate eye protection. Hydraulic fluid can cause permanent eye injury.
- When venting or filling the hydraulic system, loosen the filler cap slowly and remove it gradually.
- **Never** reset any relief valve in the hydraulic system to a pressure higher than recommended by the manufacturer.

Hydraulic Fluid Injection Hazard

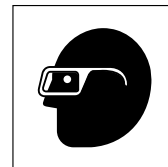
⚠ WARNING! Accidental injection of pressurized fluid into the hands or body is dangerous and could result in death or serious injury. **Use caution when checking hydraulic leaks as pressurized hydraulic fluid has enough force to penetrate skin, causing serious personal injury.**

If a leak is discovered:

- Ensure engine is turned off; relieve pressure in hydraulic circuit.
- Wear proper hand and eye protection.

- Visually examine the hydraulic hoses or fluid lines in the vicinity of the leak for breaks or cracks. **Do not** use your hand to check for leaks.
- Repair or replace hydraulic lines according to the manufacturer's recommendations.

Fluid injection injuries are not always obvious. Victims have reported such injuries feel like a bee sting or splinter under the skin. If you suspect you have a fluid injection injury, do not take chances. Seek proper medical care immediately. If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury.



Wear eye protection



Pressurized fluid can inject into the body

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Perform Maintenance Safely

Battery Hazards

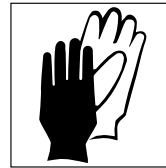
The liquid in batteries contains acid, which is a POISON and could cause SEVERE CHEMICAL BURNS.

Avoid injury:

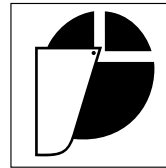
- Wear a face shield to prevent contact with your eyes.
- Wear chemical-resistant gloves and clothing to keep electrolyte off your skin and regular clothing.

⚠ WARNING! Electrolyte will damage eyes or skin on contact. **Always wear a face shield to avoid electrolyte in eyes.**

If liquid from the battery contacts your eyes, flush immediately with clean water and get medical attention. Wear chemical-resistant gloves and protective clothing to keep liquid off your skin. If liquid contacts exposed skin or clothing, wash off immediately with clean water. If liquid is ingested, drink large quantities of water or milk. DO NOT induce vomiting. Seek medical attention immediately.



Wear hand protection



Wear face protection

29

Perform Maintenance Safely

Avoid Explosion

⚠ WARNING! Avoid serious injury from explosion. Lead-acid batteries produce extremely explosive gases especially when being charged. **Keep arcs, sparks, flames and lighted tobacco away.**

- Do not smoke near batteries.
- Keep them away from arcs, sparks and open flames.
- Provide adequate ventilation.

Never check the battery by placing a metal object across the battery posts. The resulting spark could cause an explosion.

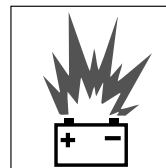
⚠ WARNING! Avoid serious injury from battery explosion. **Do not charge a battery or jump-start the engine if the battery is frozen.**

Warm to 60°F (15.6°C) or the battery may explode and could cause serious injury.

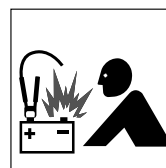
Safety rules during battery jump-starting:

- Follow the instructions for proper battery jump-starting, as specified in the manufacturer's manual(s).
- Be sure the machines are not touching.
- Adhere to the polarity of the batteries and connections.

- Make the final cable connection to the engine or the farthest ground point away from the battery. Never make the final connection at the starter or dead battery. Sparks may ignite the explosive gases present at the battery.
- When disconnecting cables, remove the cables in reverse order of connection (e.g., final connection first).



Avoid sparks and open flames near batteries



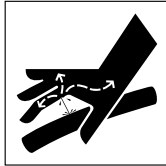
When jump-starting, observe polarity and make final connection at ground point

Perform Maintenance Safely

Complete Service and Repairs Before Machine is Released

Tighten all bolts, fittings, and connections to torques specified by the manufacturer.

Inspect for leftover components such as cotter pins, washers, locknuts, etc. after completing service. Replace any missing parts.



Pressurized fluid
can inject into
the body

Start the engine and check for leaks. (See page 27, **Hydraulic System Hazards**.) Operate all controls to make sure the machine is functioning properly. Test the machine if necessary. After testing, shut down and check the work you performed.

Recheck all fluid levels before releasing the equipment for operation.

All parts should be inspected during repair and replaced if worn, cracked or damaged. Excessively worn or damaged parts could fail and cause injury or death.

Install all guards, covers, and shields after servicing. Refill and recharge pressure systems only with manufacturer-approved or recommended fluids.



Verify service work
when completed

Notes

10.2 Electrical Schematic Components

Ref.	Description	Ref.	Description
1	Ground	20	Battery
2	Front right lights	21	Sprayer pump 1
3	Fuel pump (gasoline models)	22	Sprayer pump 2
4	Fuse holder	23	Front left lights
5	Fuel cutoff (LP models)	24	Electric lock-off (LP models)
6	Negative coil 1	25	Coolant temperature light
7	Negative coil 2	26	Alternator light
8	Negative coil 3	27	Work light switch
9	Operator presence switch	28	Oil pressure light
10	Positive coil 1	29	Oil pressure relay
11	Positive coil 2	30	Power steer (PWR)
12	Positive coil 3	31	Operator relay
13	Speed sensor	32	Sprayer switch
14	Ignitor assembly	33	Fuel cutoff (gasoline models)
15	Coolant temperature sensor	34	Operator throttle
16	Oil pressure sensor	35	Key switch—armrest (RH)
17	Alternator	36	Hour meter
18	2-pin alternator	37	Fuel selector switch (dual fuel models)
19	Starter solenoid	38	Single fuel select (gasoline models)

Wire Colors							
BK	Black	RD	Red	YL	Yellow	OR	Orange
GN	Green	TN	Tan	BR	Brown	PU	Purple
BU	Blue	VIO	Violet	CL	Clear	SH	Shield
PK	Pink	WH	White	GY	Gray	LB	Lt. blue

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