



Husqvarna®



CRT 60-74LX

Husqvarna, 2019-12-01

Operator's manual, EN

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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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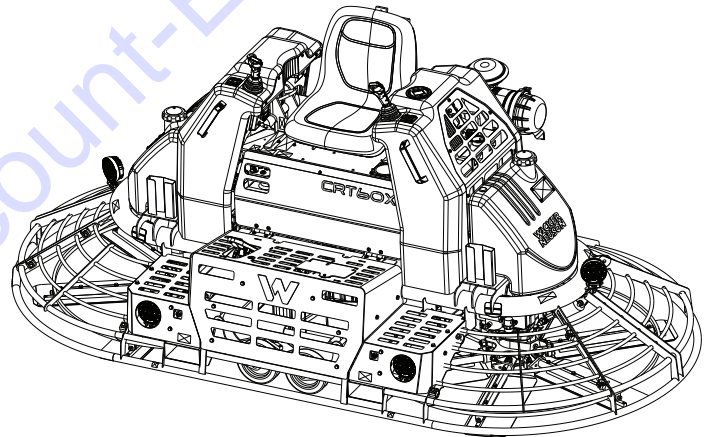
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Operator's Manual

Ride-On Trowel

CRT60-74LX



Type	CRT60-74LX
Document	5100038827
Date	0918
Revision	02
Language	EN



5 1 0 0 0 3 8 8 2 7

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.

NOTICE! CALIFORNIA AIR RESOURCES BOARD (CARB): This machine is considered a preempt Off-Road Applicatoin as relating to CARB standards. The U.S. EPA has sole authority to establish emission standards for preempt construction equipment. For more information see www.arb.ca.gov/msprog/offroad/preempt.htm

CALIFORNIA Proposition 65 Warning

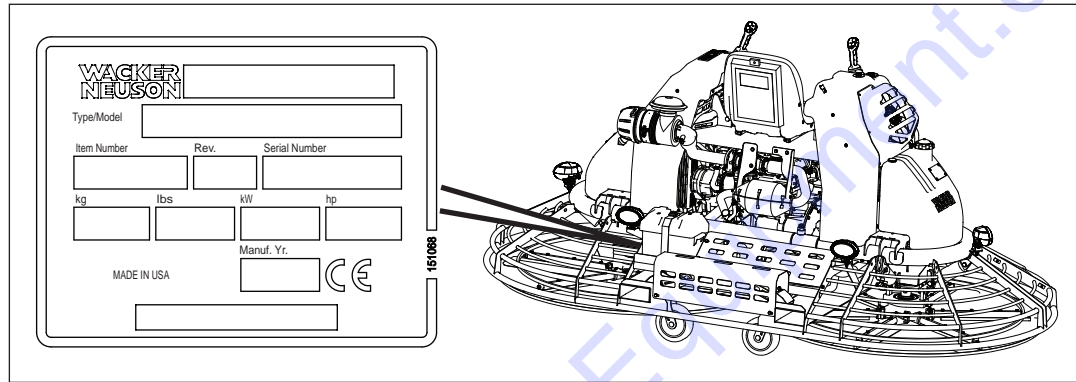
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Foreword

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
CRT60-74LX	5100038000



wc_gr012648

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 your Wacker Neuson Dealer, or visit the Wacker Neuson website at <http://www.wackerneuson.com/>.
- 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 if you have questions about approved or unapproved parts, attachments, or modifications.

Abbreviations

Abbreviation or Acronym	Definition	Abbreviation or Acronym	Definition
ASC	Accelerator Speed Control	LT	Left
AUX	Auxiliary	MAF	Mass Air Flow
BATT	Battery	P/L	Pressure Limiter
CAN	Controller Area Network	Pb	Lead
Cd	Cadmium	PPE	Personal Protective Equipment
CKP	Crank Position	PTO	Power Takeoff
CMP	Camshaft Position	QR	Quick Response
CRT	Ride-on Concrete Trowel	REV	Reverse
DTC	Diagnostic Trouble Code	RT	Right
EGR	Exhaust Gas Recirculation	S/N	Serial Number
FWD	Forward	SCV	Suction Control Valve
GND	Ground	T4f	Tier Four Final
HDC	Hydraulic Drive Control	TSC1	Torque/Speed Control
Hg	Mercury	TWV1	Total Wattage Viewer
IC	Integrated Circuit	—	—

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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 is mounted a diesel engine, a fuel tank, a water tank, two hydraulic motors, a hydraulic control module, and an operator's platform with controls and a seat. A set of metal blades is connected to each hydraulic motor. A ring guard surrounds the blades. The engine rotates the blades via a hydraulic signal from the control module to the motors. 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 foot 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 Safety Guidelines for Operating the Machine

Operator training

Before operating the machine:

- Read and understand the operating instructions contained in all manuals delivered with the machine.
- Familiarize yourself with the location and proper use of all controls and safety devices.
- Contact Discount-equipment for additional training if necessary.

When operating this machine:

- Do not allow improperly trained people to operate the machine. People operating the machine must be familiar with the potential risks and hazards associated with 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, drugs, or prescription drugs

Application area

Be aware of the application area.

- Keep unauthorized personnel, children, and pets away from the machine.
- Remain aware of changing positions and the movement of other equipment and personnel in the application area/job site.
- Identify whether special hazards exist in the application area, such as toxic gases or unstable ground conditions, and take appropriate action to eliminate the special hazards before using the machine.
- Do not operate the machine in areas that contain flammable objects, fuels, or products that produce flammable vapors.

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.

Safety devices, controls, and attachments

Only operate the machine when:

- All safety devices and guards are in place and in working order.
- All controls operate correctly.
- The machine is set up correctly according to the instructions in the Operator's Manual.
- The machine is clean.
- The machine's labels are legible.

To ensure safe operation of the machine:

- Do not operate the machine if any safety devices or guards are missing or inoperative.
 - Do not modify or defeat the safety devices.
 - Only use accessories or attachments that are approved by Wacker Neuson.
-

Safe operating practices

When operating this machine:

- Remain aware of the machine's moving parts. Keep hands, feet, and loose clothing away from the machine's moving parts.
 - Do not operate a machine in need of repair.
 - Do not consume the operating fluids used in this machine. Depending on your machine model, these operating fluids may include water, wetting agents, fuel (gasoline, diesel, kerosene, propane, or natural gas), oil, coolant, hydraulic oil, heat transfer fluid (propylene glycol with additives), battery acid, or grease.
-

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
-

After use

- When the machine is not being operated, allow the engine to idle for five minutes and then stop the engine.
- Close the fuel valve on engines equipped with one when the machine is not being operated.
- Ensure that the machine will not tip over, roll, slide, or fall when not being operated.
- Store the machine properly when it is not being used. The machine should be stored in a clean location out of the reach of children.

1.4 Service Safety

Service training

Before servicing or maintaining the machine:

- Read and understand the instructions contained in all manuals delivered with the machine.
- Familiarize yourself with the location and proper use of all controls and protective devices.
- Only trained personnel shall troubleshoot or repair problems occurring with the machine.
- Contact Discount-equipment for additional training if necessary.

When servicing or maintaining this machine:

- Do not allow untrained or improperly trained people to service or maintain the machine. Personnel servicing or maintaining the machine must be familiar with the associated potential risks and hazards.

Precautions

When servicing or maintaining the machine:

- Read and understand the service procedures before performing any service to the machine.
- All adjustments and repairs must be completed before operating the machine. Do not operate the machine with a known problem or deficiency.
- All repairs and adjustments shall be completed by a qualified technician.
- Turn off the machine before performing maintenance or making repairs.
- Remain aware of the machine's moving parts. Keep hands, feet, and loose clothing away from the machine's moving parts.
- Reinstall the safety devices and guards after repair and maintenance procedures are complete.

Machine modifications

When servicing or maintaining the machine:

- Use only accessories/attachments that are approved by Wacker Neuson.
- Do not defeat safety devices.
- Do not modify the machine without the express written approval of Wacker Neuson.

Replacing parts and labels

- Replace worn or damaged components.
- Replace all missing and hard-to-read labels.
- When replacing electrical components, use components that are identical in rating and performance to the original components.
- 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.

Cleaning

When cleaning and servicing the machine:

- Keep machine clean and free of debris such as leaves, paper, cartons, etc.
- Keep labels legible.
- Clean with soapy water only.

When cleaning the machine:

- Do not clean the machine while it is running.
 - Never use gasoline or other types of fuels or flammable solvents to clean the machine. Fumes from fuels and solvents can become explosive.
-

**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).

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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.
- 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.
- Do not use the machine in areas with risk of explosion or fire.

Refueling safety

When refueling the engine:

- Clean up any spilled fuel immediately.
- Refill the fuel tank in a well-ventilated area.
- Reinstall the fuel tank cap after refueling.
- Use suitable tools for refueling (for example, a fuel hose or funnel).
- Do not smoke.
- Do not refuel a hot or running engine.
- Do not refuel the engine near sparks or open flames.

1.6 Hydraulic Oil Safety



WARNING

Possibility of severe injury. Hydraulic oil is under high pressure and becomes very hot during operation.

- ▶ To avoid injury, obey the safety instructions listed below.

Safety instructions

- Inspect the hydraulic system thoroughly before operating the machine.
- Do not touch hydraulic oil or hydraulic components while the machine is operating. Wait until the machine is cool.
- Before disconnecting hydraulic fittings or hoses, ensure that all pressure has been bled from the circuit. Set all controls in neutral, turn the engine off, and allow the fluids to cool before loosening hydraulic fittings or attaching test gauges.
- Hydraulic oil escaping under high pressure may penetrate the skin, causing burns, blindness, or other serious injuries or infections. Contact a physician immediately for treatment if your skin has been penetrated by hydraulic oil, even if the wound seems minor.
- Fluid leaks from small holes are often practically invisible. Do not use your bare hands to check for leaks. Check for leaks using a piece of cardboard or wood.
- Hydraulic oil is extremely flammable. Stop the engine immediately if a hydraulic leak is detected.
- After servicing the hydraulics, make sure all components are reconnected to the proper fittings. Failure to do so may result in damage to the machine and/or injury to a person on or near the machine.

1.7 Safety Guidelines for Lifting the Machine

When lifting the machine:

- Make sure slings, chains, hooks, ramps, jacks, forklifts, cranes, hoists, and any other type of lifting device used is attached securely and has enough weight-bearing capacity to lift or hold the machine safely. See the *Technical Data* chapter for machine weight.
- Remain aware of the location of other people when lifting the machine.
- Only use the lifting points and tie-downs described in the Operator's Manual.
- Make sure the transporting vehicle has sufficient load capacity and platform size to safely transport the machine.

To reduce the possibility of injury:

- Do not stand under the machine while it is being lifted or moved.
- Do not get onto the machine while it is being lifted or moved.

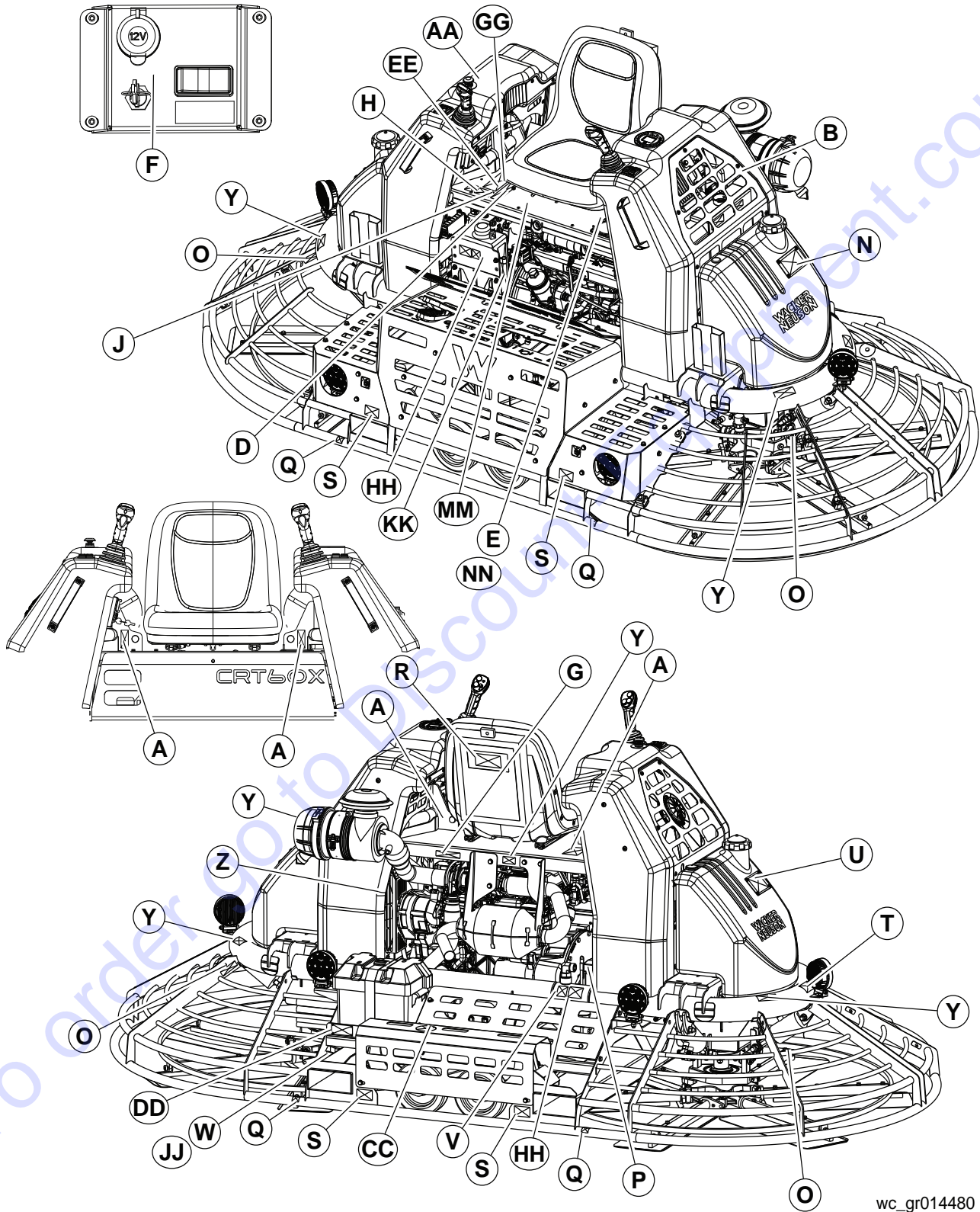
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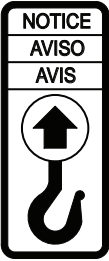







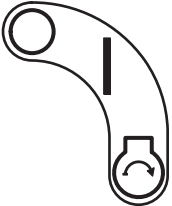
2 Labels


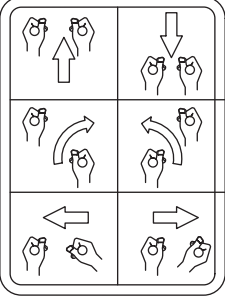
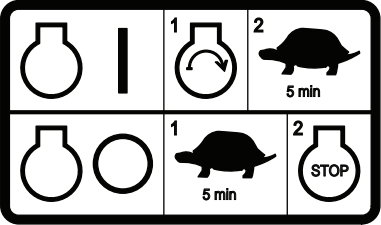

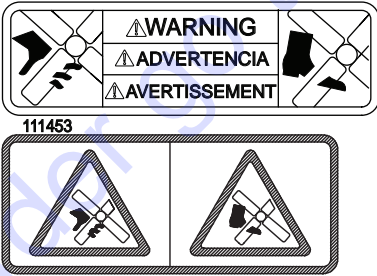
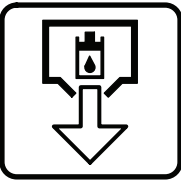
2.1 Label Locations

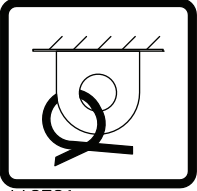
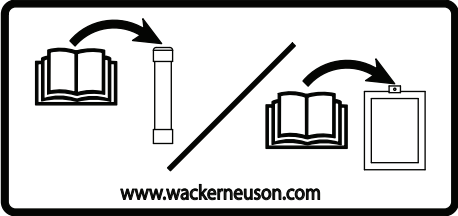
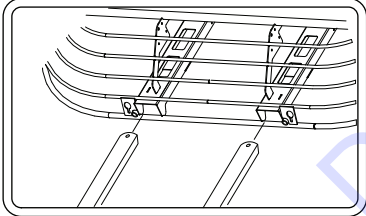




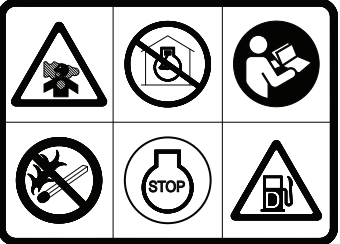

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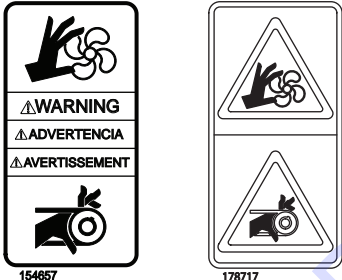
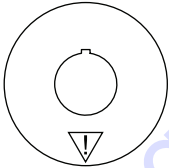

2.2 Label Meanings

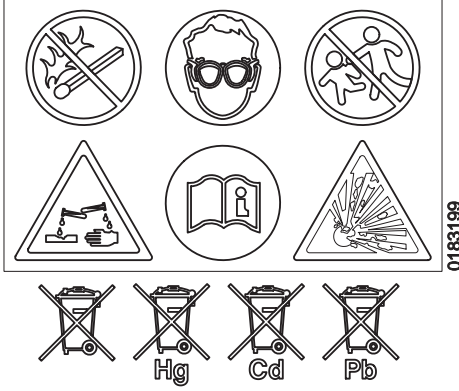
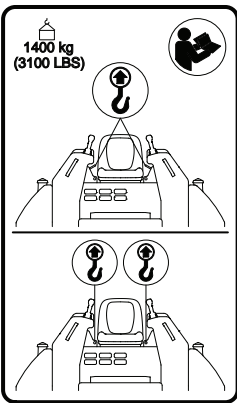


<p>A</p>	 <p>111418</p>  <p>178709</p>	<p>NOTICE Lifting point</p>
<p>B</p>	 <p>110164</p>  <p>178711</p>	<p>WARNING Pressurized contents. Do not open when hot!</p>
<p>D</p>	 <p>150349</p>  <p>178714</p>	<p>Read and understand the supplied Operator's Manual before operating this machine. Failure to do so increases the risk of injury to yourself or others.</p>
<p>E</p>	 <p>118085</p>  <p>178745</p>	<p>WARNING Always wear hearing and eye protection when operating this machine.</p>
<p>F</p>	 <p>118084</p>	<p>Positions of the key switch: OFF ON START</p>

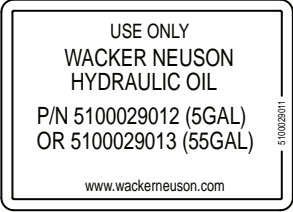

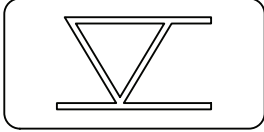
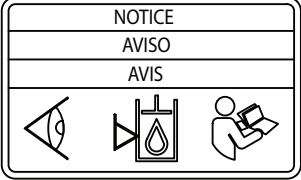

<p>G</p>		<p>WARNING Do not use starting agents.</p>
<p>H</p>		<p>Steering control. See <i>Steering</i>.</p>
<p>J</p>		<p>Starting and stopping procedures</p> <p>To start:</p> <ol style="list-style-type: none"> 1. Turn the key switch to the START position. 2. Release the key when the engine starts. 3. Allow engine to idle for 5 minutes. <p>To stop:</p> <ol style="list-style-type: none"> 1. Allow the engine to idle for 5 minutes. 2. Turn the key switch to the OFF position.
<p>N</p>		<p>Water tank fill. Use only clean water or water-based retardants.</p>
<p>O</p>		<p>WARNING Cutting hazard. Keep hands and feet away from blades. Always replace blade guard.</p>
<p>P</p>		<p>Hydraulic oil drain</p>

<p>Q</p>	 <p>113726</p>	<p>Tie-down point</p>
<p>R</p>	<div style="border: 1px solid black; padding: 5px;"> <p>OPERATOR'S MANUAL MUST BE STORED ON MACHINE. REPLACEMENT OPERATOR'S MANUAL CAN BE ORDERED THROUGH YOUR LOCAL WACKER DISTRIBUTOR.</p> <p>EL MANUAL DE OPERACION DEBE SER RETENIDO EN LA MAQUINA. CONTACTE A SU DISTRIBUIDOR WACKER MAS CERCANO PARA PEDIR UN EJEMPLAR ADICIONAL.</p> <p>LA NOTICE D'EMPLOI DOIT ETRE MUNIE SUR LA MACHINE. CONTACTER LE DISTRIBUTEUR WACKER LE PLUS PROCHE POUR COMMANDER UN EXEMPLAIRE SUPPLEMENTAIRE.</p> </div> <p>150350</p>  <p>www.wackerneuson.com</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>S</p>	 <p>151108</p>	<p>Fork pockets</p>
<p>T</p>	<div style="border: 1px solid black; padding: 5px;"> <p>ULTRA LOW SULFUR FUEL ONLY. NUR ULTRANIEDRIGEN SCHWEFELKRAFTSTOFF. SOLAMENTE COMBUSTIBLE DE ULTRABAJO CONTENIDO DE AZUFRE. SEULEMENT CARBURANT DE SOUFRE ULTRA BAS.</p> </div>  <p>180563</p>	<p>Low sulfur fuel or ultra low sulfur fuel only</p>

<p>U</p>	 <p>173440</p>  <p>178752</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>V</p>	 <p>111760</p>	<p>Hydraulic oil reservoir fill</p>
<p>W</p>	<p>U.S.PAT Nos: 5993109, 6155648, 6250844, 6322151, 6368016, 6422786, 6619754, D390765, D410313, D453344 OTHER U.S. AND FOREIGN PATENTS PENDING TROWEL/BUGGY 159115</p>	<p>This machine may be covered by one or more patents.</p>

<p>Y</p>		<p>WARNING Hot surface</p>
<p>Z</p>		<p>WARNING Hand entanglement hazard. Moving parts can crush and cut. Do not operate with guard removed.</p>
<p>AA</p>		<p>Emergency stop</p>
<p>CC</p>		<p>Not a step</p>

<p>DD</p>	 <p>0183199</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>EE</p>	 <p>5200016961</p>	<p>Read Operator's Manual for lifting instructions.</p> <p>Attach sling or chain in this location to triangulate for one hoist point.</p> <p>Attach sling or chain in this location for vertical lifting with two hoist points.</p>
<p>GG</p>	<div data-bbox="289 1150 548 1696"> <p>NOTICE</p> <p>COLD WEATHER STARTING BELOW 40° F (4° C) : RUN ENGINE AT FULL THROTTLE FOR AT LEAST 5 MINUTES BEFORE DEPRESSING FOOT PEDAL. COLD RUNNING COULD RESULT IN HYDRAULIC DAMAGE NOT COVERED BY WARRANTY.</p> <p>AVISO</p> <p>PARA EL ARRANQUE EN CLIMA FRÍO POR DEBAJO DE 40° F (4° C): PONGA EN MARCHA EL MOTOR A ACCELERACIÓN TOTAL AL MENOS DURANTE 5 MINUTOS ANTES DE OPRIMIR EL PEDAL. SI LA MÁQUINA FUNCIONA EN FRÍO PUEDE RESULTAR EN DAÑO AL SISTEMA HIDRÁULICO NO CUBIERTOS POR LA GARANTÍA.</p> <p>AVIS</p> <p>PAR TEMPS FROID SOUS 40°F (4°C): FAIRE FONCTIONNER LE MOTEUR À PLEIN GAZ PENDANT AU MOINS 5 MINUTES AVANT D'APPLUYER SUR LA PÉDALE. LE FONCTIONNEMENT À RÉGIME FROID PEUT CAUSER DES DOMMAGES HYDRAULIQUES NON COUVERTS PAR LA GARANTIE.</p>  <p>5100025382</p> </div> <div data-bbox="279 1743 824 1900">  <p>5100027078</p> </div>	<p>Cold weather starting:</p> <p>When the temperature is below 40°F (4°C), run the engine at full throttle for at least 5 minutes before depressing the foot pedal.</p> <p>Operating the machine in cold weather without proper warm up could result in hydraulic damage not covered by warranty.</p>

<p>HH</p>		<p>Use only Wacker Neuson hydraulic oil</p> <p>P/N 5100029012 (5 gallons) or 5100029013 (55 gallons)</p>
<p>JJ</p>		<p>Industry Canada ICES-002 Compliance Label: CAN ICES-2/NMB-2</p>
<p>KK</p>		<p>Hydraulic oil level</p>
<p>MM</p>		<p>NOTICE Check hydraulic oil. Read the Operator's Manual.</p>
<p>NN</p>		<p>California Proposition 65 Warning Cancer and Reproductive Harm - www.P65Warnings.ca.gov.</p>

3 Lifting and Transporting

3.1 Lifting the Machine

- Requirements**
- Lifting equipment (crane, hoist, or forklift truck) capable of supporting the machine's weight. See the *Technical Data* chapter.
 - Lifting devices (hooks, chains, and shackles) capable of supporting the machine's weight.
 - Engine stopped.
 - All access covers closed and secured.

**WARNING**

Crushing hazard. You may be crushed if the lifting devices fail.

- ▶ Never stand under, or get onto, the machine while it is being lifted or moved.

**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 points to lift the machine.

Procedure

Perform the procedure below to lift the machine.

1. Attach lifting devices as follows:
 - Use lifting locations **(c)** to triangulate to one lifting point.
 - Use lifting locations **(b)** for lifting with two lifting points.

OR

- Insert the forks of a forklift truck into the fork pockets **(a)**.

Note: *The machine is equipped with two fork pockets (a) on the front and back, and two lifting locations (b) and (c). The lifting locations are provided to accommodate different types of lifting devices.*

2. Lift the machine a small distance.

**WARNING**

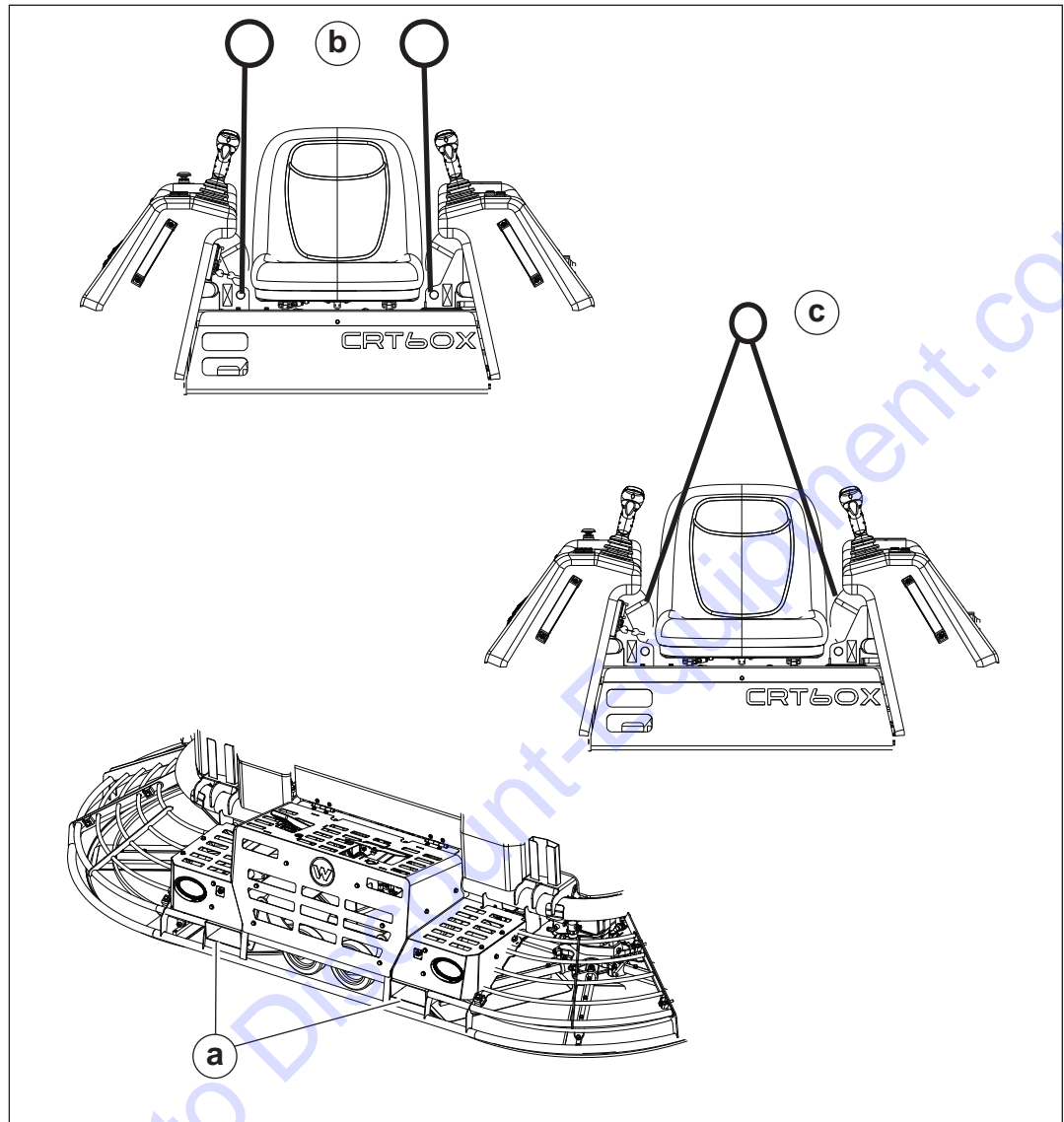
Crushing hazard. An unstable machine may cause the lifting device to fail. You may be crushed if the lifting device fails.

- ▶ Check for stability before continuing.

3. Check for stability. If necessary, lower the machine, reposition the lifting devices, and lift the machine a small distance again.

4. Continue lifting the machine only when it is stable.

NOTICE: To avoid machine damage, ensure that the lifting devices do not touch or interfere with the joysticks.

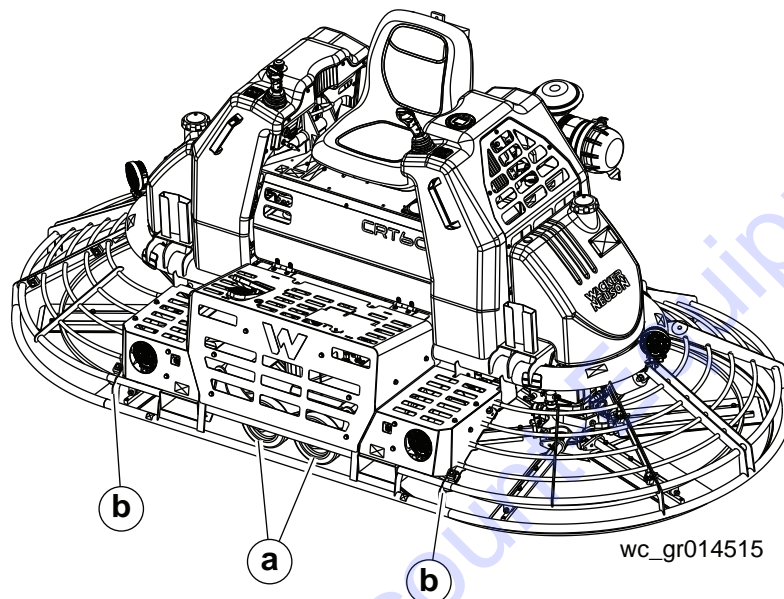


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3.2 Transporting the Machine

- Requirements**
- Transporting vehicle has enough weight-bearing capacity to transport the machine safely. See chapter *Technical Data*.
 - Transporting vehicle has appropriate tie-down connection points.
 - Appropriate chains and cables

- Procedure**
1. Ensure that the wheel kit **(a)** is stored in the raised position. See *Using the Wheel Kit*.



2. Connect the machine to the transporting vehicle using the tie-down points **(b)**.

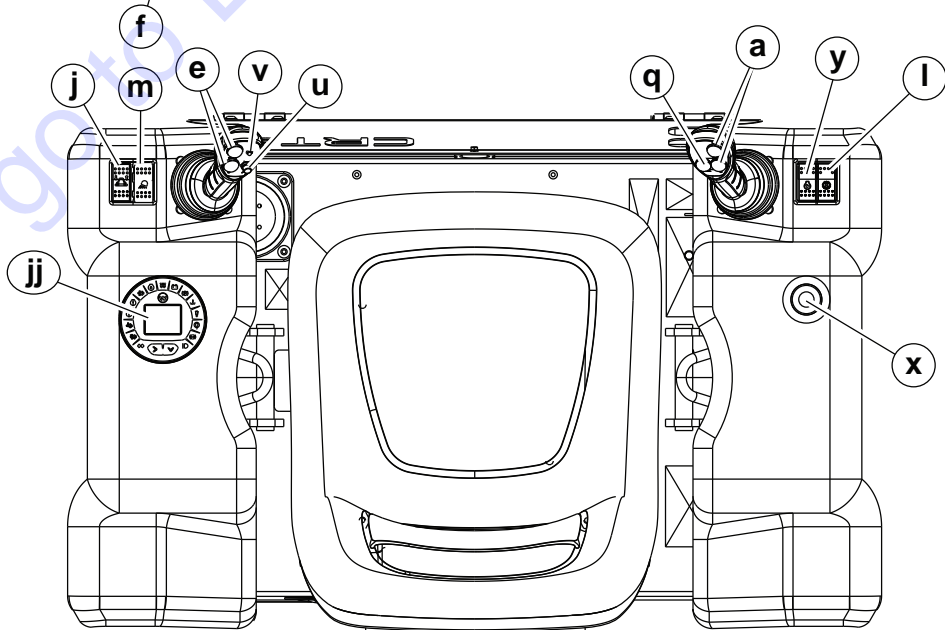
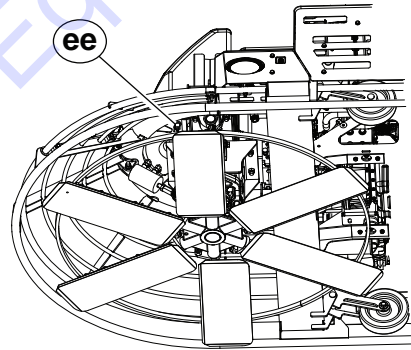
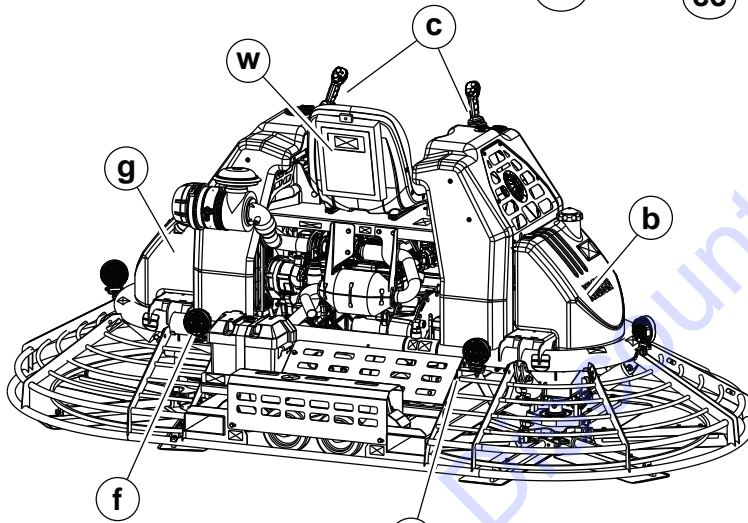
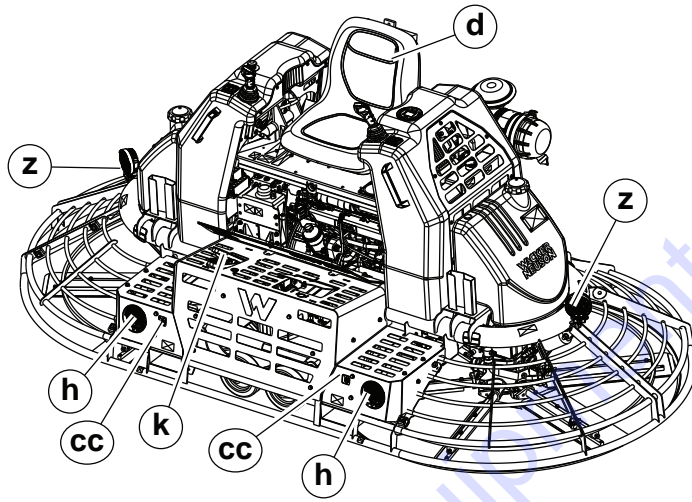
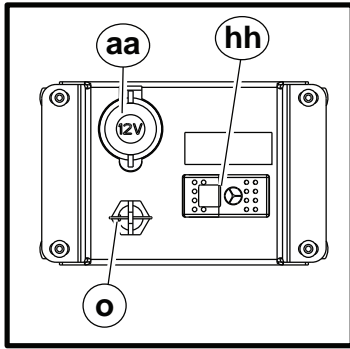
Notes

To order go to Discount-Equipment.com



4 Controls

4.1 Control and Component Locations



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4.2 Control and Component Descriptions

Ref.	Description	Function
a	Right pitch control	Sets the angle of the trowel blades
b	Fuel tank	Holds the diesel fuel
c	Joysticks	Controls the travel direction and rotation of the machine
d	Operator's seat with operator presence switch	Allows the engine to run (idle) with no operator in the seat, but no blade movement
e	Left pitch control	Sets the angle of the trowel blades
f	Rear work light (one each side)	Illuminates the rear work area
g	Water tank	Holds the water or water-based retardant for the retardant spray system
h	Front work light (one each side)	Illuminates the front work area
j	Wheel switch	Controls raising or lowering the wheels; lowering the wheels raises the machine/blades off the ground so the trowel can be moved to another location; raising the wheels allows the machine/blades to operate
k	Foot pedal (blade speed control)	Controls how fast the blades rotate
l	Cruise control switch	Once blade speed has been established, activates the cruise control to maintain blade speed without the operator's foot on the foot pedal
m	Work light switch	Turns ON and OFF the work lights
o	Engine key switch	Three-position switch used to start the engine; START, ON, and OFF
q	Water spray switch	Operates the Retardant Spray System
u	Steering mode switch	Selects the steering mode; either High Resolution or High Rate
v	LED—Steering mode indicator	When illuminated, indicates that steering mode is High Resolution
w	Manual holder	A box that contains the Operator's Manual
x	Emergency stop switch	When activated, stops the machine and all functions
y	Engine speed control switch	Selects engine speed; slow or fast
z	Side work light (one each side)	Illuminates the side work areas
aa	12V power outlet	Auxiliary power outlet
cc	Water spray nozzles	When the water spray switch is activated, water/retardant will spray from the water spray nozzles.
ee	Fuel valve	Normal position is OPEN—close the fuel valve in an emergency shutdown.
hh	Gyroscopic steering switch	Activates the steering assist system to help the operator maintain forward and reverse headings
jj	Instrument display	Informs the operator of the machine's operation, required maintenance, and possible malfunctions. See <i>Instrument Display</i> .

Operator presence system

The Ride-On Trowel features a seat with an integrated operator presence system which works in conjunction with the engine controller. This system allows the engine to remain running with no operator in the seat, but will not allow blade movement.

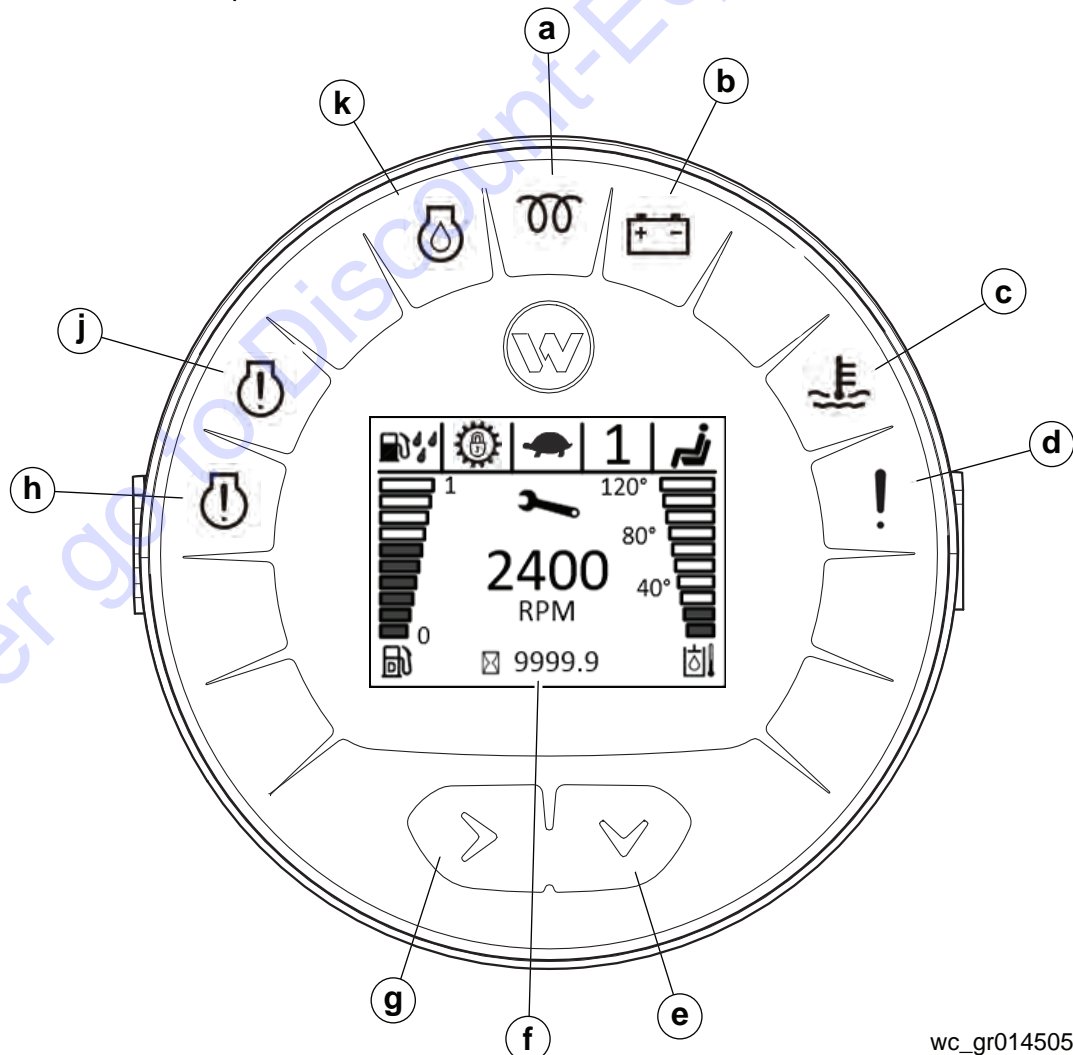
Learning to operate the trowel

To familiarize a new operator with the Ride-On Trowel, the following steps should be taken:

- With the operator in the seat, show him or her the functions of the joysticks (c) and how to start the machine.
- Have the operator practice steering the trowel. A hard concrete slab slightly wetted with water is an ideal surface on which to practice.
- Pitch the blades up approximately 6.35 mm (1/4 in.) on the leading edge. Start by making the machine hover in one spot, and then practice moving the machine in a straight line and making 180° turns.







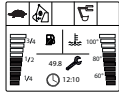



4.3 Instrument Display

The instrument display informs the operator of the operating states, required maintenance, or possible machine malfunctions.

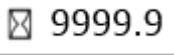

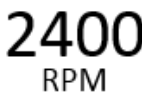




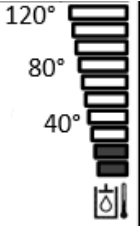








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Instrument display indicator lights

Ref.	Symbol	Color	Function
a		Yellow	Engine preheating
b		Red	Battery charge
c		Red	Engine coolant temperature
d		Red	General malfunction
e		—	Selector button (Instrument Display)
g		—	To next menu page or set (Instrument Display)
f		—	Instrument Display (See <i>Instrument Display Symbols and Functions</i>)
h		Red	Engine stop
j		Yellow	Engine warning
k		Red	Engine oil pressure

4.4 Instrument Display Symbols and Functions

Symbol	Function
	Engine hours
	Service indicator
	Engine speed
	Time

Symbol	Function
	Fuel level
	Hydraulic oil temperature
	Water in fuel system
	Cruise control
	Slow engine speed
	Fast engine speed
1	Steering mode
2	
	Operator not present
	Engine error
	Machine error
	Engine data

Symbol	Function
	Machine data
	Instrument display settings
 2750 RPM <small>n/min</small>	Detailed engine speed
 80 °F	Detailed engine coolant temperature
 13.35 VDC	Detailed electrical system voltage
	Setting of display brightness
	Setting of display contrast
	Setting of time and date
	Low fuel level
	Hydraulic oil warm-up
	Hydraulic oil filter needs to be replaced
	High hydraulic oil temperature warning
	Hydraulic system pressures

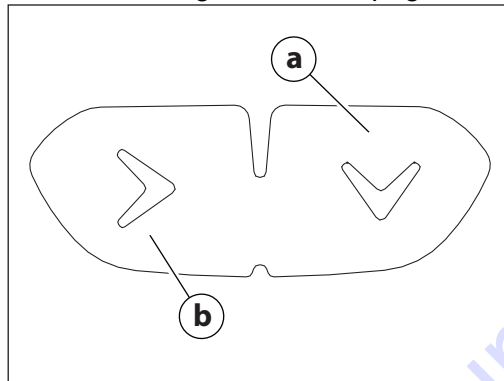
4.5 Instrument Display Menu Behavior

When a control is activated, the display will show the newly activated control symbol in the center of the instrument display for a few seconds and then return to the home display mode.

Note: Most, but not all, of the new commands will remain showing in one of the top five windows until it is changed.

4.6 Instrument Display Subpages

Navigate to each subpage using the selector button **(a)** and next menu button **(b)** on the instrument display. When selected, a subpage remains active for 5 seconds before returning to the main page.

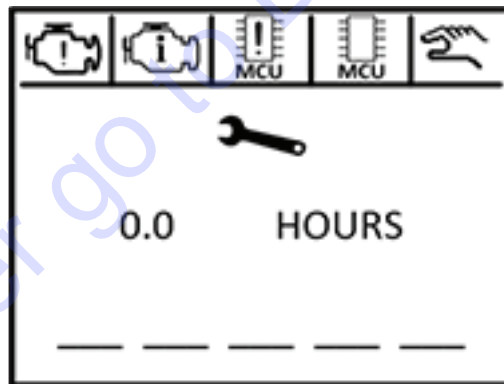


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Service hour reset

This page is only available when the service counter reaches 0.0 hours.

After counting down from 500 hours, the service icon flashes when the counter reaches 0.0 hours.









wc_gr014506

To reset the service counter, use the selector button **(a)** and the next menu button **(b)** at the bottom of the instrument display to enter the reset code—12345. If the code is entered correctly, the service counter will be reset to 500.0 hours.

Hydraulic system pressures







This window displays the charge oil pressure, auxiliary pressure, left pressure, and right pressure.

				
	CHARGE	XXXXX	PSI	
	AUX	XXXXX	PSI	
	LEFT	XXXXX	PSI	
	RIGHT	XXXXX	PSI	

wc_gr014655

Engine controller error codes










This window contains the error messages reported from the engine controller.

				
	SPN 123456			
	SPN 123456			
	SPN 123456			
	SPN 123456			
	SPN 123456			

wc_gr014656

Engine information

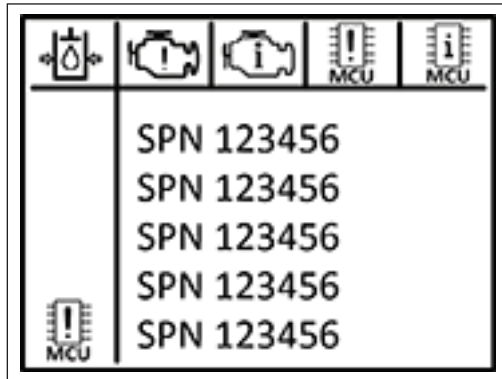
This window displays the engine speed, engine coolant temperature, and electrical system voltage.

				
		2750	RPM	
		80	°F	
		13.35	VDC	

wc_gr014657

Machine controller error codes

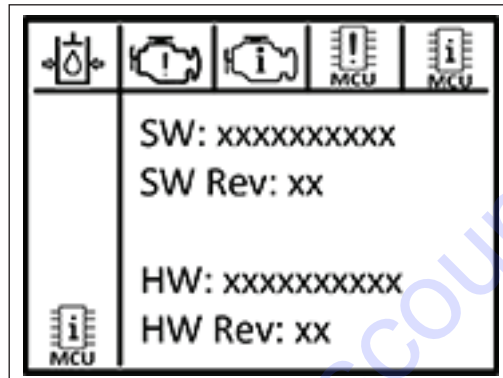
This window on the left contains the error codes reported from the machine controller.



wc_gr014658

Machine information

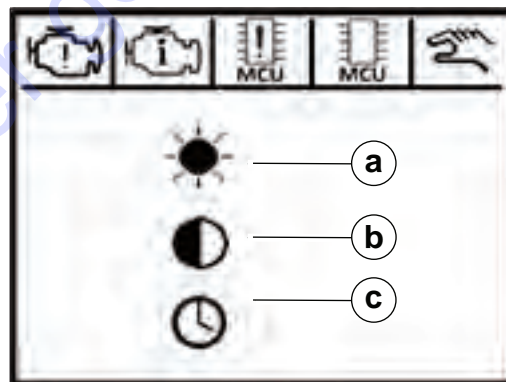
This window displays the software material number, software material number revision, hardware material number, and hardware material number revision..



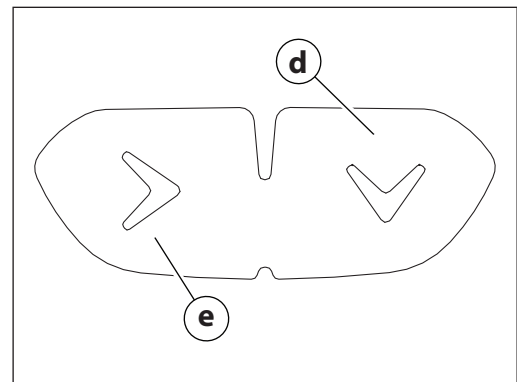
wc_gr014659

Instrument display settings

This screen allows the operator to adjust the brightness **(a)** and contrast **(b)** of the display screen. The time can be adjusted by selecting the time clock **(c)**. Use the selector button **(d)** and the next menu button **(e)** at the bottom of the instrument display to scroll through the screens to get the screen shown to set the time, and adjust contrast and brightness.



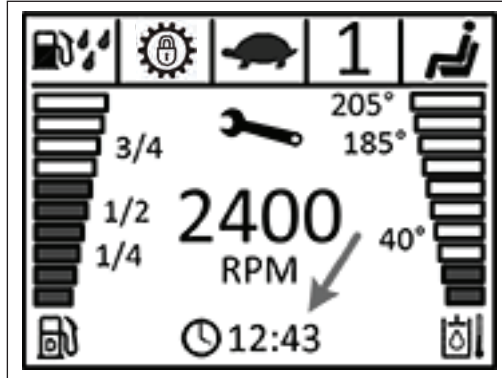
wc_gr014509



wc_gr014510a

4.7 Clock Display

The clock displays the current time in 12-hour format without AM or PM indication. When the clock is activated, it replaces the hour meter on the instrument display screen.



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5 Operation

5.1 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. Add fluids as needed and applicable, including fuel, engine oil, hydraulic oil, retardant, and battery acid.
5. Move the machine to its operating location.
6. Connect component parts not already attached.

5.2 Break-in Period

New engines and hydraulic components 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 and hydraulics in this machine have 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.
- Use only for medium-duty concrete load conditions. Postpone heavy-duty concrete loads until the break-in period has elapsed.

5.3 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

5.4 Recommended Fuel

The engine requires the same type of diesel fuel as used in cars (EN590 for E.U. - ASTM D975-09B regulation - S 15 for U.S). Use of other types of fuel could damage the engine. Biodiesel fuels containing 10% methyl ester or BIO are suitable for use, provided they meet the specifications listed in the engine manual. Use only fresh, clean, undiluted fuel. Fuel containing water or other contaminants will damage the fuel system. Consult the engine owner's manual for complete fuel specifications.

5.5 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.
 - ▶ Do not refuel if the machine is positioned in a truck fitted with a plastic bed liner. Static electricity can ignite the fuel or fuel vapors.
 - ▶ Refuel only when the machine is outdoors.
 - ▶ Clean up spilled fuel immediately.
-

1. Remove the fuel cap.
 2. Fill the fuel tank until it is full.
-



CAUTION

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

- ▶ Do not overfill the fuel tank.
-

3. Reinstall the fuel cap.

5.6 Inspecting the Hydraulic System

This machine features several components that are powered by hydraulic oil. These include the drive motors, wheel kit, and the pitch cylinders.

A diagram of the hydraulic system is provided in the *Schematics* chapter at the back of this Operator's Manual. The *Schematics* chapter also includes a chart of hydraulic pressure test locations and recommended operating pressures.

When Inspect the hydraulic system daily before starting the machine.

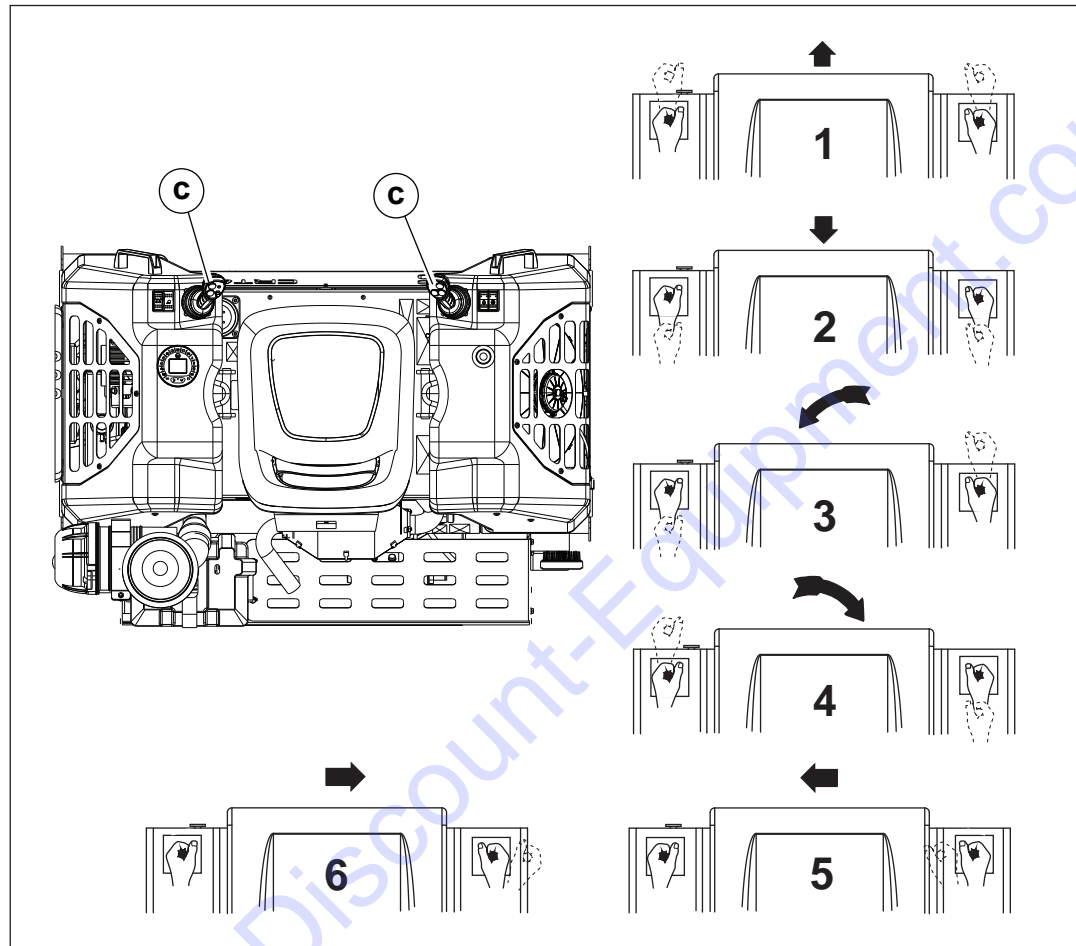
Checklist Below is a list of possible conditions that may be observed when inspecting the hydraulic system.

NOTICE: If any of the following conditions exist, take the machine out of service immediately and arrange for repairs.

- Dirty hydraulic oil, incorrect hydraulic oil, or lack of hydraulic oil
- Cloudy hydraulic oil in the overflow bottle (signifies water or air contamination)
- Damaged or leaking fittings
- Worn, cut, or torn hose casings
- Swollen hose casings
- Crushed or pinched hose
- Metal shavings visible in the filter

5.7 Steering

The joysticks (c) control the travel direction and rotation of the machine.



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Joystick motions

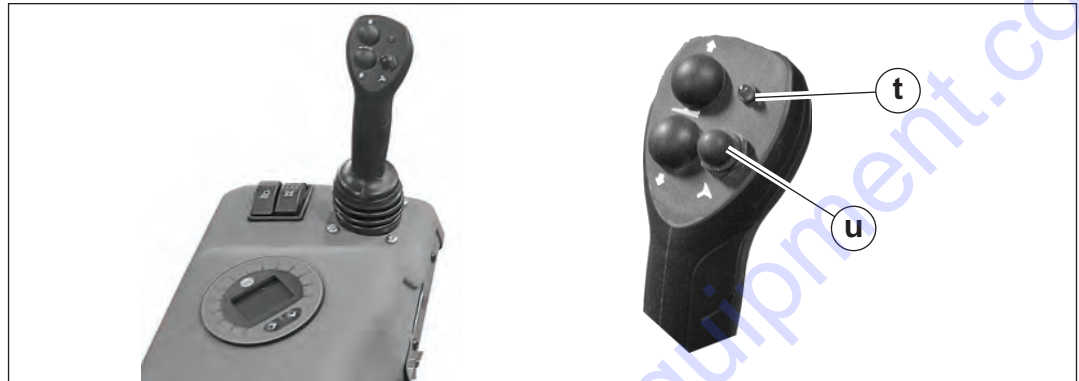
Refer to the illustration for the necessary joystick motions to move the trowel in the desired direction.

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

Note: *The left joystick moves in only two directions: forward and backward. When the trowel is operated sideways (5 and 6), the right joystick controls the machine's movement while the left joystick remains stationary.*

5.8 Changing the Steering Mode

The steering mode button **(u)** allows the operator to change the response of the joysticks depending upon the intended machine movement or concrete surface condition. Press the steering mode button to change between the two response modes. The instrument display screen shows either a **1** for high resolution mode or a **2** for high rate mode.



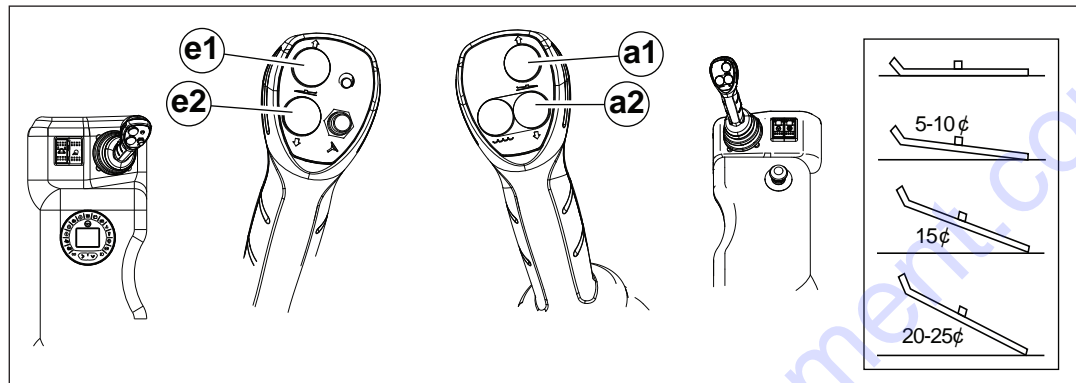
wc_gr014516

Modes

Mode	Machine response	Recommended use
High Resolution 1	This is the standard response mode. In this mode, larger movements of the joysticks are required to control machine motion. The LED (t) illuminates when in this mode.	Intended for use when edging, finishing around poles, or operating on extremely sticky surfaces.
High Rate 2	This is the increased response mode. In this mode, smaller movements of the joysticks are required to control machine movement.	Intended for use when panning, traveling at high speeds, or when minimum directional control is required while covering large areas.

5.9 Adjusting the Pitch

Changing the pitch (angle) of the trowel blades enables the operator to finish concrete from the wet surface stage through the hard finishing stage (burnishing).



Procedure

Perform the procedure below to change or set the pitch angle of the trowel blades.

1. Slow the machine.
2. Set the desired pitch on the left side of the machine.
 - To increase the pitch, press the left front button **(e1)** on the left joystick.
 - To decrease the pitch, press the left rear button **(e2)** on the left joystick.
3. Adjust the right side to match, using buttons **(a1, a2)** on the right joystick.

Suggested working pitch

Working conditions of concrete	Suggested working pitch
1. Wet surface working stage	Flat (no pitch)
2. Wet to plastic working stage	Slight pitch (5–10°)
3. Semi-hard working stage	Additional pitch (15°)
4. Hard finishing stage (burnishing)	Maximum pitch (20–25°)

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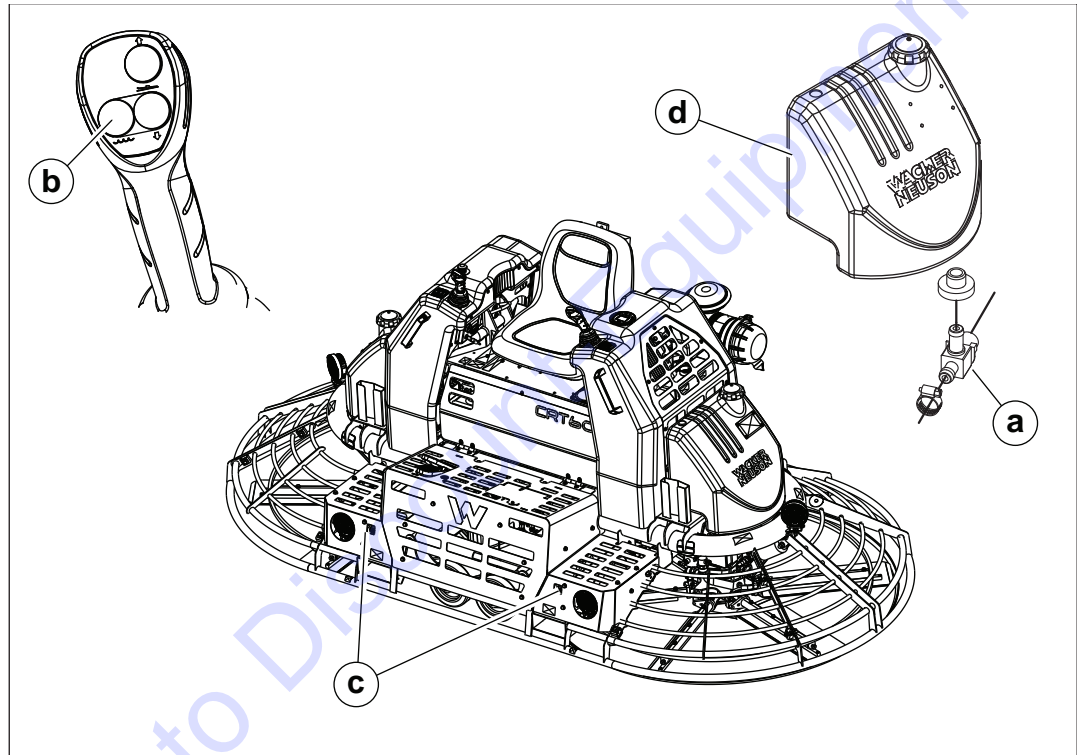
5.10 Using the Retardant Spray System

The retardant spray system is controlled by a switch located on the right joystick.

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

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

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



wc_gr014518

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

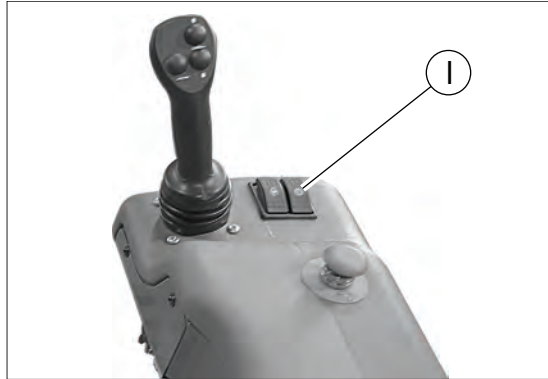
NOTICE: Drain the retardant spray system if the machine will be subject to temperatures below freezing. Frozen water or frozen retardant may damage the retardant spray system.

5.11 Operating the Cruise Control

The machine is equipped with an automatic blade speed control (“cruise control”) system. When activated, the cruise control maintains rotor speed while allowing the operator to remove his/her foot from the foot pedal.



The cruise control system is activated by the switch **(I)** next to the right joystick. The cruise control symbol appears in the center of the display when the cruise control is active.



wc_gr008144



CAUTION

Possible loss of machine control. The cruise control maintains rotor speed only and does not steer the machine.

- ▶ Keep both hands on the joysticks even when the cruise control is active.

Activating the cruise control

Perform the procedure below to activate the cruise control.

1. While the machine is operating, press the foot pedal until the desired blade speed is reached.
2. Press the front of the cruise control switch to set the blade speed.
3. Release the foot pedal and use the joysticks to steer the machine as usual.

Deactivating the cruise control

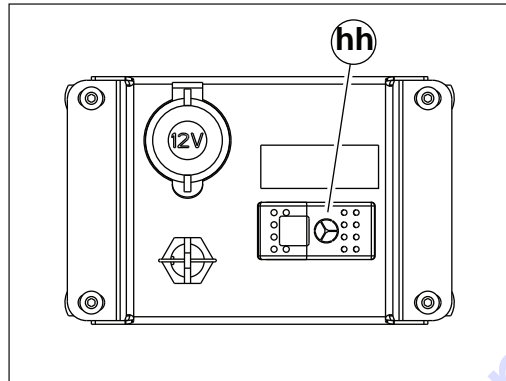
To deactivate the cruise control, perform one of the following actions:

- Press the cruise control switch.
- Press the foot pedal.

5.12 Operating the Gyroscopic Steering Assist

The machine is equipped with a gyroscopic steering assist system. When activated, the steering assist helps the operator maintain forward and reverse headings by reducing nuisance machine rotation due to variations in the concrete surface. The effect of the steering assist will benefit the operator with smoother steering and fewer corrections when both joysticks are being used to direct machine movement forward or rearward. The steering assist system does not apply to side to side motion of the machine, nor is it an auto-pilot system.

The gyroscopic steering assist is activated by the switch **(hh)** next to the key switch. An indicator lamp in the switch illuminates when the steering assist is active.



wc_gr014527



CAUTION

Possible loss of machine control. The steering assist aids in maintaining a straight heading only and does not steer the machine.

- ▶ Keep both hands on the joysticks even when the steering assist is active.
- ▶ The steering assist system does not lock the control joysticks into position.

Activating the steering assist

Perform the procedure below to activate the steering assist.

1. Press the front of the steering assist switch to activate.
2. Press the joysticks forward until the desired forward travel speed is reached. Steering assist will aid in maintaining a straight path. Centering of the control joysticks towards the neutral position will slow the travel of the machine.
3. Use the joysticks to steer the machine as usual.

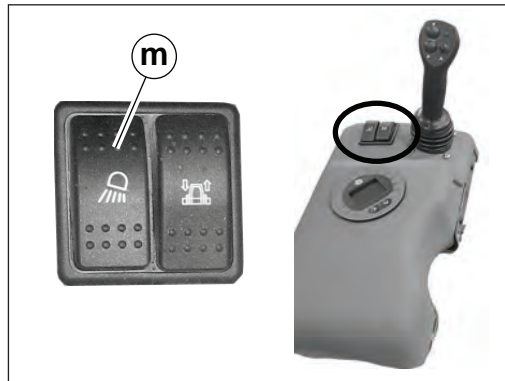
Deactivating the steering assist

To deactivate the steering assist, press the rear side of the steering assist switch.

Note: *Steering assist is intended to reduce operator fatigue by reducing input corrections on large, unobstructed flatwork slab projects. The steering system should be deactivated during finishing operations on elevated slabs, and when close maneuvering around pop-ups or other objects on the slab is necessary.*

5.13 Using the Work Lights

The machine is equipped with three pairs of work lights. The work lights are controlled by a rocker switch **(m)** next to the left joystick.



wc_gr014511

- To turn on the lights, press the front of each rocker switch.
- To turn off the lights, press the rear of each rocker switch.

5.14 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
- Hydraulic oil level—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

5.15 Starting and Stopping the Machine

- Requirements**
- Machine is in serviceable condition and has been properly maintained
 - There is fuel in the tank

**DANGER**

Asphyxiation hazard. Engine exhaust contains carbon monoxide which CAN KILL YOU IN MINUTES. This is a poison that you cannot see or smell.

- ▶ Do not start the engine in enclosed spaces.

**WARNING**

Explosion hazard.

- ▶ Do not use evaporative starting fluids such as ether on this engine.

Starting the machine

Perform the procedure below to start the engine.



1. Sit in the operator's seat.
2. Turn the key to the ON position. The engine preheat symbol on the instrument display illuminates, and the engine proceeds through a preheat cycle.
3. Once the engine preheat light turns off, turn the key to the START position. When the engine starts, release the key. *See Warm-up time* on the next page.

NOTICE: Do not crank the engine for more than 15 seconds. If the engine does not start, allow at least one minute between cranking attempts.

4. Set the engine speed to FAST.
5. Press the foot pedal to control the blade speed.

This procedure continues on the next page.

Continued from the previous page.

Warm-up time Before operating the machine, allow it to warm up per the charts below.

Proper warm-up of the machine can be done in two different ways. The rotors do not turn until the oil is warmed up to the proper hydraulic oil temperature. Two charts are provided for the operator to choose between a low idle warm up or a high idle warm up.

Hydraulic system warm-up times at SLOW engine speed	
Outdoor temperature °F (°C)	Warm up time minutes
40 or warmer (4.4)	5
35 (1.7)	5
30 (-1.1)	10
25 (-3.9)	15
20 (-6.7)	20
15 (-9.4)	25
10 or colder (-12.2)	Set the engine speed to FAST and refer to the table below

Hydraulic system warm-up times at FAST engine speed	
Outdoor temperature °F (°C)	Warm up time minutes
40 or warmer (4.4)	5
35 (1.7)	5
30 (-1.1)	5
25 (-3.9)	5
20 (-6.7)	5
15 (-9.4)	5
10 (-12.2)	10
5 (-15.0)	10
0 or colder (-17.8)	15

Notes

- See the *Controls* chapter for information on hydraulic warning symbols and lights.
- The hydraulic cooling fan is temperature controlled and only runs when the hydraulic oil is warm.
- If the high hydraulic oil temperature indicator illuminates while the machine is hot, see *Troubleshooting*.

NOTICE: Continuing to operate the machine with the high hydraulic oil temperature indicator illuminated can cause extensive machine damage. Stop the machine immediately and investigate the cause.

This procedure continues on the next page.

Continued from the previous page.

Stopping the Engine

Perform the procedure below to stop the trowel.

1. Release pressure on the foot pedal.
 2. Return joysticks to their neutral positions.
 3. Set engine speed to low idle.
 4. Allow engine to idle for at least 5 minutes
 5. Turn the key to the OFF position.
-

NOTICE

- Do not turn off the engine when the engine is running at FAST speed.
- Overheating and turbocharger damage may occur if the engine is stopped before the cool-down idling time period.

5.16 Operating Guidelines

Follow the guidelines below to use your Ride-On Trowel to its fullest capacity.

- Steer the machine in the direction that the operator is facing. This method allows the operator to 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.
 - Or, move the machine laterally (sideways) and then travel backward to the other end of the slab.
-

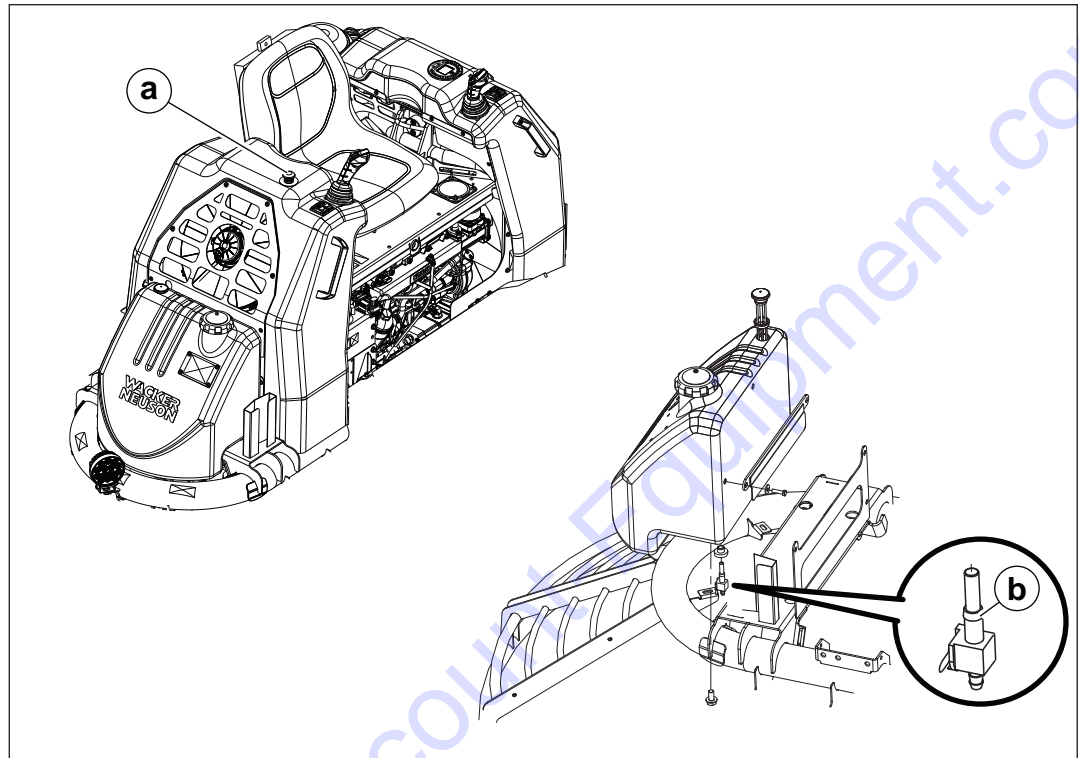
NOTICE

- Only experienced concrete finishers should operate the trowel.
- Do not use excessive pressure on the joysticks. 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.

5.17 Emergency Shutdown Procedure

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

1. Press the emergency stop switch **(a)**.



wc_gr014519

2. Close the fuel valve **(b)**.
3. Remove the machine from the job site.
Note: *The wheel kit cannot be used to raise/lower the machine when the engine is stopped.*
4. Clean concrete from the blades and the machine.
5. Contact Discount-equipment for further instructions.

5.18 Using the Wheel Kit

The machine is equipped with two sets of hydraulically positioned wheels. Lowering the wheels raises the machine and blades off the ground so that the trowel can be rolled to a new location. Raising the wheels positions the wheels off the work surface so that the machine and blades may operate.

NOTICE

- Do not operate the rotors when the wheels are lowered (machine and blades raised). Damage to the drive motors will occur.
- Do not use the wheel kit when the machine is on partially cured concrete. Damage to the work surface may occur.

Requirements

- Bystanders are out of the way
- Machine is on a level surface

Procedure

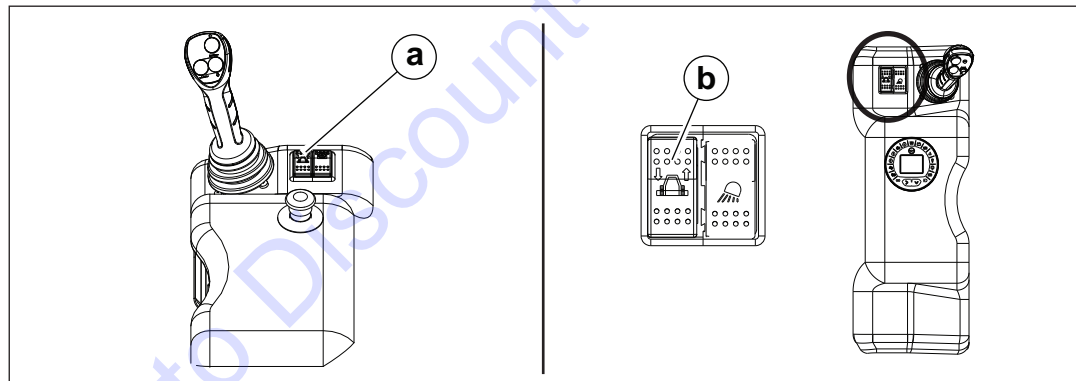
Perform the procedure below to use the wheel kit.



CAUTION

Possibility of unexpected machine movement.

- ▶ Use the wheel kit only when the machine is on a level surface.



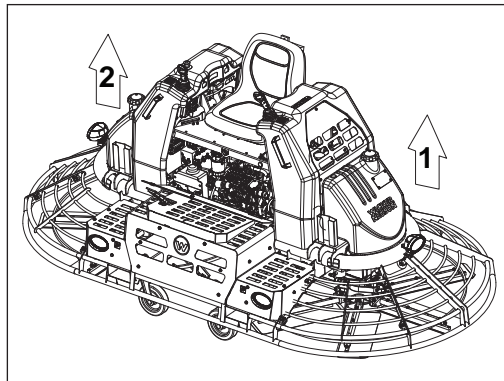
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6. Start the engine.
7. When the machine is warmed up, set the engine speed to FAST by pressing the “rabbit” symbol on the engine speed switch **(a)**.
8. To lower the wheels, press and hold the front of the wheel switch **(b)** until the wheels are fully extended.

This procedure continues on the next page.

Continued from the previous page.

Note: It is normal for one side of the machine to rise before the other.



wc_gr012736

9. To raise the wheels, press and hold the rear of the wheel switch **(b)** until the wheels are fully retracted.



WARNING

Personal injury hazard.

- ▶ Do not tow the machine using the wheel kit.

6 Maintenance

6.1 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 50 hours	Every 100 hours	Every 250 hours	Every 500 hours	Every 1000 hours
Grease trowel arms.	✓					
Check hydraulic oil level.	✓					
Inspect air filter.	✓					
Check external hardware.	✓					
Pressure wash all surfaces until free of concrete.	✓					
Check for leaks around hydraulic hoses and connections.	✓					
Lubricate wheel kit hydraulic cylinder.		✓				
Check wiring and electrical connections.		✓				
Grease steering pivots.		■				
Drain water from fuel/water separator.			✓			
Check for leaks around radiator hoses and hose clamps.				✓		
Check condition of intake air line.				✓		
Clean air cleaner element. ¹				■		
Remove sediment in fuel tank.					■	
Clean radiator filler cap.					■	
Replace hydraulic oil filter. ^{2, 3, 4}				■	■	
Replace hydraulic oil. ^{3, 4}				■	■	
Replace fuel line hose.						■
Replace air cleaner element. ¹	Every year					■
Change radiator coolant.	Every 2 years					■

¹ Service more often in dusty conditions.

² Perform initially after first 50 hours of operation. Hydraulic oil filter is included with machine.

³ In hot climates exceeding 32°C (90°F), replace fluid and filter every 250 hours.

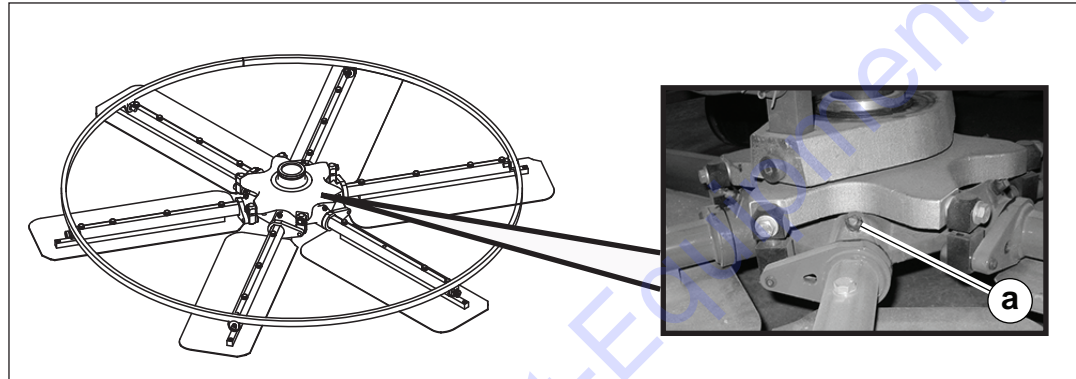
⁴ In climates below 32°C (90°F), replace fluid and filter every 500 hours.

6.2 Lubricating the Trowel Arms

- Requirements**
- Machine stopped
 - Grease (Unirex N2 or equivalent)

Procedure Perform the procedure below to grease the trowel arms.

1. Set the trowel on a flat, level surface.
2. Disconnect the battery.
3. Apply grease to each zerk **(a)** on the spider assembly.



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4. Connect the battery.

6.3 Adjusting the Blade Arms for Smooth Operation

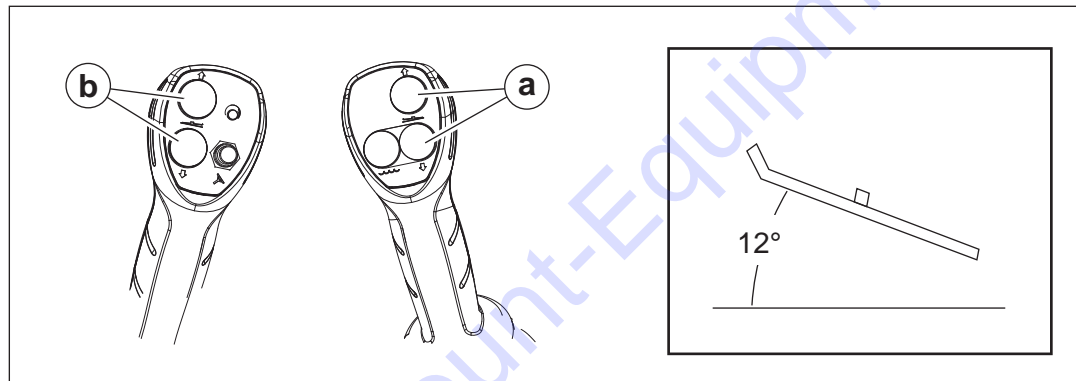
When Adjust the blade arms if the machine is wobbling during operation, after replacing an arm, or after disassembling the spider assembly.

Requirements

- Measuring device
- Lifting devices with enough weight-bearing capacity to lift the machine (optional)

Procedure Perform the procedure below to adjust the blade arms.

1. Using an appropriate hoist or crane, or the wheel kit, raise the machine off the ground so that the blades (at full pitch) will not touch the ground.
2. Start the engine. Using the pitch buttons **(a or b)** on the joystick, adjust the blades so that they are between 1/2 and full pitch (approximately 12°).



3. Stop the engine, remove the key, and disconnect the battery.



WARNING

Cutting and pinch hazard.

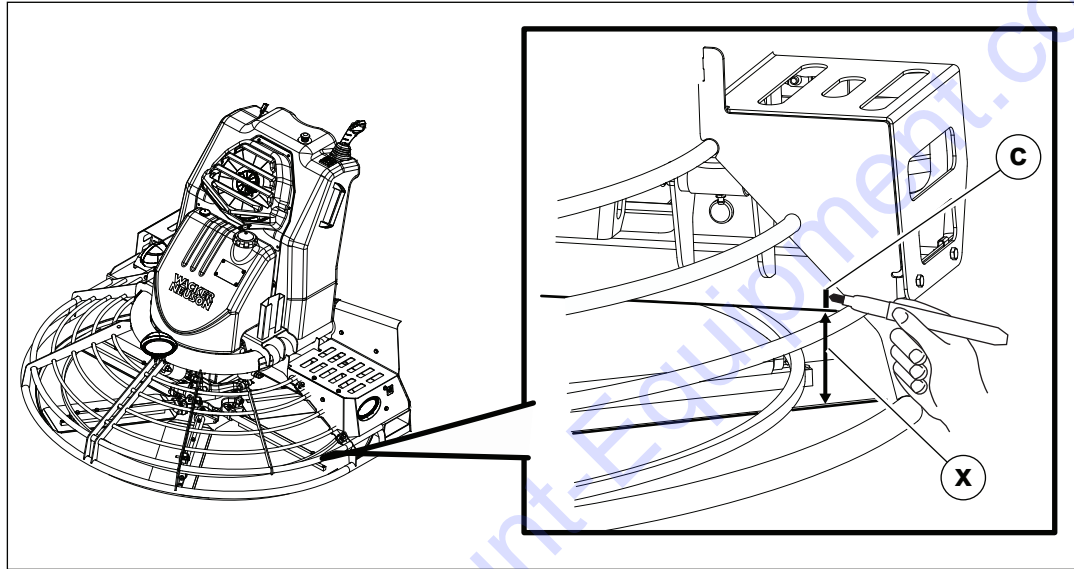
- ▶ Disconnect the battery before measuring the blades.
- ▶ Wear hand protection when handling the blades.

This procedure continues on the next page.

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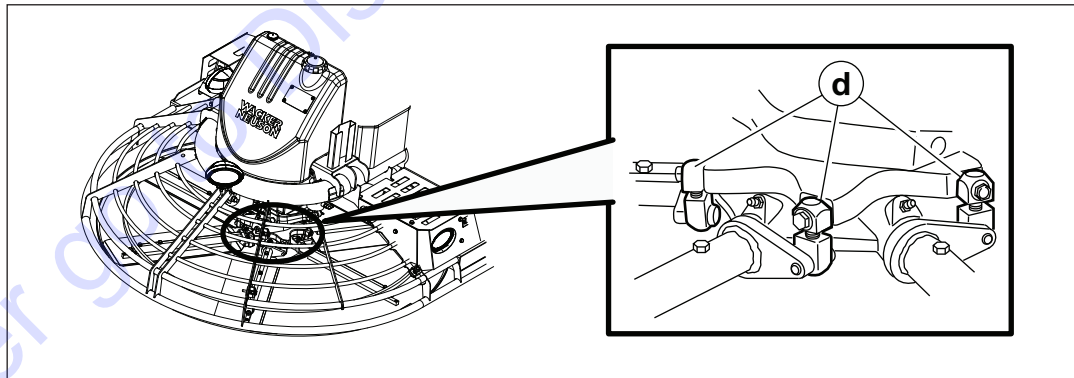
- There is a small amount of play in the connection between the blade arm and the spider (lift plate). Gently wiggle each blade so that the lower end of the blade is at the lowest point of the play. Mark **(c)** the fork pocket at the location where you will measure. Then, measure the distance **(x)** from the bottom of the fork pocket to the bottom edge of the blade. Measure the distance **(x)** for each blade.

Note: You can rotate the blades by hand, however, only in one direction.



wc_gr012738

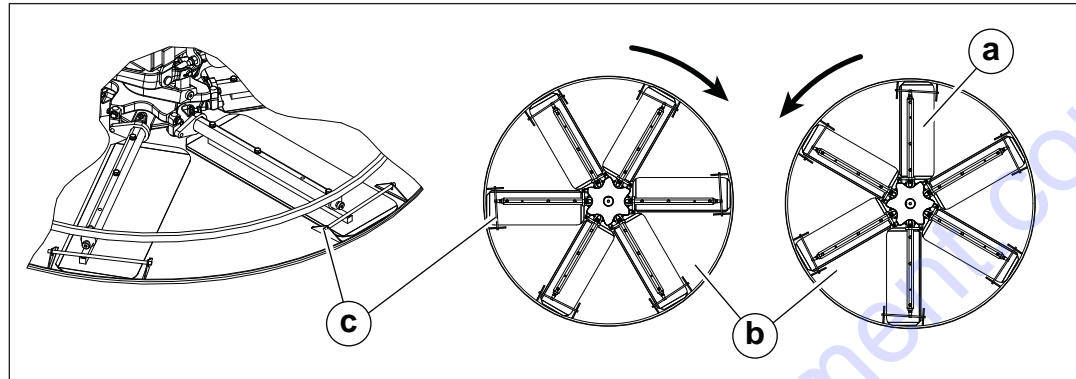
- Determine the average distance "x". Adjust any blade that does not measure the distance "x" ± 1.25 mm (0.050 in.). To adjust a blade, loosen or tighten the pitch links **(d)** as necessary.



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6.4 Mounting Float Pans

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



wc_gr008925

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, aligning each blade with a pocket on the pan.
- Note:** *Right-hand trowel blades turn counter-clockwise; left-hand trowel blades turn clockwise.*
5. Engage safety latch pins **(c)** over the blades to secure the pans to the trowel.
 6. Lower the trowel.



WARNING

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

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

6.5 Installing or Changing the Blades

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

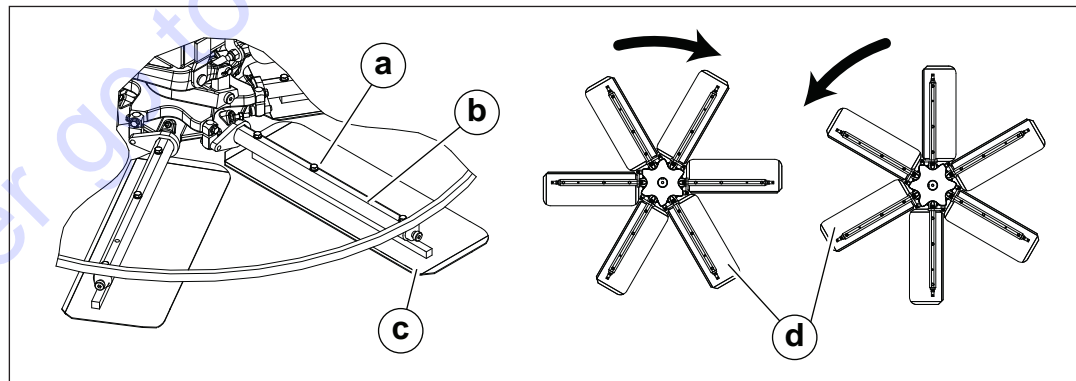
Cutting hazard. Trowel blade edges are extremely sharp, especially if worn.

- ▶ 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.



wc_gr008926

This procedure continues on the next page.

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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.

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6.6 Servicing the Air Cleaner

The air cleaner assembly **(a)** consists of a filter element **(b)** housed inside the air cleaner body. Snap clamps fasten the cover **(d)** to the body. An ejection valve **(e)** removes large particulates and moisture.

When

- Check the condition of the air filter element every day before operating the machine.
- Clean the air filter element every 250 hours or when error code *SPN 107* appears on the instrument display. Replace the element every year if it becomes damaged or heavily soiled.

Note: Possible errors are displayed in the instrument display for a few seconds when the machine is started. For more information about the instrument display pages see the Controls chapter.

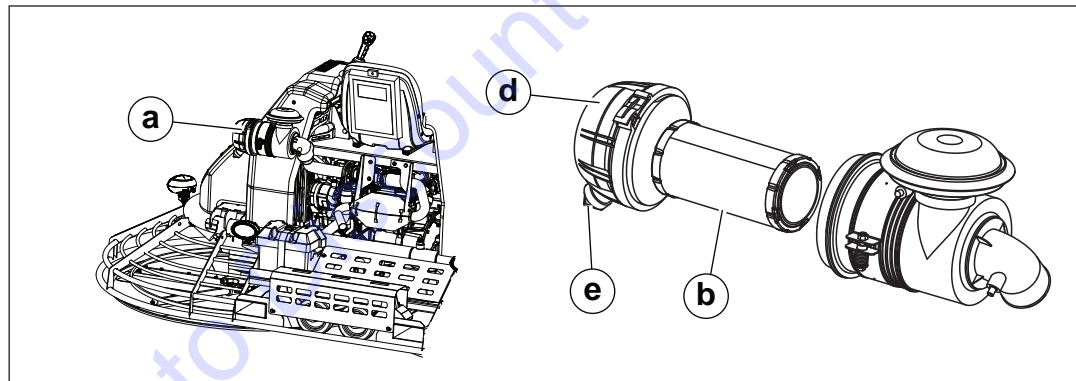
Requirements

- Machine shut down
- New air filter element (if required)

NOTICE: Do not use the air filter as a starting aid (e.g., ether) intake.

Procedure

Perform the procedure below to clean the air cleaner.



wc_gr012740

1. Lift the latch and turn to remove the cover **(d)**.
2. Remove the filter element **(b)** from the air cleaner body.
3. Clean the filter element by repeatedly tapping the front of the filter several times against a flat surface.

NOTICE: Do not use compressed air to clean the element.

This procedure continues on the next page.

Continued from the previous page.

**WARNING**

Fire or explosion hazards.

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

4. Wipe the inside of the air cleaner body with a clean, dry cloth.

5. Reinstall the filter element inside the air cleaner body.

NOTICE: Never run the engine without the air cleaner. Severe engine damage will occur.

6. Replace the cover by twisting to lock in place. Position it so that the dust ejector points down.

6.7 Hydraulic Oil Requirements

Wacker Neuson requires the use of a premium grade, synthetic-based hydraulic oil. It is designed to outperform conventional oils by flowing better at low temperatures while resisting viscosity loss at higher temperatures.

When selecting hydraulic oil for your machine, be sure to specify anti-wear properties. Wacker Neuson offers a premium grade blue hydraulic oil for use in this machine.

NOTICE: Avoid mixing different brands of hydraulic oil.

Oil viscosity

Most hydraulic oils are available in different viscosities. The SAE number for an oil is used strictly to identify viscosity. It does not indicate the type of oil (engine, hydraulic, gear, etc.). The higher the SAE number, the thicker the oil.

When selecting a hydraulic oil be sure it matches the specified SAE viscosity rating and is intended to be used as a hydraulic oil. See *Trowel* in the *Technical Data* chapter.

6.8 Hydraulic System Cleanliness

Keeping the hydraulic oil clean is a vital factor affecting the service life of hydraulic components. Oil in hydraulic systems is used not only to transfer power, but also to lubricate the hydraulic components used in the system. Keeping the hydraulic system clean will help avoid costly downtime and repairs.

Sources of contamination

Major sources of hydraulic system contamination include:

- Particles of dirt introduced when the hydraulic system is opened for maintenance or repair
- Contaminants generated by the mechanical components of the system during operation
- Improper storage and handling of hydraulic oil
- Use of the wrong type of hydraulic oil
- Leakage in lines and fittings

Keeping the system clean

Perform the tasks below to minimize hydraulic oil contamination.

- Clean hydraulic connections before opening the lines. When adding oil, clean the hydraulic tank filler cap and surrounding area before removing it.
- Avoid opening the pumps, motors, or hose connections unless absolutely necessary.
- Plug or cap all open hydraulic connections while servicing the system.
- Clean and cover the containers, funnels, and spouts used to store and transfer the hydraulic oil.
- Change the hydraulic filters and oils at the recommended service intervals.
- Flush the strainer in the rear of the machine after hydraulic component failure. A screen is located inside the collector with case drain lines attached. The screen catches larger debris generated in the event of a failed component and keeps the reservoir and other hydraulic components from being affected.

6.9 Maintaining the Hydraulic Oil

When

- Check the hydraulic oil level daily, adding fresh oil if necessary.
- Replace the hydraulic oil and hydraulic oil filter every 250 hours if the machine is being operated in hot climates (in temperatures above 32°C (90°F)).
- Replace the hydraulic oil and hydraulic oil filter every 500 hours

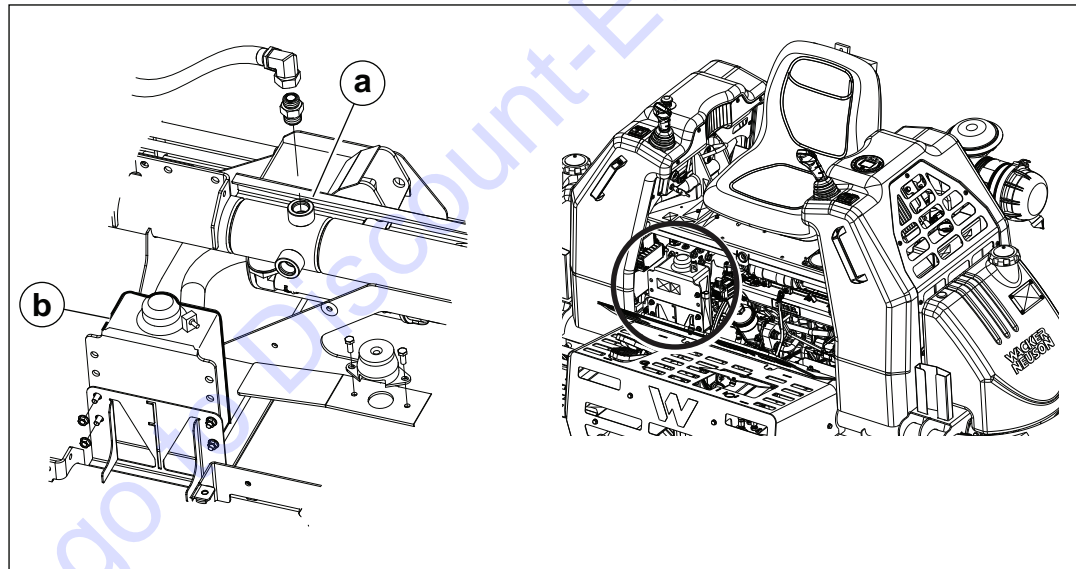
Requirements

- Machine shut down
- Fresh hydraulic oil, as needed. (See *Hydraulic Oil Requirements* in this chapter, or *Trowel* in the *Technical Data* chapter.)
- Replacement hydraulic oil filter. See *Changing the Hydraulic Oil Filter*.
- Plastic cloth and a container of sufficient volume to collect drained oil

Note: Collect, store and dispose of drained oil in accordance with current environmental protection regulations.

Checking the hydraulic oil level

The hydraulic oil fill port (a) is located at the rear of the machine. Use this fill port when refilling a high volume of hydraulic oil. Low volumes of hydraulic oil can be added to the overflow bottle (b).

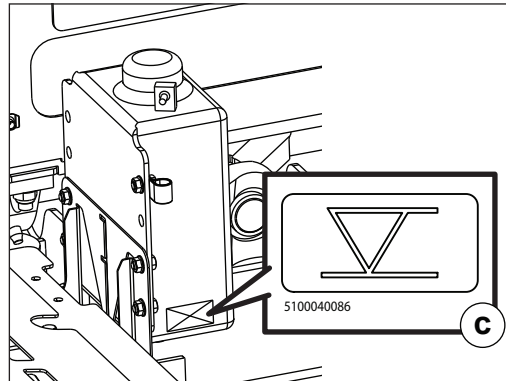


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- The hydraulic oil should fill the overflow bottle to the level indicator **(c)** on the side of the bottle when the machine is at room temperature.
- Over-filling the bottle could cause spilling as the hydraulic oil warms and expands.



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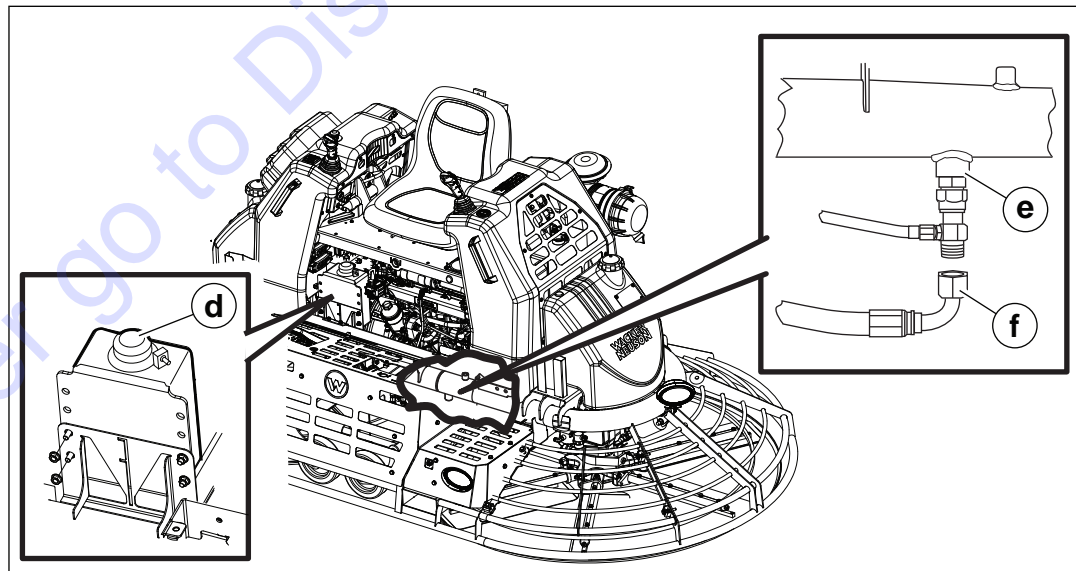
Add fresh hydraulic oil if necessary.

Note: An empty overflow bottle may indicate the main reservoir is not filled.

Draining used hydraulic oil

Perform the procedure below to drain the hydraulic oil.

1. Park the machine on a flat, level surface. Use the wheel kit to raise the machine off the level surface.
2. Stop the engine.
3. Remove the cap **(d)** from the overflow bottle.



wc_gr012372

4. The hydraulic oil drain port **(e)** is located at the front of the machine beneath the foot area. Place a suitable container beneath the drain port.
 5. Disconnect the hydraulic hose **(f)** and drain the hydraulic oil into the container.
- This procedure continues on the next page.*

Continued from the previous page.



WARNING

Most used hydraulic 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.

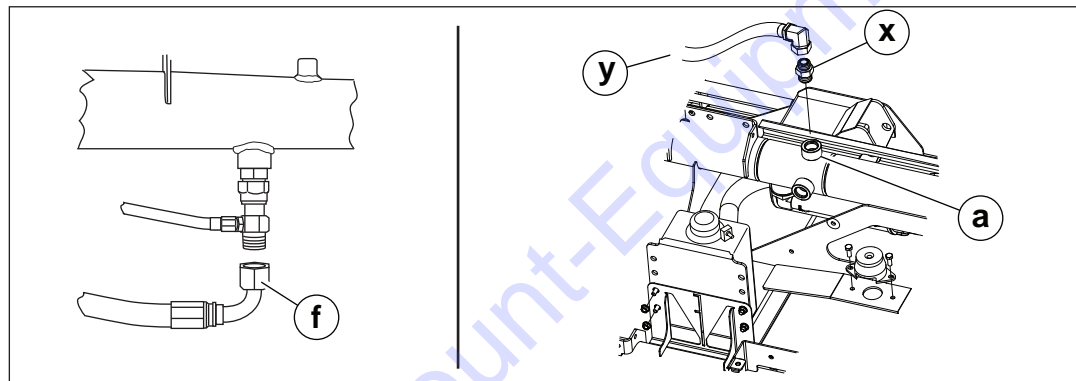
- ▶ Take steps to avoid inhaling or ingesting used hydraulic oil.
- ▶ Wash skin thoroughly after exposure to used hydraulic oil.

6. Remove the container.

Adding hydraulic oil

After the used hydraulic oil has been drained, refill the system. To do so:

1. Reconnect the hydraulic hose (f).



wc_gr012742

2. Remove the hydraulic hose (y).
3. Remove the fitting (x).
4. Add fresh hydraulic oil to the machine through the fill port (a). See *Technical Data* for quantity and type.
5. Reconnect the fitting (x) and the hydraulic hose (y) to the fill port.
6. Fill the overflow bottle to the level indicator on the side of the bottle.

Distributing the hydraulic oil

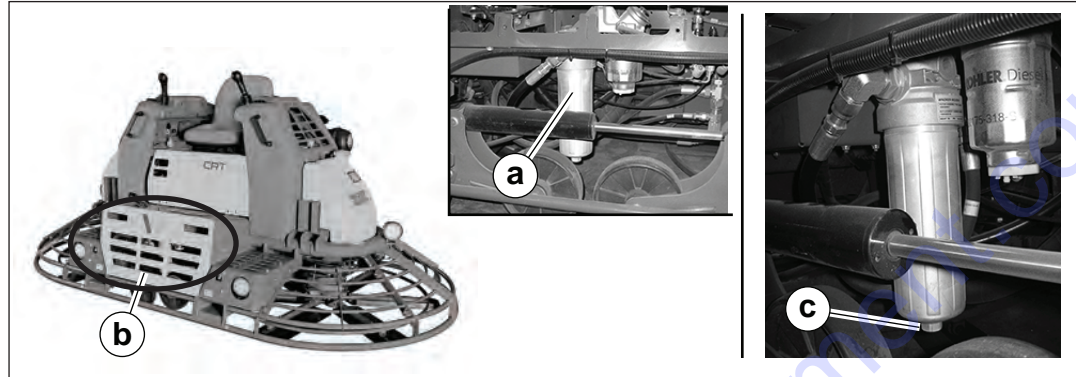
1. Start the engine and allow it to warm up for a few minutes.

NOTICE: Do not operate the rotors for more than five minutes or at high speeds when there is no resistance to blade rotation. Doing so may damage the motors.

2. Operate the rotors at a slow rate of speed for approximately five minutes.
3. Raise the wheels to lower the trowel.
4. Operate the trowel—using all hydraulic functions—for 5–10 minutes. Add hydraulic oil if necessary.
5. Stop the engine. Allow the machine to cool.
6. Check the hydraulic oil level in the overflow bottle. Add oil as needed.

6.10 Changing the Hydraulic Oil Filter

The machine has a hydraulic oil filter to collect particulates from oil. The filter **(a)** is located behind the access panel **(b)** at the front of the machine.



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NOTICE: Replace the hydraulic filter regularly to avoid damaging the hydraulic system.

When

- Replace the hydraulic oil filter after the first 50 hours, and with every hydraulic oil change.
- In hot climates exceeding 32°C (90°F), replace the hydraulic oil and hydraulic oil filter every 250 hours.
- In climates below 32°C (90°F), replace the hydraulic oil and hydraulic oil filter every 500 hours.

Requirements

- Machine shut down
- New hydraulic oil filter
- Plastic cloth and a container of sufficient volume to collect drained oil
- Wrench

Procedure

Perform the procedure below to replace the hydraulic oil filter.

1. Place a collection container below the filter.
2. Remove the access panel.
3. Using a wrench, twist the hex stud **(c)** counterclockwise to unscrew the filter canister. Remove the old filter.

Note: Discard the old filter in accordance with current environmental protection regulations.



WARNING

Most used hydraulic 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 hydraulic oil.
- ▶ Wash skin thoroughly after exposure to used hydraulic oil.

This procedure continues on the next page.

Continued from the previous page.

4. Insert the new hydraulic oil filter into the filter canister.
5. Twist the canister clockwise onto the housing, and tighten the hex stud using the wrench.
6. Install the access panel.

6.11 Maintaining the Fuel/Water Separator

The fuel/water separator removes water from the fuel supply. As fuel flows through the separator element, removed water collects in the bowl.

Required maintenance includes draining the bowl as needed. If the water in fuel indicator light illuminates, the separator should be drained as soon as possible.

When

- Drain the fuel/water separator when the bowl is full of water.

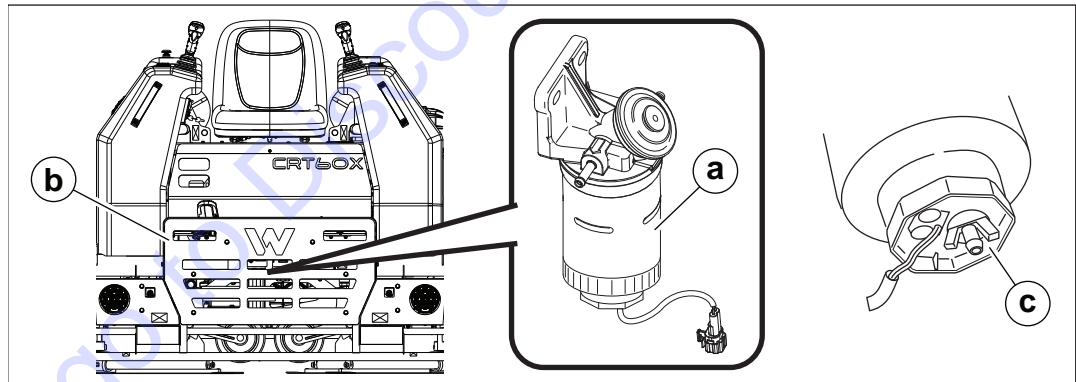
Requirements

- Machine shut down
- Plastic cloth and a container of sufficient volume to collect drained water

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

Location

The fuel/water separator (**a**) is located beneath the operator's foot platform.



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To access the fuel/water separator, remove the access panel (**b**).

Procedure

Perform the procedure below to drain the bowl.

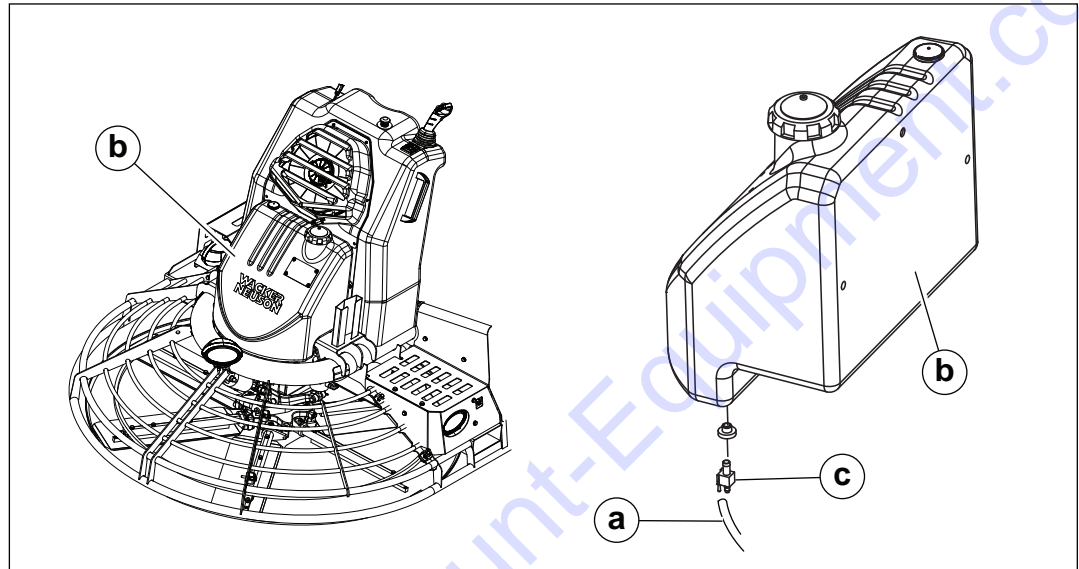
1. Place a collection container beneath the bowl.
2. Loosen the wing nut (**c**) without removing it.
3. Drain any water present.
4. Tighten the wing nut as soon as fuel begins to flow.

6.12 Removing Sediment from the Fuel Tank

- Requirements**
- Machine shut down
 - Suitable container

Procedure Prepare the procedure below to drain sediment from the fuel tank.

1. Locate the fuel line (a) on the fuel tank (b).



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2. Place a suitable container under the area of the fuel valve (c).
 3. Disconnect the fuel line to expose the fuel valve.
 4. Open the fuel valve and allow sediment to drain into a suitable container.
- Note:** Collect, store and dispose of all used fluids in accordance with current environmental protection regulations.
5. Close the fuel valve.
 6. Connect the fuel line.

6.13 Cleaning the Radiator Filler Cap

When Every 500 hours of service or yearly

Requirements

- Machine shut down
- Engine cool

Procedure Perform the procedure below to clean the radiator filler cap.

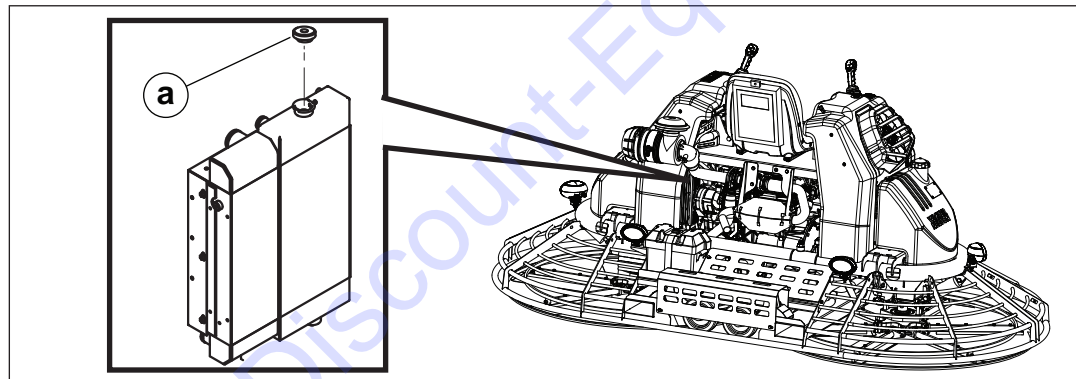


WARNING

Burn hazard. At operating temperature, engine coolant is hot and under pressure. It can cause severe personal injury.

- ▶ Remove the radiator filler cap only after the engine has been shut down and is cool.
-

1. Open the engine compartment.
2. Slowly remove the radiator filler cap **(a)** to relieve pressure.



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CAUTION

Burn hazard. Coolant can contain alkali.

- ▶ Avoid coolant contact with skin and eyes.
-

3. Clean the radiator filler cap with a clean cloth.
4. Inspect the radiator filler cap for damage. Replace the cap if it is damaged.
5. Reinstall the radiator filler cap.

6.14 Flushing the Radiator

- Requirements**
- Machine shut down and on a level surface
 - Engine cool
 - Suitable container
 - Antifreeze (50% antifreeze and 50% decalcified water)

Draining Follow the procedure below to drain the cooling system coolant.

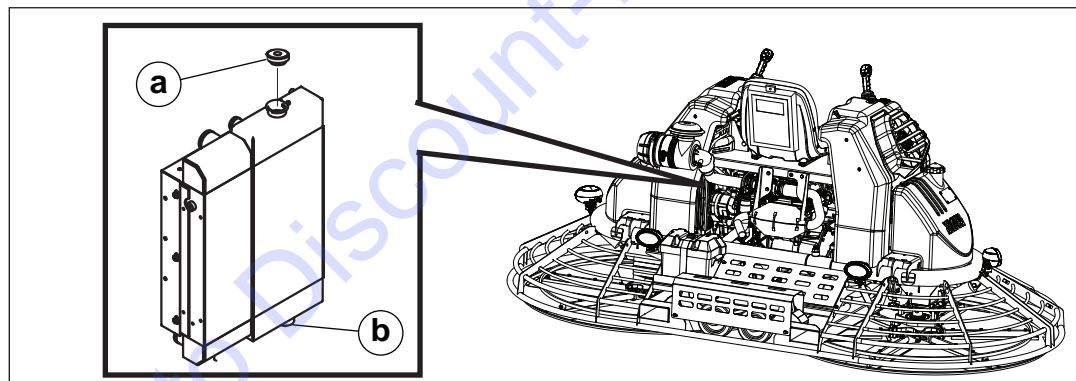


WARNING

Burn hazard. At operating temperature, engine coolant is hot and under pressure. It can cause severe personal injury.

- ▶ Check the coolant level only after the engine has been shut down and is cool.

1. Locate the radiator.
2. Remove the five screws holding the access panel and then remove the access panel.
3. Open the radiator filler cap **(a)** slowly in order to relieve the pressure. Remove the filler cap after the pressure has been released.



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4. Place a suitable container underneath the machine.
5. Open the drain valve **(b)** on the bottom of the radiator and allow the coolant to drain through the attached hose into a suitable container.

Cleaning Follow the procedure below to clean the cooling system.

1. Close the radiator drain valve.
2. Fill the coolant system with clean decalcified water and 6–10% coolant system cleaner.
3. Install the radiator filler cap.
4. Start the engine. Run the engine for 90 minutes.
5. Stop the engine. Allow the cooling system to completely cool.

This procedure continues on the next page.

Continued from the previous page.

6. Open the radiator filler cap.
7. Place a suitable container underneath the machine.
8. Open the drain valve **(b)** on the bottom of the radiator and allow the cleaner to drain into a suitable container.

Note: *Collect, store and dispose of all used coolant in accordance with current environmental protection regulations.*

9. Flush the cooling system with water until the draining water is transparent.
-

Filling

Follow the procedure below to fill the cooling system.

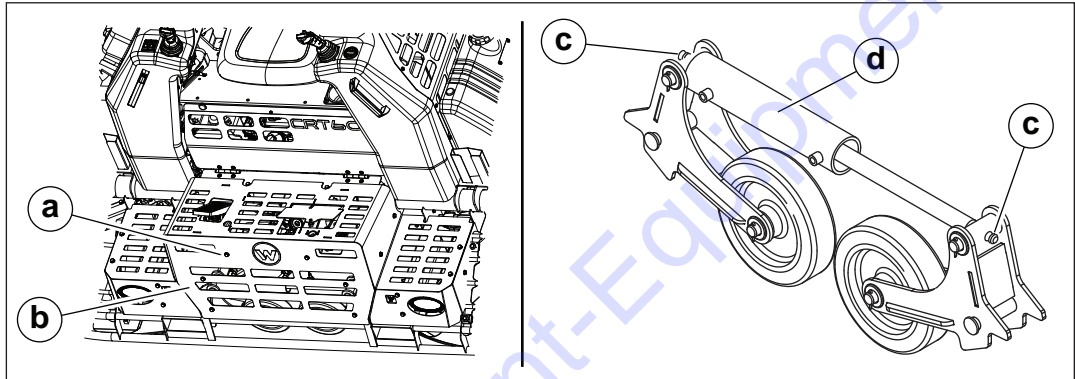
1. Close the radiator drain valve.
2. Add the recommended amount of coolant to the radiator.
3. Start the engine.
4. Leave the radiator fill cap off until the thermostat opens and the coolant level is stabilizes.
5. Maintain the coolant level to 2.54 cm (1 in.) below the shoulder of the fill pipe.
6. Inspect the radiator filler cap and filler cap seal for damage. Clean the radiator filler cap or replace it if necessary. See *Cleaning the Radiator Filler Cap*.
7. Reinstall the radiator filler cap.

6.15 Lubricating the Wheel Kit Cylinder Pivots

- Requirements**
- Machine stopped
 - Grease (Unirex N2 or equivalent)

Procedure Perform the procedure below to grease the front wheel kit cylinder pivots.

1. Set the trowel on a flat, level surface.
2. For access, raise the wheel kit.
3. Disconnect the battery.
4. Remove the six screws **(a)** holding the access panel **(b)**.

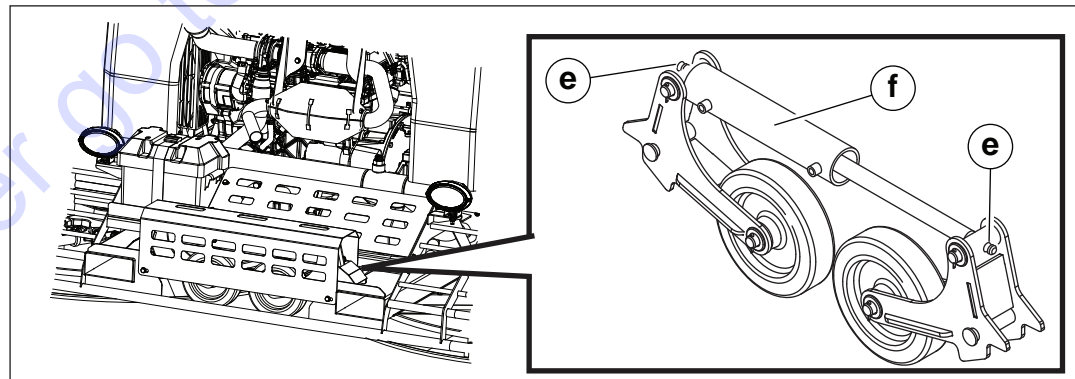


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5. Lift off the access panel.
6. Apply grease to each zerk **(c)** on the front wheel kit cylinders **(d)**.
7. Install the access panel with six screws.

Perform the procedure below to grease the rear wheel kit cylinder pivots.

1. Locate each zerk **(e)** on the rear wheel kit cylinders **(f)**.



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2. Apply grease to each zerk on the rear wheel kit cylinders.
3. Connect the battery.

6.16 Cleaning the Machine

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.

When Clean the machine after each use.

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, wheels, 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:

- Oil cooler, fan, and connecting hoses
- Fuel cooler, fan, and connecting hoses
- Operator's station including the seat, joysticks, control switches, key switch, indicator lights, and throttle control
- Foot pedal
- Hydraulic manifold
- Fuse boxes
- Electronic controller
- Electrical connectors

6.17 Long-Term Storage

Extended storage of equipment requires preventive maintenance. Performing these steps helps to preserve machine components and ensures the machine will be ready for future use. While not all of these steps necessarily apply to this machine, the basic procedures remain the same.

When Prepare your machine for extended storage if it will not be operated for 30 days or more.

Preparing for storage Perform the procedures below to prepare your machine for storage.

- Complete any needed repairs.
- Replenish or change oils (engine, exciter, hydraulic, and gearcase) per the intervals specified in the Scheduled Maintenance table.
- Grease all fittings and, if applicable, repack bearings.
- Inspect engine coolant. Replace coolant if it appears cloudy, is more than two seasons old, or does not meet the average lowest temperature for your area.
- If your machine has an engine equipped with a fuel valve, start the engine, close the fuel valve, and run the engine until it stops.
- Consult the engine owner's manual for instructions on preparing the engine for storage.

Stabilizing the fuel After completing the procedures listed above, fill the fuel tank completely and add a high-quality stabilizer to the fuel.

- Choose a stabilizer that includes cleaning agents and additives designed to coat/protect the cylinder walls.
- Make sure the stabilizer you use is compatible with the fuel in your area, fuel type, grade, and temperature range. Do not add extra alcohol to fuels which already contain it (for example, E10).
- For engines with diesel fuel, use a stabilizer with a biocide to restrict or prevent bacteria and fungus growth.
- Add the correct amount of stabilizer per the manufacturer's recommendations.

Storing the machine Perform these remaining steps to store your machine.

- Wash the machine and allow it to dry.
- Move the machine to a clean, dry, secure storage location. Block or chock the wheels to prevent machine movement.
- Use touch-up paint as needed to protect exposed metal against rust.
- If the machine has a battery, either remove or disconnect it.

NOTICE: Allowing the battery to freeze or completely discharge is likely to cause permanent damage. Periodically charge the battery while the machine is not in use. In cold climates, store and charge the battery indoors or in a warm location.

- Cover the machine. Tires and other exposed rubber items should be protected from the weather. Either cover them or use a protectant.

6.18 Machine Disposal/Decommissioning

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, grease, and hydraulic oil
- Batteries
- Electronic components, such as circuit boards, control panels, LEDs, and joysticks

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 oil.
 - 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 oil in accordance with local environmental protection regulations.

6.19 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.



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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.

Engine Maintenance: Kohler (T4f)

7 Engine Maintenance: Kohler (T4f)

The information in this chapter comes from copyrighted Kohler material.

The viscosity of the engine oil is an important factor when determining the correct engine oil to use in your machine. Use an engine oil of appropriate viscosity based on the expected outside air temperature. See the table below.



WARNING

Most used liquids from this machine such as oil, gasoline, grease, etc., contain 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 liquids.
- ▶ Wash skin thoroughly after exposure to used liquids.

1.4 Oil



Important

- The engine may be damaged if operated with improper oil level.
- Do not exceed the MAX level because a sudden increase in engine rpm could be caused by its combustion.
- Use only the recommended oil to ensure adequate protection, efficiency and service life of the engine.
- The use of lubricants other than recommended may shorten the engine life.
- Viscosity must be appropriate to the ambient temperature to which the engine is to be exposed (**Par. 1.4.1**).

1.4.1 SAE oil classification

- In the SAE classification, oils are identified according to viscosity without considering any other qualitative characteristic.



Danger

- Prolonged skin contact with the exhausted engine oil can cause cancer of the skin.
- If contact with oil cannot be avoided, thoroughly wash your hands with soap and water as soon as possible.
- For the exhausted oil disposal, refer to [Par. 5.6 DISPOSAL and SCRAPPING](#).
- The code is-made up of two numbers. The first number refers to the viscosity when cold, for use during winter ("W"= winter), while the second number is for viscosity at high temperatures.

Tab. 1.2

RECOMMENDED OIL			
VISCOSITY	SAE	5W-30 / 10W-40	LOW S.A.P.S.
WITH SPECIFICATIONS	API	CJ4	
	ACEA	E6-E9	

N. B.: Low S.A.P.S. technology (fuel with low Sulphate, Phosphorous, Sulphur content) keeps catalyst in working conditions. The presence of sulfate, phosphorus and sulfur ashes causes with time the catalyst clogging and its consequent inefficiency.

CLASSIFICATION	DESCRIPTION ACEA SPECIFICATION
E6	Long drain LOW S.A.P.S.
E9	Long drain MID S.A.P.S.

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Engine Maintenance: Kohler (T4f)

The engine maintenance schedule(s) in this chapter are reproduced from the engine owner's manual. For additional information, see the engine owner's manual.

4.2 Periodic maintenance

The intervals of preventive maintenance in **Tab. 4.1** and **Tab. 4.2** refer to the engine operating under normal operating conditions with fuel and oil meeting the recommended specifications.

Tab. 4.1

CLEANING AND CHECKING							
OPERATION DESCRIPTION	PERIOD (HOURS)						PAR.
	10	250	500	1000	1500	5000	
Engine oil level							4.3
Coolant level / Check of the radiator heat-exchanger surface ⁽²⁾							4.8 4.6
External cartridge dry-type air filter ⁽²⁾							4.5
Radiator heat-exchange surface and Intercooler ⁽²⁾							4.6
Alternator belt tension ⁽⁵⁾							4.9
Rubber hose (intake air / coolant)							4.7
Fuel hose							--

Tab. 4.2

REPLACEMENT							
OPERATION DESCRIPTION	PERIOD (HOURS)						PAR.
	10	250	500	1000	1500	5000	
Engine oil ⁽¹⁾							5.1
Oil filter cartridge ⁽¹⁾							5.2 5.3
Fuel filter cartridge ⁽¹⁾							5.4
Alternator Poly-V belt	Alternator V belt ^{(3) (6)}						--
	Not heavy environmental condition ⁽⁶⁾						--
	Heavy environmental condition ⁽⁶⁾						--
Coolant ⁽⁶⁾							--
Intake manifold hose (air filter - intake manifold) ⁽⁶⁾							--
Coolant hoses ⁽⁶⁾							--
Dry air cleaner external cartridge ^{(2) (6)}	After 6 checks with cleaning The replacement must be carried out by authorized KOHLER workshops						5.5
Fuel line hose	The replacement must be carried out by authorized KOHLER workshops						

(1) - In case of low use: 12 months.

(2) - The period of time that must elapse before checking the filter element depends on the environment in which the engine operates.

The air filter must be cleaned and replaced more frequently under very dusty conditions.

(3) - In case of low use: 36 months.

(4) - In case of low use: 24 months.

(5) - Not Poly-V type.

(6) - The replacement must be carried out by authorized **KOHLER** workshops.

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8 Troubleshooting

8.1 Machine Troubleshooting

Problem	Cause	Remedy
Engine doesn't start	No fuel	<ul style="list-style-type: none"> ■ Fill tank with fuel. ■ Fill fuel filter. ■ If additional priming is needed, loosen fittings at fuel injectors.
	Battery discharged	Charge battery.
	Battery connections corroded	Clean battery connections.
	Faulty starter	Replace starter.
	Emergency stop switch activated	Pull emergency stop switch out.
Engine tries to start but stops	No fuel	<ul style="list-style-type: none"> ■ Fill tank with fuel. ■ Fill fuel filter. ■ If additional priming is needed, loosen fittings as fuel injectors.
	Clogged fuel filter	Replace fuel filter.
	Fuel circuit failure	Check fuel lines.
	Air cleaner element plugged	Check and/or replace air filter.
	Electrical connections loose or broken	Check electrical circuit and battery grounds.
Machine out of balance; wobbling excessively	Trowel arm(s) bent	Replace trowel arm(s).
	Trowel arm(s) out of adjustment	Adjust trowel arm(s).
	Trowel blade(s) bent	Replace trowel blade(s).
Poor handling; excessive free play in steering mechanism	Worn pivot bearings, rod ends, and/or cylinder mounts	Inspect pivot bearings, rod ends, and cylinder mounts. Replace as needed.
Machine does not move	Vacuum exists between bottom of blades or pans and surface of concrete	Change pitch on blades or actuate steering system to break suction.
	Electro-hydraulic system fault	See <i>Hydraulic System Troubleshooting</i> .
	Low auxiliary oil pressure	<ul style="list-style-type: none"> ■ Add oil if necessary. ■ Clean oil filter. ■ See <i>Hydraulic System Troubleshooting</i>.

Problem	Cause	Remedy
Blade rotation slows or stops while engine is at full throttle	Throttle solenoid out of adjustment	Adjust throttle cable from solenoid. Cable must fully engage throttle lever. (Solenoid must bottom out before full throttle engagement to avoid throttle solenoid circuit overload.)
Drive motor rotates, but rotors do not rotate	Sheared drive key	Replace key and other components as needed.
Hydraulic oil filter restriction indicator illuminates	Cold oil	Allow the machine to warm up before operation.
	Clogged hydraulic oil filter	Replace the hydraulic oil filter.
Hydraulic temperature indicator illuminates and alarm sounds	Hydraulic oil temperature has exceeded safe operating range	<ul style="list-style-type: none"> ■ Reduce the engine speed to idle. ■ Verify that air flow through the oil cooler and cooler fan is unobstructed. ■ If indicator remains illuminated with alarm sounding, stop the machine and allow the engine to cool before restarting.

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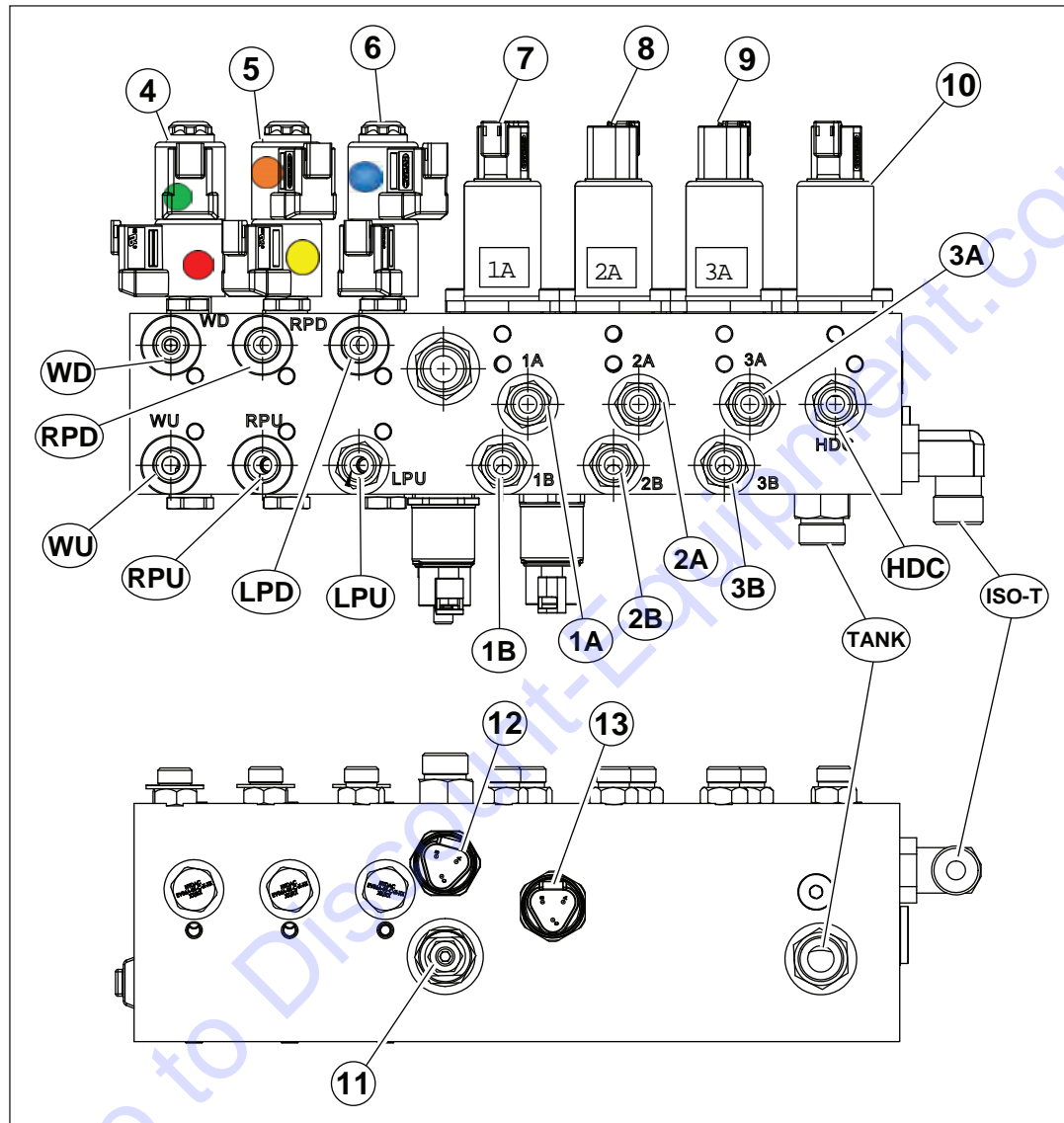
8.2 Hydraulic System Troubleshooting

Problem	Cause	Remedy
Blades do not rotate	Pedal signal incorrect, or not present	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.
	Controller signal incorrect, or not present	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.
	Insufficient auxiliary pressure (hydro pump control source pressure)	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.
	Contamination in servo piston	Verify system pressure. <ul style="list-style-type: none"> ■ Start engine, set engine speed to high idle, and set pedal at full travel. ■ Check system pressure at left and right motor closed loop gauge ports. ■ Maximum system pressure is 5400 psi. If system pressure exists: <ul style="list-style-type: none"> ■ Blades are excessively overloaded. ■ Lower unit motors may have failed. ■ Contact Discount-equipment. If system pressure does not exist: <ul style="list-style-type: none"> ■ Hydro pumps may have failed. ■ Contact Discount-equipment.
	Contamination in control cartridge	
	Excessive machine load	
Blade rotation disabled due to cold hydraulic oil	Allow machine to idle and warm up.	
Steering system responds slowly or not at all	Controller signal incorrect, or not present	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.
	Controller error code exists	<ul style="list-style-type: none"> ■ If no error code exists, check wiring and connector integrity. ■ Contact Discount-equipment for assistance.
	Insufficient auxiliary pressure (Steering control source pressure)	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.
Pitch function responds slowly or not at all	Control cartridge signal incorrect or not present	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.
	Insufficient auxiliary pressure (Pitch cylinder pressure)	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.

Problem	Cause	Remedy
Wheel kit function responds slowly or not at all	Control solenoid signal incorrect or not present	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.
	Insufficient auxiliary pressure (Wheel kit cylinder pressure)	Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.

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8.3 Hydraulic Manifold








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ID	Description	ID	Description
1A	Right forward/reverse extend	11	Relief valve
1B	Right forward/reverse retract	12	Pressure sensor
2A	Left forward/reverse extend	13	Temperature sensor
2B	Left forward/reverse retract	HDC	Drive pump control
3A	Left/right steering extend	LPD	Left pitch down
3B	Left/right steering retract	LPU	Left pitch up
4	Wheel kit solenoid	RPD	Right pitch down
5	Right pitch solenoid	RPU	Right pitch up
6	Left pitch solenoid	WD	Wheel kit down
7	Right forward/reverse steering solenoid	WU	Wheel kit up
8	Left forward/reverse steering solenoid	TANK	Manifold to tank
9	Left/right steering solenoid	ISO-T	Manifold to tank front
10	Hydraulic control solenoid	—	—

To order go to Discount-Equipment.com

8.4 Instrument Display Warning Symbols

! When a warning appears on the instrument display screen, the general malfunction indicator light also illuminates.

Instrument Display Symbol	Description
	<p>An audible alarm beeps three times. Replace the hydraulic oil filter.</p>
	<p>An audible alarm beeps twice. The low fuel level icon flashes in the center of the display once every 5 minutes. Add fuel to the tank or risk running out of fuel and having to re-prime the fuel system.</p>
	<p>When the temperature value is greater than 180°F (82°C) but less than or equal to 200°F (93°C), an audible alarm beeps three times. When the temperature value is greater than 200°F (93°C), an audible alarm beeps continuously.</p>
	<p>When the temperature value is less than 40°F (4°C), an audible alarm beeps three times.</p>
	<p>Combined with the following text to indicate high or low charge oil pressure or auxiliary oil pressure:</p> <ul style="list-style-type: none"> ■ CHARGE HIGH ■ CHARGE LOW ■ AUX HIGH ■ AUX LOW

9 Diagnostic Trouble Codes (DTC)

9.1 Accessing DTCs through engine CAN

Overview The engine Controller Area Network (CAN) display is connected to the engine and can display information such as:

- Engine run time
 - Engine RPM
 - Engine error codes or DTCs
 - Other engine parameters
-

Correcting error codes

Perform the procedure below to correct an error code.

1. Identify the error code.
2. Verify that system voltage is within the proper 12 volt system range (11–14 volts).
3. Check for loose or disconnected electrical connections in the steering circuit. This includes both joystick connectors, both controller connectors, six cartridge valve connectors, and ground.
4. If system voltage is within range, and all electrical connections are tight, contact Discount-equipment to correct the error.

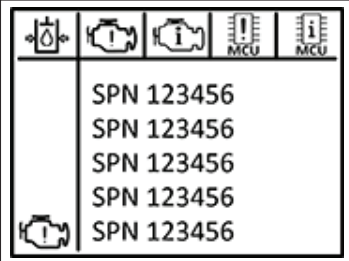
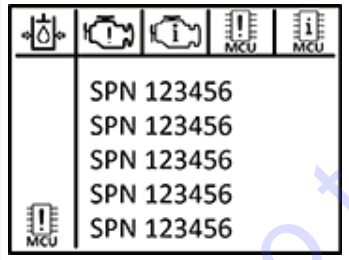
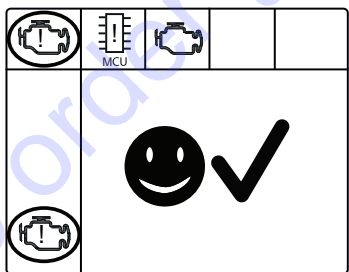
9.2 Engine Error Codes

Observe the following if an error is displayed in the instrument display:

Machine travel or operation is prohibited in case of major errors.

- Engine performance is reduced.
- Stop and park the machine.
- Contact Discount-equipment and have the malfunction rectified. Machine travel and operation is possible in case of minor errors.
- Engine performance is not reduced.
- Contact Discount-equipment and have the malfunction rectified.

Note: Possible errors are displayed in the instrument display for a few seconds when the machine is started. For more information about the instrument display pages see the Controls chapter.

Symbol	
 <p>SPN 123456 SPN 123456 SPN 123456 SPN 123456 SPN 123456</p> <p>wc_gr014656</p>	<p>Engine control unit error Indicates engine errors.</p>
 <p>SPN 123456 SPN 123456 SPN 123456 SPN 123456 SPN 123456</p> <p>wc_gr014658</p>	<p>Machine control unit error Indicates machine errors.</p>
 <p>wc_gr014147</p>	<p>No error If there is no error, the marked symbol appears in the service tool “Engine error/machine status/drive status.” The corresponding symbol flashes and is displayed at the bottom in addition.</p>

9.3 List of Engine Diagnostic Trouble Codes (DTCs)

Error Code		Description
SPN	FMI	
27	7	EGR feed back/position sensor/Dynamic range failure (for CAN)
28	3	Accelerator pedal for ASC (PTO) sensor signal too high
28	4	Accelerator pedal for ASC (PTO) sensor signal too low
28	20	Accelerator pedal for ASC (PTO) sensor 2 signal too high
28	21	Accelerator pedal for ASC (PTO) sensor 2 signal too low
29	3	Accelerator pedal sensor No. 2 signal too high
29	4	Accelerator pedal sensor No. 2 signal too low
51	3	Intake throttle position signal too high
51	4	Intake throttle position signal too low
84	8	Vehicle speed sensor frequency too high
84	5	Vehicle speed sensor input open/ short
84	2	Vehicle speed sensor signal invalid
91	3	Accelerator pedal sensor No. 1 signal too high
91	4	Accelerator pedal sensor No. 1 signal too low
94	3	SCV(+) output short to BATT; SCV(-) output short to BATT
94	6	SCV(+) output open load/short to GND; SCV(-) output open load/short to GND; SCV coil open/short
96	4	Fuel level sensor signal too low
96	3	Fuel level sensor signal too high
97	2	Water in fuel filter failure
100	1	Engine oil pressure down
102	3	Boost pressure sensor signal too high
102	4	Boost pressure sensor signal too low
102	2	Boost pressure sensor performance invalid
105	3	Air temperature sensor signal too high
105	4	Air temperature sensor signal too low
107	2	Air filter clogging error
107	3	Air filter differential pressure sensor signal too high
107	4	Air filter differential pressure sensor signal too low
108	3	Atmosphere pressure sensor signal too high

Error Code		Description
SPN	FMI	
108	4	Atmosphere pressure sensor signal too low
110	3	Coolant temperature sensor signal too high
110	4	Coolant temperature sensor signal too low
110	2	Coolant temperature sensor performance invalid
110	0	Coolant temperature exceeds upper limit
132	3	MAF (mass air flow) sensor signal too high
132	4	MAF (mass air flow) sensor signal too low
132	2	MAF (mass air flow) sensor performance invalid
156	14	P/L (pressure limiter) activated
156	2	Multiple high rail pressure error/ Engine stall after PLV opening
157	9	C/Rail press. Sensor signal keeping the middle range
157	2	PC sensor offset diagnosis
157	14	PC sensor offset diagnosis for NOX requirement
157	20	PC sensor high offset
157	3	C/Rail pressure sensor signal too high
157	4	C/Rail pressure sensor signal too low
157	31	C/Rail pressure control can not achieve target fuel
157	1	C/Rail pressure falls below the control limit of the target pressure
157	16	C/Rail pressure exceeds hi upper limit 2
157	15	C/Rail pressure exceeds hi upper limit 1
167	31	Capacitor charge-up circuit malfunction injector (insufficient charge)
167	1	Capacitor charge-up circuit malfunction injector (excessive charge)
168	3	Vehicle system voltage too high (> 16 V)
168	4	Vehicle system voltage too low (< 8 V)
172	3	Air temperature (MAF side) sensor signal too high
172	4	Air temperature (MAF side) sensor signal too low
174	3	Fuel temperature (w/ pump) sensor signal too high
174	4	Fuel temperature (w/ pump) sensor signal too low
190	9	Crank position e camshaft position sensor no pulse
190	0	Engine overrun
190	2	Crankshaft and Camshaft synchronous error

Error Code		Description
SPN	FMI	
249	8	Crank position (CKP) sensor no pulse
249	2	Crank position (CKP) sensor performance invalid
430	3	Starter switch short to BATT
430	5	Starter relay short to battery
430	4	Starter relay short to GND
598	2	Clutch switch circuit malfunction (manual transmission only)
604	2	Neutral switch circuit malfunction (manual transmission only)
626	4	Glow relay output open load/short to GND
626	3	Glow relay output short to BATT
637	8	Camshaft position (CMP) sensor no pulse
637	2	Camshaft position (CMP) sensor performance invalid
1083	31	CAN bus-line open from general unit
1083	19	CAN1 node error
1084	19	CAN2 node error
1127	0	Boost pressure sensor exceeds upper limit
1127	1	Boost pressure sensor exceeds lower limit
1349	2	Pump learning uncompleted
1382	16	Fuel filter diagnosis level 1
1382	0	Fuel filter diagnosis level 2
1393	5	TWV1 output open load injector coil open
1393	2	Engine angle speed error 1 (injector #1)
1394	5	TWV2 output open load injector coil open
1394	2	Engine angle speed error 2 (injector #2)
1395	5	TWV3 output open load injector coil open
1395	2	Engine angle speed error 3 (injector #3)
1396	5	TWV4 output open load injector coil open
1396	2	Engine angle speed error 4 (injector #4)
1397	3	COM1 TWV drive system output short to BATT TWV1 or 3 output short to BATT
1397	4	COM1 TWV drive system output short to GND TWV1 or 3 output short to GND
1397	5	COM1 TWV drive system output open load both TWV1 and TWV3 open load
1639	5	Coolant fan low speed relay short to battery

Error Code		Description
SPN	FMI	
1639	6	Coolant fan low speed relay short to GND
1639	3	Coolant fan high speed relay short to battery
1639	4	Coolant fan high speed relay short to GND
1639	31	Electric fan open load/short to GND/short to battery
1762	4	Hydraulic pressure sensor signal too low
1762	3	Hydraulic pressure sensor signal too high
2791	3	EGR (exhaust gas recirculation) lift sensor signal too high
2791	4	EGR (exhaust gas recirculation) lift sensor signal too low
2791	2	EGR feedback error
2791	2	EGR motor drive circuit invalid
2791	14	EGR battery/motor failure (for CAN)
2791	2	EGR no transmission/not received failure (for CAN)
2791	7	EGR valve stick/initialization failure (for CAN)
2791	31	EGR valve temperature failure (for CAN)
2791	13	EGR cleaning failure (valve stuck open/poppet much lower than normal)
2802	13	QR data is not written
2802	11	QR data error
2802	9	QR definition error (definition concerning QR correction is not right)
2802	31	CPU fault; watchdog IC fault
2802	12	CPU fault; main CPU fault
2802	14	Check sum error—flash area
3349	9	TSC1 Time out error
3349	10	TSC1 Rolling count test
3349	2	TSC1 Checksum test
3509	3	Battery 5V reference 1 circuit high (5V power supply for sensor)
3509	4	Battery 5V reference 1 circuit low (5V power supply for sensor)
3510	3	Battery 5V reference 2 circuit high (5V power supply for sensor)
3510	4	Battery 5V reference 2 circuit low (5V power supply for sensor)
4082	3	Electric lift pump relay short to battery
4082	4	Electric lift pump relay short to GND

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9.4 List of Trowel/MCU DTCs

Error Code	Description
SPN	
517127	Sensor—charge oil pressure
519524	Solenoid valve—steering FWD (R - 1B)
517145	Joystick—x-axis (R)
519525	Solenoid valve—steering REV (R - 1A)
517144	Joystick—y-axis (R)
519526	Solenoid valve—steering RT (R - 3B)
517139	Gyrometer
517143	Joystick—y-axis (L)
519527	Solenoid valve—steering LT (R - 3A)
517146	Foot pedal—redundant
519522	Solenoid valve—steering FWD (L - 2B)
517140	Sensor—hydraulic pressure (L)
517053	Foot pedal—primary
519523	Solenoid valve—steering REV (L - 2A)
517141	Sensor—hydraulic pressure (R)
519802	Relay coil—hydraulic cooling fan
517142	Sensor—hydraulic pressure (AUX)
517006	Sensor—hydraulic oil temperature
519534	Solenoid valve—rotor speed (HDC)

10 Technical Data

10.1 Engine

Model		CRT60-74LX
Engine make		Kohler
Engine model		KDI 2504 TCR
Max. rated power @ rated speed	kW (hp)	55 (74) @ 2,600 rpm
Displacement	cm ³ (in. ³)	2,482 (152)
Operating speed	rpm	up to 2,600
Engine speed—idle		1,000
Battery	V/size	12/BCI G 24
Fuel type	type	Clean, filtered diesel
Fuel tank capacity	L (gal)	44.7 (11.8)
Fuel consumption	L (gal)/hr	12.5 (3.3)
Running time	hours	3.6
Rotor drive control	type	Electronically variable hydrostatic
Engine oil capacity	L (qt)	8.5 (9)
Engine lubrication	oil grade	5W30 10W40

To order go to DiscountEquipment.com

10.2 Trowel

Machine		CRT60-74LX
Operating weight	kg (lb)	1235 (2720)
Dimensions (L x W x H)	mm (in.)	3227 x 1637 x 1455 (127 x 64 x 57)
Rotor speed (range)	rpm	25–132
Blade pitch (range)	degrees	0–25
Rotor drive	type	Tandem hydro pump Twin radial piston motor
Hydraulic oil	type	Synthetic ISO/VG 68 blue hydraulic oil Available in 5-gallon containers as Wacker Neuson part number 5100029012 or 55-gallon container as Wacker Neuson part number 5100029013
Hydraulic oil capacity	L (qt)	36 (38)

Operation		
Troweling width with pans (non-overlapping)	mm (in.)	3,092 (122)
Troweling width without pans (non-overlapping)		3,049 (120)
Troweling area with pans (non-overlapping)	m ² (ft ²)	4.6 (50)
Troweling area without pans (non-overlapping)		4.4 (48)

10.3 Sound Specifications

The required sound specifications, per 1.7.4.2 (u), Directive 2006/42/EC of the EC-Machine Regulations, are:

- The sound pressure level at operator's location (L_{pA}):
93.4 dB(A)
- The guaranteed sound power level (L_{wA}):
115.5 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 measurement for sound pressure level includes an uncertainty of 2.5 dB, while the sound power level includes an uncertainty of 1.5 dB per EN 12649.

10.4 Vibration Specifications

The weighted effective acceleration value, determined according to EN 1033 and ISO 2631, is:

- For whole body: 0.2 m/s² at the seat; 0.3 m/s² at the footrest
- For hand/arm: 1.4 m/s²

The sound specifications were obtained with the unit operating on fully cured, water-wetted concrete at working engine speed. Vibration specifications for whole body vibration were recorded at the operator's seat. Vibration specifications for hand/arm vibration were recorded at the right joystick.

Measurements for both sound and vibration specifications were recorded with the unit operating at full throttle, hovering on cured concrete, with combination blades pitched at 7 degrees.

Vibration Uncertainties

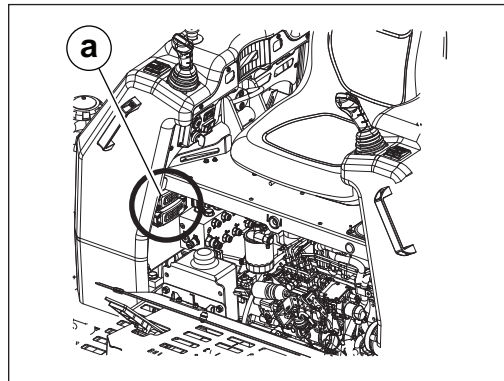
Hand-transmitted vibration was measured per ISO 5349-1. This measurement includes an uncertainty of 1.5 m/sec².

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

10.5 Fuse Box

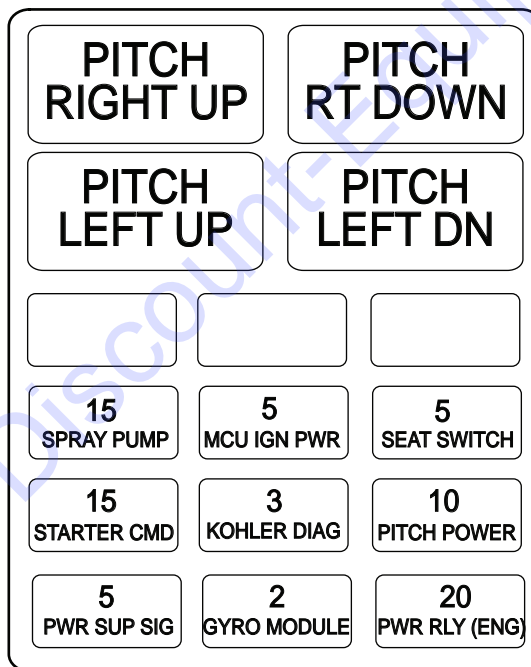
Fuse Box Location

The two fuse boxes (a) are located under the right hand side of the operator's seat.



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Relay Box 1 Layout

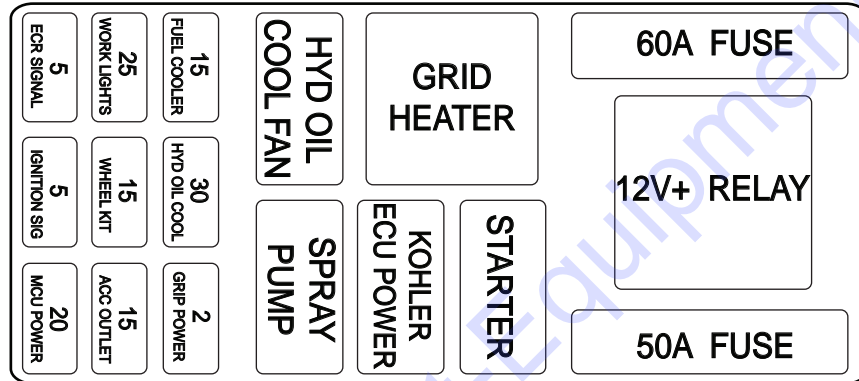


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Label Text	Meaning
PITCH RIGHT UP	Right pitch up relay
PITCH RT DOWN	Right pitch down relay
PITCH LEFT UP	Left pitch up relay
PITCH LEFT DN	Left pitch down relay
SPRAY PUMP	15 amp water pump fuse
MCU IGN PWR	5 amp ignition signal fuse
SEAT SWITCH	5 amp operator presence switch
STARTER CMD	15 amp starter command switch fuse

Label Text	Meaning
KOHLER DIAG	3 amp engine diagnostic connection fuse
PITCH POWER	10 amp pitch fuse
PWR SUPPLY SIGNAL	5 amp power supply signal fuse
GYRO MODULE	1 amp gyroscopic steering assist fuse
PWR RELAY (ENG)	20 amp power relay (engine)

Fuse/Breaker Box 2 Layout

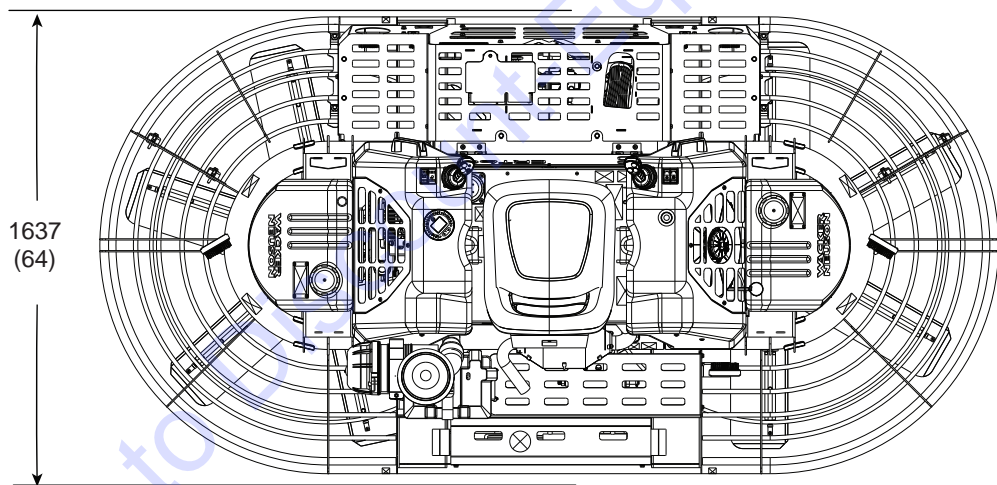
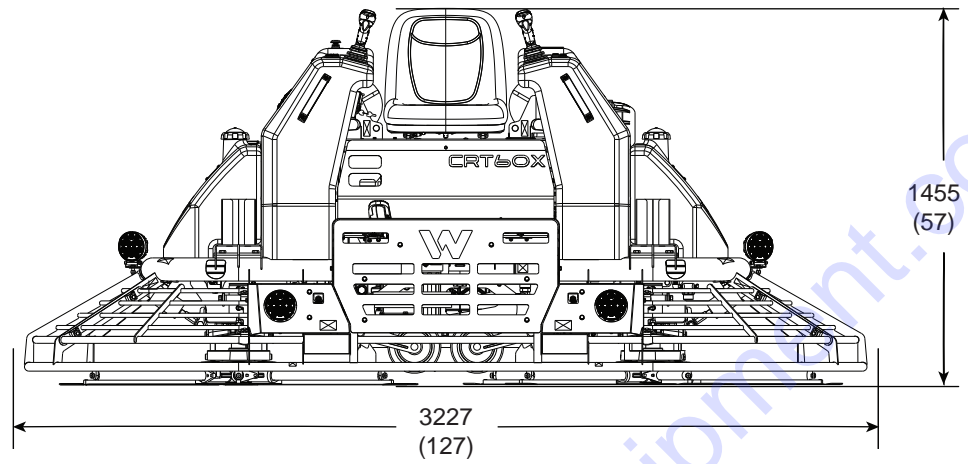


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Label Text	Meaning
12 V+ RELAY	12 volt auxiliary power outlet relay
60A FUSE	60 amp Power fuse
50A FUSE	50 amp grid fuse
GRID HEATER	Grid heaters relay
STARTER	Starter relay
KOHLER ECU POWER	Power supply for the engine control unit
HYD OIL COOL FAN	Hydraulic oil cooling fan relay
SPRAY PUMP	Water pump relay
FUEL COOLER	15 amp fuel cooler fuse
HYD OIL COOLER	30 amp hydraulic oil cooler resettable breaker
GRIP POWER	2 amp power supply for joystick buttons
WORK LIGHTS	25 amp work lights fuse
WHEEL KIT	15 amp wheel kit fuse
ACC OUTLET	15 amp accessory outlet fuse
ECR SIGNAL	5 amp EGR Signal fuse
IGNITION SIG	5 amp ignition signal fuse
MCU POWER	20 amp power supply for trowel machine control unit

10.6 Dimensions

cm (in.)



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SAFETY MANUAL

FOR OPERATING AND MAINTENANCE PERSONNEL

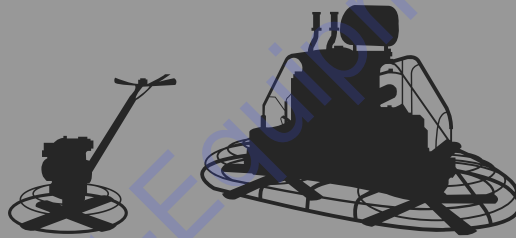


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Acknowledgment

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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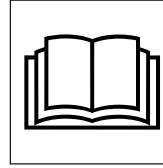
Foreword

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.



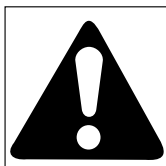
NOTICE is used to address practices not related to physical injury.

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.

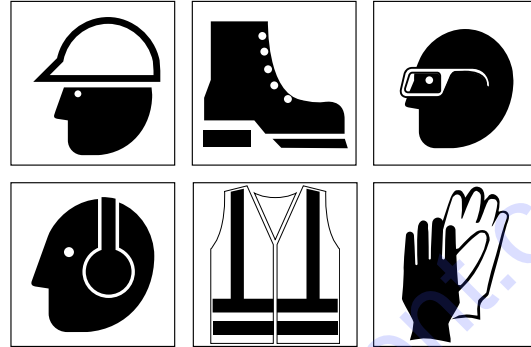
For your safety and the safety of others, act safely and encourage your fellow workers to act safely as well.

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.

7

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.**

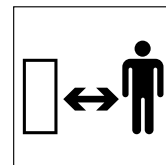
These are some of the rules you must work by:

- 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**).

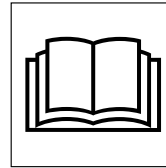
Know the Equipment

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.

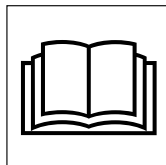
9

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.

11

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.**

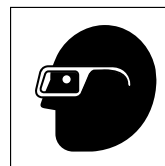
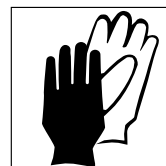
If a leak is discovered:

- 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



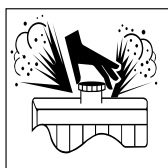
Wear proper hand and eye protection

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

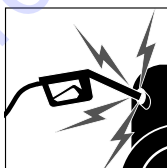
13

Prepare for Safe Operation

Ultra-Low Sulfur Diesel (ULSD) Fuel Hazard

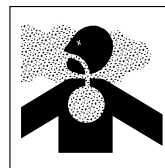
Avoid Static Electricity Risk When Fueling

⚠ 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

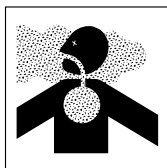
Vent exhaust and assure a flow of fresh air when an internal combustion engine is used in a closed space.

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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.

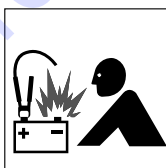
17

Start Safely

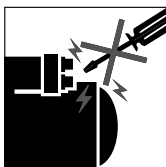
Starting Aids

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

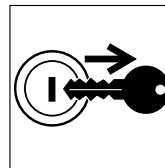
Always store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of reach of children.

⚠ 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

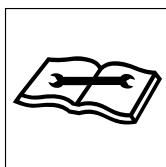
Know What You're Doing

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

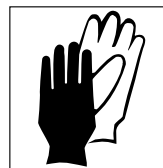
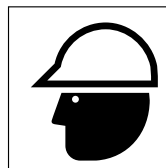
Protect Yourself

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

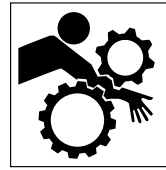
⚠ WARNING! Avoid death or serious injury from entanglement. **Do not wear loose clothing or accessories. Stay away from all rotating components when the engine is running.** Contact, wrapping or entanglement with rotating or moving parts could result in death or serious injury.

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

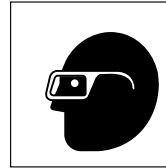
Always use safety glasses, goggles or a face shield. They provide eye protection from fluids under pressure, during grinding and while servicing batteries. Protection is also needed from flying debris, liquids and loose material produced by equipment, tools and pressurized air/water.

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.

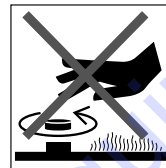
Handle tools and heavy parts sensibly, with regard for the safety of yourself and others. Lower items; don't drop them.



Avoid rotating parts



Wear eye protection



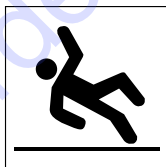
Do not loosen radiator cap until cool

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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.**

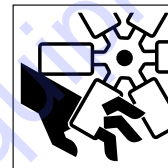
Trowel Maintenance and Repair

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.



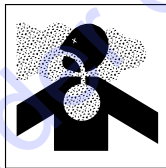
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Perform Maintenance Safely

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

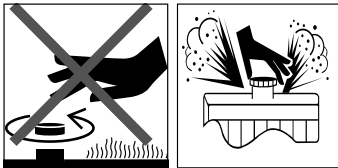
Ultra-Low Sulfur Diesel (ULSD) Hazard

⚠ 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

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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

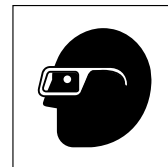
⚠ WARNING! Accidental injection of pressurized fluid into the hands or body is dangerous and could result in death or serious injury. **Use caution when checking hydraulic leaks as pressurized hydraulic fluid has enough force to penetrate skin, causing serious personal injury.**

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

Perform Maintenance Safely

Battery Hazards

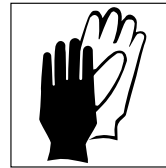
The liquid in batteries contains acid, which is a POISON and could cause SEVERE CHEMICAL BURNS.

Avoid injury:

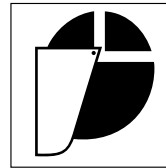
- Wear a face shield to prevent contact with your eyes.
- Wear chemical-resistant gloves and clothing to keep electrolyte off your skin and regular clothing.

⚠ 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

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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.

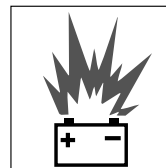
⚠ WARNING! Avoid serious injury from battery explosion. **Do not charge a battery or jump-start the engine if the battery is frozen.**

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



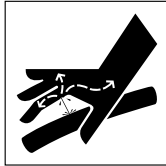
When jump-starting, observe polarity and make final connection at ground point

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

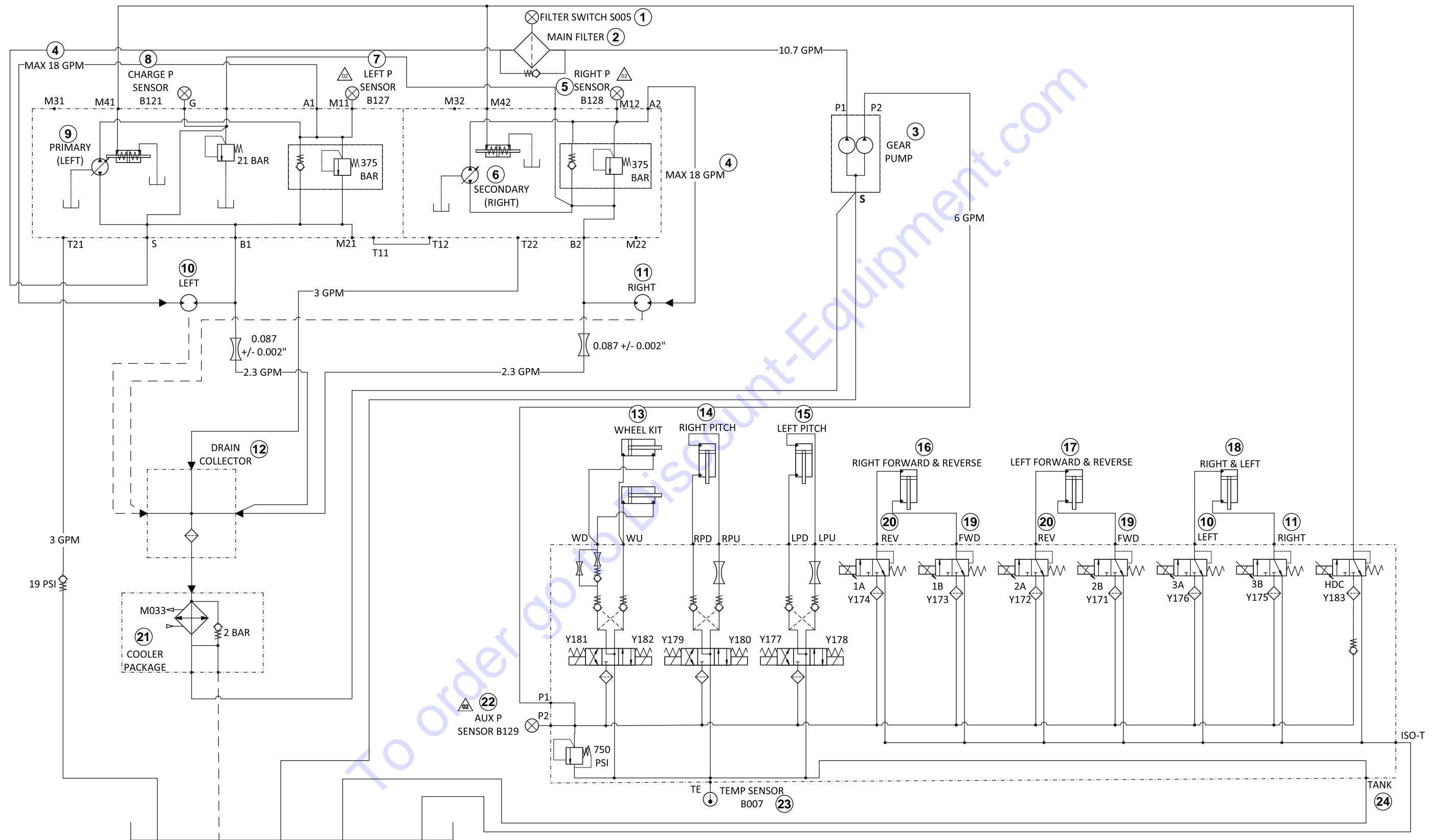
12.2 Electrical Schematic Components

Ref.	Description	Ref.	Description
1	Alternator	44	Fuel cooler fan
2	Starter	45	ACC outlet
3	Splice battery power	46	Air filter restriction switch
4	Starter CMD	47	Work lights
5	ECU power	48	Work light switch
6	Splice #17 ECU power	49	15A wheel kit
7	Kohler ECU power relay	50	Wheel kit switch
8	Splice #3 relayed engine power	51	Wheel kit down
9	3A Kohler diagnostics	52	Wheel kit up
10	Grid heater	53	Gyro module
11	Grid heater relay	54	2A grip power
12	5A EGR signal	55	MCU
13	Starter relay	56	Hydraulic charge pressure sensor
14	Key switch	57	Hydraulic temperature sensor
15	Splice	58	Steer valve
16	5A power supply signal	59	HDC valve
17	12V+ power relay	60	Left up pitch valve
18	Fuel sender	61	Left down pitch valve
19	Left joystick	62	Right up pitch valve
20	Right joystick	63	Right down pitch valve
21	Splice #10 sensor power	64	Hydraulic filter switch
22	Throttle switch	65	Self ground
23	Emergency stop	66	10A pitch power
24	5A IGN signal	67	Splice #6 pitch power
25	Engine to vehicle connection	68	Left grip buttons
26	Display	69	Right grip buttons
27	Kohler diagnostic port	70	15A spray pump
28	Fuel/water separator	71	Spray pump relay
29	Machine diagnostic port	72	Spray pump
30	Pedal	73	Right pitch down relay
31	Hydraulic left pressure sensor	74	Right pitch up relay
32	Hydraulic right pressure sensor	75	Left pitch down relay
33	Hydraulic auxiliary pressure sensor	76	Left pitch up relay
34	MCU power	77	Splice #25 relay ground
35	MCU IGN power	78	Splice #23 manifold ground
36	Seat switch	79	Main ground
37	Splice #12 fuse power	80	Splice #24 right ground
38	Gyro	81	Ground to Kohler ECU
39	Gyro switch	82	Splice #26 left ground

Ref.	Description	Ref.	Description
40	Cruise switch	83	Telematics
41	Hydraulic oil fan	84	Sensor ground
42	Hydraulic oil cooler relay	85	Splice #5 grip power
43	Hydraulic oil cooler fan	—	—

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

12.3 Hydraulic Schematic



12.4 Hydraulic Schematic Components

Ref.	Description	Ref.	Description
1	Filter switch	13	Wheel kit
2	Main filter	14	Right pitch
3	Gear pump	15	Left pitch
4	Max 18 GPM	16	Right forward and reverse
5	Right P sensor	17	Left forward and reverse
6	Secodary (right)	18	Right and left
7	Left P sensor	19	Forward
8	Charge P sensor	20	Reverse
9	Primary (left)	21	Cooler package
10	Left	22	Auxiliary P sensor
11	Right	23	Temperature sensor
12	Drain collector	24	Tank

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