

# OPERATION MANUAL



***WHITEMAN* SERIES**  
**MODEL HHXDF4-DF5**  
**RIDE-ON TROWEL**  
**(KUBOTA WG972 DUAL FUEL)**  
**Gasoline and Propane Engine**

Revision #2 (03/08/18)

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publication, visit our website at:  
[www.multiquip.com](http://www.multiquip.com)



**THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.**

**PN: 32651**



## **CALIFORNIA — Proposition 65 Warning**


Engine exhaust and some of its constituents, and some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm. Some examples of these chemicals are:

- Lead from lead-based paints.
- Crystalline silica from bricks.
- Cement and other masonry products.
- Arsenic and chromium from chemically treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: ALWAYS work in a well ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.

# SILICOSIS/RESPIRATORY WARNINGS


**! WARNING**



**SILICOSIS WARNING**

Grinding/cutting/drilling of masonry, concrete, metal and other materials with silica in their composition may give off dust or mists containing crystalline silica. Silica is a basic component of sand, quartz, brick clay, granite and numerous other minerals and rocks. Repeated and/or substantial inhalation of airborne crystalline silica can cause serious or fatal respiratory diseases, including silicosis. In addition, California and some other authorities have listed respirable crystalline silica as a substance known to cause cancer. When cutting such materials, always follow the respiratory precautions mentioned above.

**! WARNING**



**RESPIRATORY HAZARDS**

Grinding/cutting/drilling of masonry, concrete, metal and other materials can generate dust, mists and fumes containing chemicals known to cause serious or fatal injury or illness, such as respiratory disease, cancer, birth defects or other reproductive harm. If you are unfamiliar with the risks associated with the particular process and/or material being cut or the composition of the tool being used, review the material safety data sheet and/or consult your employer, the material manufacturer/supplier, governmental agencies such as OSHA and NIOSH and other sources on hazardous materials. California and some other authorities, for instance, have published lists of substances known to cause cancer, reproductive toxicity, or other harmful effects.

Control dust, mist and fumes at the source where possible. In this regard use good work practices and follow the recommendations of the manufacturers or suppliers, OSHA/NIOSH, and occupational and trade associations. Water should be used for dust suppression when wet cutting is feasible. When the hazards from inhalation of dust, mists and fumes cannot be eliminated, the operator and any bystanders should always wear a respirator approved by NIOSH/MSHA for the materials being used.

## HHXDF4-DF5 Ride-On Trowel

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### **NOTICE**

Specifications and part numbers are subject to change without notice.



# TRAINING CHECKLIST

## TRAINING CHECKLIST

This checklist will lists some of the minimum requirements for machine maintenance and operation. Please feel free to detach it and make copies. Use this checklist whenever a new operator is to be trained or it can be used as a review for more experienced operators.

Training Checklist			
No,	Description	OK?	Date
1	Read operation manual completely.		
2	Machine layout, location of components, checking of engine and hydraulic oil levels.		
3	Fuel system, refueling procedure.		
4	Operation of spray and lights.		
5	Operation of controls (machine not running).		
6	Safety controls, safety stop switch operation.		
7	Emergency stop procedures.		
8	Startup of machine, pre-heat, engine choke.		
9	Maintaining a hover.		
10	Maneuvering.		
11	Pitching.		
12	Matching blade pitch. Twin-Pitch™		
13	Concrete finishing techniques.		
14	Shutdown of machine.		
15	Lifting of machine (lift loops).		
16	Machine transport and storage.		

## DAILY PRE-OPERATION CHECKLIST

Daily Pre-Operation Checklist		✓	✓	✓	✓	✓	✓
1	Engine oil level						
2	Hydraulic oil level						
3	Radiator coolant level						
4	Condition of blades						
5	Blade pitch operation						
6	Safety stop switch operation						
7	Steering control operation						

# SAFETY INFORMATION

Do not operate or service the equipment before reading the entire manual. Safety precautions should be followed at all times when operating this equipment. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.



## SAFETY MESSAGES

The four safety messages shown below will inform you about potential hazards that could injure you or others. The safety messages specifically address the level of exposure to the operator and are preceded by one of four words: **DANGER**, **WARNING**, **CAUTION** or **NOTICE**.

## SAFETY SYMBOLS

**! DANGER**

Indicates a hazardous situation which, if not avoided, **WILL** result in **DEATH** or **SERIOUS INJURY**.

**! WARNING**

Indicates a hazardous situation which, if not avoided, **COULD** result in **DEATH** or **SERIOUS INJURY**.

**! CAUTION**

Indicates a hazardous situation which, if not avoided, **COULD** result in **MINOR** or **MODERATE INJURY**.

**NOTICE**

Addresses practices not related to personal injury.

Potential hazards associated with the operation of this equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
	Rotating parts hazards
	Pressurized fluid hazards
	Hydraulic fluid hazards



# SAFETY INFORMATION

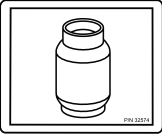
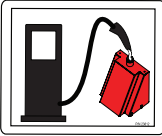



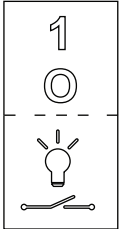

## DECALS


Decals associated with the operation of this equipment are defined below.

DECAL	DEFINITION
	<p><b>DANGER</b> Rotating Blade Hazard</p> <ul style="list-style-type: none"> <li>Keep hands, fingers, and feet clear of engine fan blades and guard rings.</li> <li>Moving parts can cut. <b>DO NOT</b> remove guards.</li> <li>Stop engine before servicing.</li> </ul>
	<p><b>NOTICE</b> Read Manual</p> <p>To avoid injury you must read and understand operator's manual before using this machine.</p>
	<p><b>DANGER</b> Belt Guard Hazard</p> <p>Keep hands and fingers clear from engine belts. Moving parts can crush. <b>DO NOT</b> remove belt guards.</p>
	<p><b>CAUTION</b> Lifting/Crush Hazard</p> <ul style="list-style-type: none"> <li><b>NEVER</b> allow any person to stand underneath the trowel while lifting.</li> <li><b>DO NOT</b> lift trowel with pans attached.</li> <li><b>ALWAYS</b> make sure handle is securely attached.</li> <li>On Quick Pitch™ models make sure T-Handle latch is locked (engaged).</li> </ul>
	<p><b>DANGER</b> Training</p> <p>This machine to be operated by qualified personnel only. Ask for training as needed.</p>
	<p><b>NOTICE</b> Lifting Point</p> <p>Attach lifting strap to this point.</p>
	<p><b>NOTICE</b> Protective Clothing</p> <p><b>ALWAYS</b> wear appropriate clothing before operating trowel.</p>

DECAL	DEFINITION
	<p><b>DANGER</b> Flying Objects Hazard</p> <p>To avoid injury, <b>DO NOT</b> disassemble spring cylinders without qualified service personnel. Possibility exist of severe bodily harm and injury.</p>
	<p><b>DANGER</b> No Water Warning</p> <p><b>DO NOT</b> add water to the retardant tank.</p>
	<p><b>DANGER</b> Inhalation Hazard</p> <p><b>DO NOT</b> use this equipment in an <b>enclosed area</b>. The engine used with this equipment emits harmful levels of carbon monoxide which can cause severe bodily harm — even <b>death!</b></p>
	<p><b>DANGER</b> DO NOT Remove Guards, Hazard</p> <p><b>DO NOT</b> operate equipment with guards removed. Serious bodily injury could result.</p>
	<p><b>LEFT-SIDE BLADE PITCH</b></p> <p>Indicates left-side blade pitch direction.</p>
	<p><b>RIGHT-SIDE BLADE PITCH</b></p> <p>Indicates right-side blade pitch direction.</p>
	<p><b>CAUTION</b> Burn Hazard</p> <ul style="list-style-type: none"> <li><b>HOT PARTS</b> can burn skin.</li> <li><b>DO NOT</b> touch <b>hot parts</b>. Allow machine sufficient amount of time to cool before performing maintenance.</li> </ul>

# SAFETY INFORMATION

DECAL	DEFINITION
	<p><b>PROPANE/LPG TANK</b></p> <p>The engine used in this equipment can run on <i>LPG/propane fuel</i>.</p>
	<p><b>UNLEADED GASOLINE</b></p> <p>The engine used in this equipment can run on <i>unleaded gasoline</i>.</p>
	<p><b>GASOLINE FUEL SELECTION MODE</b></p> <p>When fuel selection rocker switch is in this position, indicates that unit is in the <i>unleaded gasoline</i> mode.</p>
	<p><b>LPG/PROPANE FUEL SELECTION MODE</b></p> <p>When fuel selection rocker switch is in this position, indicates that unit is in the <i>LPG/Propane</i> mode.</p>
	<p><b>CAUTION</b></p> <p>Cold Weather Conditions Cold weather starting below 40°F (4°C). Run engine 3-5 minutes while moving steering controls before depressing blade control pedal.</p>
	<p><b>LIGHT SWITCH</b></p> <p>When light rocker switch is in position 1 all halogen lights will turn on. Position 0 will turn off all lights.</p>
	<p><b>NOISE LEVEL</b></p> <p>Indicates value of the sound power of the equipment measured at operator's seat.</p>

DECAL	DEFINITION
	<p><b>LUBRICATION POINT</b></p> <p>Indicates that lubrication is required where this icon is displayed.</p>
	<p><b>DANGER</b> Fire Hazard</p> <p><b>DO NOT</b> light matches around or near this equipment. This equipment contains highly flammable fuel. If ignited, could start a <b>fire</b> causing equipment damage and severe bodily harm — even <b>death!</b></p>
	<p><b>DANGER</b> Fire Hazard</p> <p><b>DO NOT</b> smoke around or near this equipment. This equipment contains highly flammable fuel. If ignited, could start a <b>fire</b> causing equipment damage and severe bodily harm — even <b>death!</b></p>
	<p><b>DANGER</b> Explosion Hazard</p> <p>Hot steam or coolant may escape when radiator cap is removed, causing severe burns. Allow radiator to cool before removing cap.</p>

# SAFETY INFORMATION

## GENERAL SAFETY

### CAUTION

- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.



- Avoid wearing jewelry or loose fitting clothes that may snag on the controls or moving parts as this can cause serious injury.

- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when under medication.



- **NEVER** operate this equipment under the influence of drugs or alcohol.



- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.
- No one other than the operator is to be in the working area when the equipment is in operation.
- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.

### NOTICE

- This equipment should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult to read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.

- **NEVER** use accessories or attachments that are not recommended by Multiquip for this equipment. Damage to the equipment and/or injury to user may result.

- **ALWAYS** know the location of the nearest fire extinguisher.



- **ALWAYS** know the location of the nearest first aid kit.



- **ALWAYS** know the location of the nearest phone or **keep a phone on the job site**. Also, know the phone numbers of the nearest **ambulance, doctor** and **fire department**. This information will be invaluable in the case of an emergency.



## TROWEL SAFETY

### DANGER

- Engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and **can cause death if inhaled**.

- Operate equipment only in areas with adequate ventilation. **NEVER** operate in **confined areas**, or in areas where the free flow of air is restricted.



- **NEVER** operate the equipment in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe **bodily harm or even death**.



# SAFETY INFORMATION

## WARNING

- If applicable, **NEVER** use your hand to find hydraulic leaks. Use a piece of wood or cardboard. Hydraulic fluid injected into the skin must be treated by a knowledgeable physician immediately or severe injury or death can occur.



- **ALWAYS** keep clear of rotating or moving parts while operating the trowel.



- **NEVER** disconnect any **emergency or safety devices**. These devices are intended for operator safety. Disconnection of these devices can cause severe injury, bodily harm or even death. Disconnection of any of these devices will void all warranties.

## CAUTION

- **NEVER** allow passengers or riders on the trowel during operation.
- **NEVER** lubricate components or attempt service on a running machine.
- **NEVER** place your feet or hands inside the guard rings while starting or operating this equipment.

## NOTICE

- **ALWAYS** keep the machine in proper running condition.
- Fix damage to machine and replace any broken parts immediately.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children and unauthorized personnel.
- A safety manual for operating and maintenance personnel of concrete power trowels produced by the Association of Equipment Manufacturers (AEM) can be obtained for a fee by ordering through their website at [www.aem.org](http://www.aem.org).

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## ENGINE SAFETY

### WARNING

- **DO NOT** place hands or fingers inside engine compartment when engine is running.
- **NEVER** operate the engine with heat shields or guards removed.
- Keep fingers, hands hair and clothing away from all moving parts to prevent injury.
- **DO NOT** remove the radiator cap while the engine is hot. High pressure boiling water will gush out of the radiator and severely scald any persons in the general area of the trowel.
- **DO NOT** remove the coolant drain plug while the engine is hot. Hot coolant will gush out of the coolant tank and severely scald any persons in the general area of the trowel.
- **DO NOT** remove the engine oil drain plug while the engine is hot. Hot oil will gush out of the oil tank and severely scald any persons in the general area of the trowel.



### CAUTION

- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing equipment.



## NOTICE


- **NEVER** run engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service air filter frequently to prevent engine malfunction.
- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or equipment can result if operating in speed ranges above the maximum allowable.



# SAFETY INFORMATION

## FUEL SAFETY (GASOLINE)

### DANGER

- **DO NOT** start the engine near spilled fuel or combustible fluids. Fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **DO NOT** fill the fuel tank while the engine is running or hot.
- **DO NOT** overfill tank, since spilled fuel could ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **DO NOT** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine. 

## FUEL SAFETY (LPG/PROPANE)

### DANGER

- **DO NOT** fill propane tank within 25 ft. (7.62 m) of buildings and line of adjoining structures that may be a source of ignition.
- Remove all combustible materials including dry grass and leaves within 25 ft. (7.62 m) of LPG dispenser.
- Before filling, visually inspect propane tank for dents, cracks and excessive corrosion.
- **NEVER** fill propane tank if damaged, corroded, displays leaks at fittings\valves or contains foreign material.
- **NEVER** fill propane tank if pressure relief or fill valves are damaged.

- **ALWAYS** fill propane tank in a well-ventilated area, away from sparks and open flames. LP Gas is odourless and invisible.

- **DO NOT** fill the propane tank while the engine is running or hot.

- **DO NOT** smoke around or near the equipment. Fire or explosion could result from gas vapors.



- Accumulation of LP Gas vapors may result in the development of an oxygen-deficient atmosphere which carries a risk of asphyxiation.

- **NEVER** enter a gas cloud area. This condition produces a oxygen-deficient atmosphere that could be fatal.

### CAUTION

- **ALWAYS** use protective gloves when handling propane tank. LP Gas will cause cold burns if it comes into contact with the skin.

- The eyes and body must be protected when handling all LP Gas products. **ALWAYS** wear protective eye safety glasses and clothing.

- LP Gas is heavier than air, an underground or low level leak might not be detected immediately. Low level leaks might not be detected immediately.

# SAFETY INFORMATION

## BATTERY SAFETY

### DANGER

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **DO NOT** expose the battery to open flames, sparks, cigarettes, etc. The battery contains combustible gases and liquids. If these gases and liquids come into contact with a flame or spark, an explosion could occur.



### WARNING

- **ALWAYS** wear safety glasses when handling the battery to avoid eye irritation. The battery contains acids that can cause injury to the eyes and skin.
- Use well-insulated gloves when picking up the battery.
- **ALWAYS** keep the battery charged. If the battery is not charged, combustible gas will build up.
- **DO NOT** charge battery if frozen. Battery can explode. When frozen, warm the battery to at least 61°F (16°C).
- **ALWAYS** recharge the battery in a well-ventilated environment to avoid the risk of a dangerous concentration of combustible gases.
- If the battery liquid (dilute sulfuric acid) comes into contact with **clothing or skin**, rinse skin or clothing immediately with plenty of water.
- If the battery liquid (dilute sulfuric acid) comes into contact with **eyes**, rinse eyes immediately with plenty of water and contact the nearest doctor or hospital to seek medical attention.



### CAUTION

- **ALWAYS** disconnect the **NEGATIVE** battery terminal before performing service on the equipment.
- **ALWAYS** keep battery cables in good working condition. Repair or replace all worn cables.

## TRANSPORTING SAFETY

### CAUTION

- **NEVER** allow any person or animal to stand underneath the equipment while lifting.
- Ride-on trowels are very heavy and awkward to move around. Use proper heavy lifting procedures and **DO NOT** attempt to lift the trowel by the guard rings.
- **NEVER** lift trowel with the operator on the machine.




### NOTICE

- The easiest way to lift the trowel is to utilize the lift loops that are welded to the frame. These lift loops are located to the left and right sides of the operator's seat.  
  
A strap/chain can be attached to these lift loops, allowing a forklift or crane to lift the trowel up onto and off of a slab of concrete. The strap or chain should have a minimum of 2,000 pounds (1,000 kg) lifting capacity and the lifting gear must be capable of lifting at least this amount.
- **NEVER** transport trowel with float pans attached unless safety catches are used and are specifically cleared for such transport by the manufacturer.
- **NEVER** hoist the trowel more than three feet off the ground with float pans attached.
- Before lifting, make sure that the lift loops are not damaged.
- Always make sure crane or lifting device has been properly secured to the lift loops of the equipment.
- **ALWAYS** shutdown engine before transporting.
- **NEVER** lift the equipment while the engine is running.
- Tighten fuel tank cap securely and close fuel cock to prevent fuel from spilling.
- Use adequate lifting cable (wire or rope) of sufficient strength.
- **DO NOT** lift machine to unnecessary heights.
- **ALWAYS** tie down equipment during transport by securing the equipment with straps. Inspect straps to make sure they are not frayed or damaged.

# SAFETY INFORMATION

## TOWING SAFETY

### CAUTION


- Check with your local county or state safety towing regulations, in addition to meeting **Department of Transportation (DOT) Safety Towing Regulations**, before towing your trowel. 
- In order to reduce the possibility of an accident while transporting the trowel on public roads, **ALWAYS** make sure the trailer that supports the trowel and the towing vehicle are mechanically sound and in good operating condition.
- **ALWAYS** shutdown engine before transporting
- Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer “gross vehicle weight rating.”
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both towing vehicle and trailer. **Manufacturer recommends that trailer tires be inflated to 50 psi cold.** Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with a **safety chain**.
- **ALWAYS** properly attach trailer's safety chains to towing vehicle.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake and trailer lights are connected and working properly.
- DOT Requirements include the following:
  - Connect and test electric brake operation.
  - Secure portable power cables in cable tray with tie wraps.
- The maximum speed for highway towing is 55 MPH unless posted otherwise. Recommended off-road towing is not to exceed 15 MPH or less depending on type of terrain.
- Avoid sudden stops and starts. This can cause skidding, or jack-knifing. Smooth, gradual starts and stops will improve towing.

- Avoid sharp turns to prevent rolling.
- Trailer should be adjusted to a level position at all times when towing.
- Raise and lock trailer wheel stand in up position when towing.
- Place **chock blocks** underneath wheel to prevent rolling while parked.
- Place support blocks underneath the trailer's bumper to prevent tipping while parked.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.

## ENVIRONMENTAL SAFETY/DECOMMISSIONING

### NOTICE

Decommissioning is a controlled process used to safely retire a piece of equipment that is no longer serviceable. If the equipment poses an unacceptable and unrepairable safety risk due to wear or damage or is no longer cost effective to maintain (beyond life-cycle reliability) and is to be decommissioned (demolition and dismantlement), be sure to follow rules below.

- **DO NOT** pour waste or oil directly onto the ground, down a drain or into any water source.
- Contact your country's Department of Public Works or recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this equipment. 
- When the life cycle of this equipment is over, remove battery and bring to appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the trowel frame and all other metal parts be sent to a recycling center.

Metal recycling involves the collection of metal from discarded products and its transformation into raw materials to use in manufacturing a new product.

Recyclers and manufacturers alike promote the process of recycling metal. Using a metal recycling center promotes energy cost savings.

## EMISSIONS INFORMATION (GASOLINE)

### NOTICE

The engine used in this equipment is a dual fuel engine (gasoline/LPG). The gasoline side of the engine has been designed to reduce harmful levels of carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NOx) contained in gasoline exhaust emissions.

This engine has been certified to meet US EPA Evaporative emissions requirements in the installed configuration.

Attempting to modify or make adjustments to the engine emission system by unauthorized personnel without proper training could damage the equipment or create an unsafe condition.

Additionally, modifying the fuel system may adversely affect evaporative emissions, resulting in fines or other penalties.

## EMISSIONS INFORMATION (LPG)

### NOTICE

The LPG (propane) side of the engine used in this equipment uses components that meet US EPA Phase 3 and CARB Large Spark Ignited (LSI) emission regulations.

Any modifications to the fuel system or any adjustments made to the engine will cause the engine to be in **non compliance** with emission regulations.

### Emission Control Label

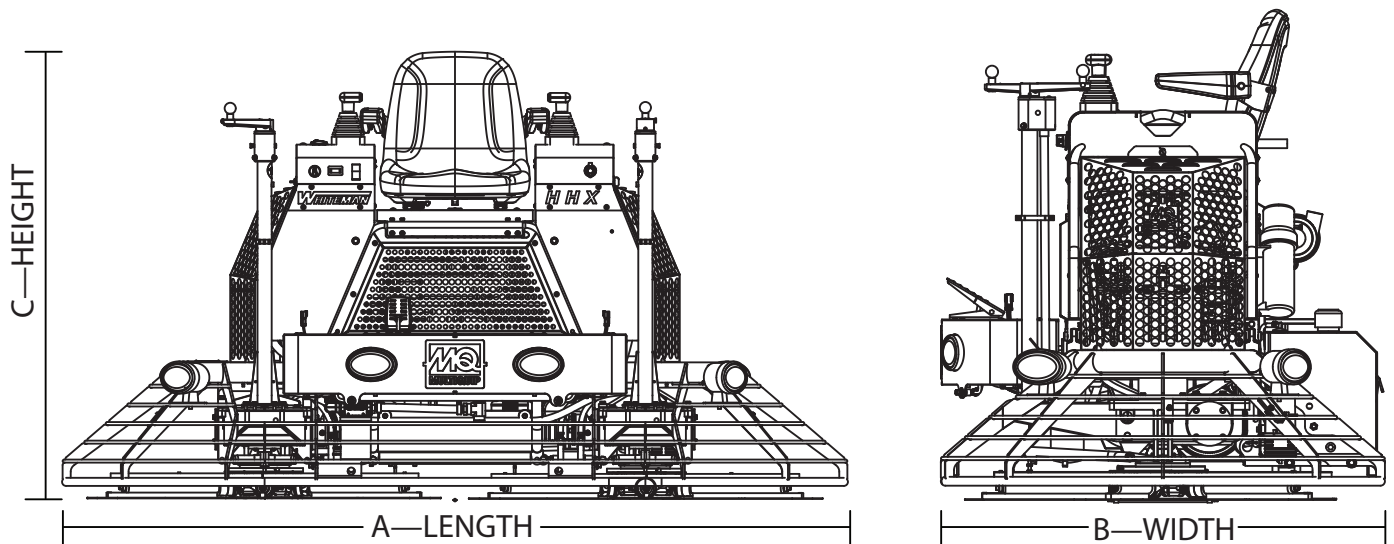
The emission control label is an integral part of the emission system and is strictly controlled by regulation(s).

The label must remain with the engine for its entire life.

If a replacement emission label is needed, please contact your authorized engine distributor.



# DIMENSIONS



**Figure 1. HHXDF4-DF5 Dimensions**

Table 1. HHXDF4-DF5 Specifications	
SPECIFICATION PARAMETER	HHXDF4-DF5 (KUBOTA)
A—Length – in. (cm)	98.00 (249)
B—Width – in. (cm)	50.0 (127)
C—Height – in. (cm)	54.0 (137.2)
Weight – lbs. (kgs.) Operating	1,397 (634)
Weight – lbs. (kgs.) Shipping	1,472 (668)
Blade Tip Speed – FPM (m/s)	1425 (7.24)
Rotor – RPM	40 to 170
Path Width – in. (cm)	91 (231)
Fuel Tank – gallons (liters)	9.5 (36)
Hydraulic Oil	Parker Duraclean™ ISO 46
Hydraulic Oil Capacity — gallons (liters)	0.1 (0.35)

# SPECIFICATIONS

**Table 2. Engine Specifications**

No. of Cylinders	3	
Type	Vertical, Water Cooled, 4-Cycle Dual Fuel (Gasoline/LPG) Engine	
	Gasoline Fuel	LPG Fuel
Bore X Stroke (in./mm.)	2.93 x 2.90 (74.5 x 73.6)	
Total Displacement (L/cu. <sup>3</sup> )	0.962 (58.7)	
Intake System	Naturally Aspirated	
ISO Net Continuous	17.5 kW / 36000 min <sup>-1</sup> (rpm) 23.5 kW / 36000 min <sup>-1</sup> (rpm)	
ISO/SAE Net Intermittent	22.0 kW / 36000 min <sup>-1</sup> (rpm) 29.5 kW / 36000 min <sup>-1</sup> (rpm)	
SAE Gross Intermittent	23.1 kW / 36000 min <sup>-1</sup> (rpm) 31.0 kW / 36000 min <sup>-1</sup> (rpm)	
Maximum Bare Speed	3,850 to 3,950 min <sup>-1</sup> (rpm)	
Minimum Bare Idling Speed	1,400 to 1,600 min <sup>-1</sup> (rpm)	
Cylinder Head	Overhead-Valve	
Ignition System	Distributor — Less Solid Stage Type	
Governor	Centrifugal Ball Type / Electronic Governor	
Direction of Rotation	Counter-Clockwise (Viewed from Flywheel)	
Spark Plug	NGK BKR4E	
Spark Plug Gap	0.024—0.027 in. (0.60—0.70 mm)	
Ignition Timing	0.31 rad (21°) before T.D.C. / 3,600 min <sup>-1</sup> (rpm)	
Firing Order	1-2-3	
Compression Ratio	9.2:1	
Lubricating System	Forced Lubrication by Trochoid Pump	
Oil Pressure Indication	Electrical Type Switch	
Lubricating Filter	Full Flow Paper Filter (Cartridge Type)	
Cooling System	Pressurized Radiator (not included in the basic model), Forced Circulation with Water Pump	
Starting System	Electric Starting with Starter (12 V, 0.7 kW)	
Battery	12 V, 35 AH or Equivalent	
Fuel Type	Gasoline	Unleaded Automobile Gasoline
	Liquid Propane	≈ HD-5 (Standard Commercial LP Gas)
Fuel Capacity	Gasoline (gal/L)	9.5 (36)
	Liquid Propane (lbs./kg/L)	33.5 lbs. (15.2 kg./36.3 L)
Lubricating Oil	Better than SH Class (API) SAW 10W30	
Lubricating Oil Capacity (gal./L)	0.90 (3.4)	
Catalytic Muffler/Converter	Three Way Catalyst	
Weight—Dry (lbs./kg)	159 (72.0)	
Application	General Power Source	
Direction of Rotation	Counterclockwise (viewed from the flywheel side)	
Dimensions (L x W x H(1) x H(2)) (in./mm.)	17.40 x 15.80 x 19.80 x 6.26 (442.6 x 402.0 x 503.1 x 159.0)	

# NOISE AND VIBRATION

Table 3. HHXDF4-DF5 Noise and Vibration	
Guaranteed ISO 11201:2010 Based Sound Pressure Level at Operator Station in dB(A)	TBD
Guaranteed ISO 3744:2010 Based Sound Power Level in dB(A)	TBD
Whole Body Vibration Per ISO 2631-1:1997+A1:2010 in $m/s^2 \Sigma A(8)$	TBD

## NOTES:

1. *Sound Pressure and Power Levels are "A" weighted Measures per ISO 226:2003 (ANSI S1.4-1981). They are measured with the operating condition of the machine which generates the most repeatable but highest values of the sound levels. Under normal circumstances, the sound level will vary depending on the condition of the material being worked upon.*
2. *The vibration level indicated is the vector sum of the RMS (Root Mean Square) Values of amplitudes on each axis, standardized to an 8 hour exposure period, and obtained using operating condition of the machine that generates the most repeatable but highest values in accordance with the applicable standards for the machine.*
3. *Per EU Directive 2002/44/EC, the daily exposure action value for whole body vibration is  $0.5 m/s^2 \Sigma A(8)$ . The daily exposure limit value is  $1.15 m/s^2 \Sigma A(8)$ .*

# GENERAL INFORMATION

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## INTENDED USE

Operate the HHXDF4-DF5 ride-on trowel, and components in accordance with the manufacturer's instructions. Use of any other tools for stated operation is considered contrary to designated use. The risk of such use lies entirely with the user. The manufacturer cannot be held liable for damages as a result of misuse.

## FAMILARIZATION

The HHXDF4-DF5 is designed for the floating and finishing of concrete slabs.

Take a walk around your trowel. Take notice of all the major components (Figure 2— Figure 4) like the engine, blades, air cleaner, fuel system, fuel shut-off valve, ignition switch etc. Ensure engine and gearbox lubricant levels are within proper operating range and maintain a proper level of hydraulic fluid in the hydraulic fluid reservoir.

Read all the safety instructions carefully. Safety instructions will be found throughout this manual and on the machine. Keep all safety information in good, readable condition. Operators should be well trained on the operation and maintenance of the trowel.

Look at the operator Control Joysticks. Grasp the Control Joysticks and move them around a bit. Observe how moving the Control Joysticks cause the gearboxes and frame to move.

Notice the foot pedal which controls the engine and blade speed. Also take a look at the main driveline of the trowel. Take note and reference how the belts look, this is the way the belts should look when adjusted properly.

Before using your trowel, test it on a flat watered down section of finished concrete. This trial test run will increase your confidence in using the trowel and at the same time it will familiarize you with the trowel's controls and indicators. In addition you will understand how the trowel will handle under actual conditions.

## ENGINE

The HHXDF4-DF5 trowel is equipped with a liquid cooled **31 HP Kubota WG972** engine which operates on gasoline or liquid propane gas (LPG). The use of both gasoline and LPG makes this 31 HP Kubota WG972 engine a Dual Fuel (DF) engine. Refer to the engine owner's manual for specific instructions regarding engine operation. This manual is included with the trowel at the time of shipping. Please contact your nearest Multiquip Dealer for a replacement should the original manual disappear.

## BLADES

The blades of the trowel finish the concrete as they are swirled around the surface. Blades are classified as combination (10 or 8 inches wide), finish (6 inches wide). The HHXDF5 is equipped with five blades per rotor equally spaced in a radial pattern and attached to a vertical rotating shaft by means of a **spider assembly**.

## GEARBOXES

The HHXDF5 consist of two separate gearbox assemblies that are enclosed in rugged cast aluminum gear cases.

The gearbox casing holds 50% more oil capacity than competitors, which allows more lubrication to be provided to critical points.

## HYDRAULIC STEERING

Dual palm grip joystick controls located to the left and right of the operator are provided for steering the HHXDF5. The joysticks are linked to three hydraulic steering cylinders located within the frame of the machine. Detailed explanation of how the joystick controls affect the steering of the trowel can be found in the Operation section of this manual.

See the steering chart (Table 3) for information on the effect the steering joysticks have upon the steering direction of the machine.

## LPG TANK

This trowel features an optional LPG fuel tank which may be used instead of gasoline fuel. Switching between gasoline and LPG fuel systems during operation may be performed uninterrupted.

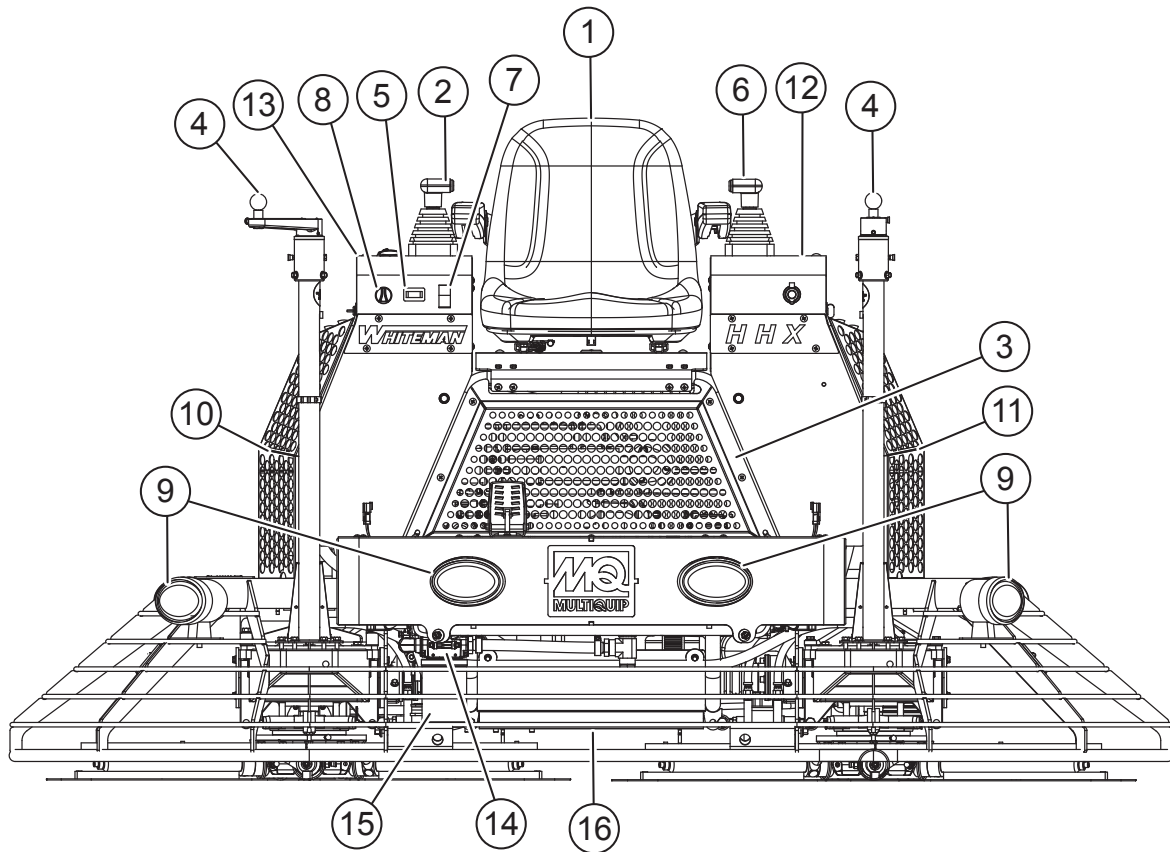
## CONSTANT VELOCITY JOINTS (CV-JOINTS)

Constant velocity joints insure the efficient transfer of power to the drive shaft and maintains the timing of the gearboxes without any chance of slippage.

## TRAINING

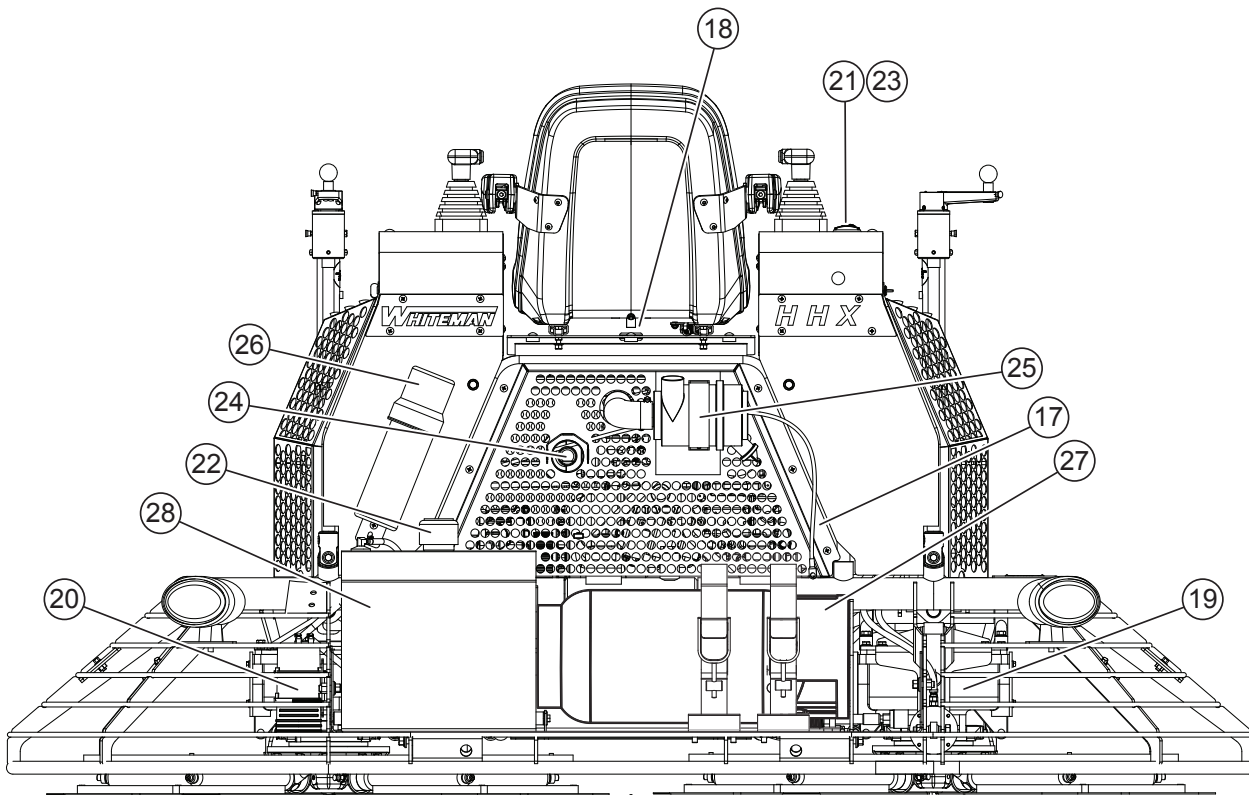
For proper training, please use the "**TRAINING CHECKLIST**" located in the front of this manual. This checklist will provide an outline for an experienced operator to provide training to a new operator.

# TROWEL COMPONENTS



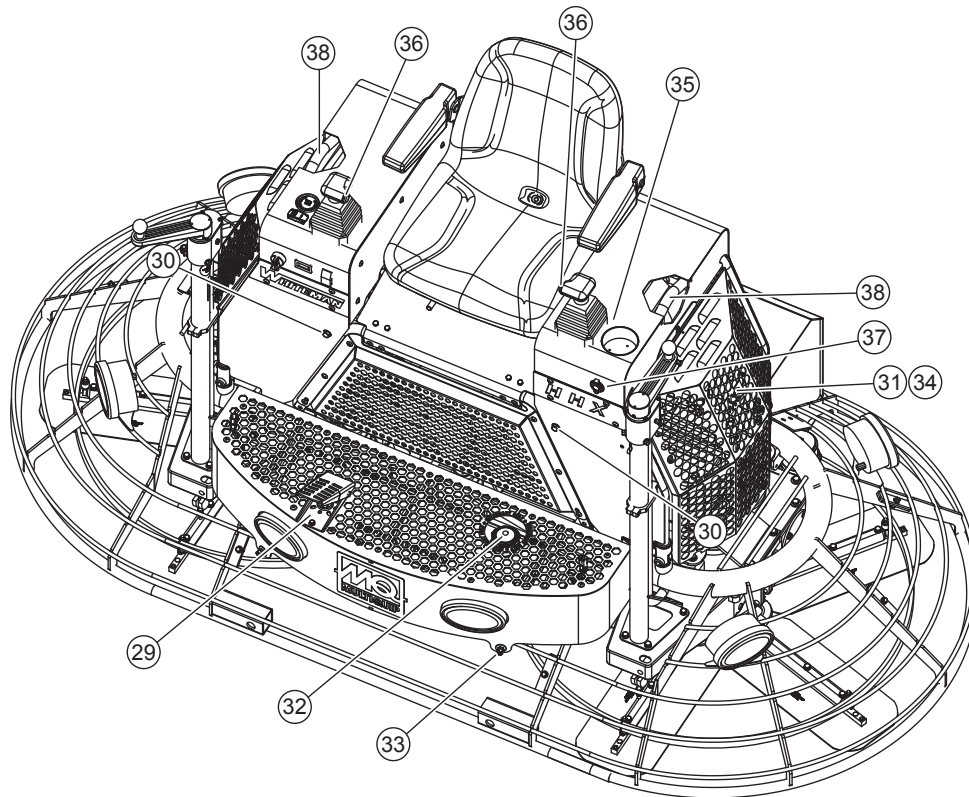
**Figure 2. HHXDF4-DF5 Front**

1. **Seat** — Place for operator to sit. Engine will not start and blades will not rotate unless operator is seated. Seat is adjustable, fore and aft for operator comfort.
2. **Steering Control (Right Side)** — Allows the right rotor to move forward or reverse. Allows the trowel to move left or right.
3. **Front Guard** — Remove this Guard Cover to access left side of engine and other internal components.
4. **Pitch Control** — Adjusts the blade pitch separately for each side of the trowel.
5. **Hour Meter** — Indicates number of hours machine has been in use or hours engine was run.
6. **Steering Control (Left Side)** — Allows the left rotor to move in a forward or reverse direction only.
7. **Light Switch** — When activated, turns on six halogen lights. Lights offer better visibility when working indoors.
8. **Ignition Switch** — Turn clockwise to start engine.
9. **Lights** — 12 v LED, 4 fore and 2 aft.
10. **Right Side Guard** — Remove to access Radiator and to allow Right Clamshell to open for Service.
11. **Left Side Guard** — Remove to access Battery and to allow Left Clamshell to open for Service.
12. **Left Side Clamshell** — Remove two bolts to open for service and maintenance access.
13. **Right Side Clamshell** — Remove two bolts to open for service and maintenance access.
14. **By-Pass Indicator** — Sight glass located in-line and just above the Hydraulic By-Pass Filter. System in a By-Pass condition when indicator in the red area.
15. **Hydraulic By-Pass Filter** — Filters contaminants from hydraulic system during a By-Pass condition.
16. **Magnetic Drain Plug** — Remove to drain hydraulic oil from hydraulic system.



**Figure 3. HHXDF4-DF5 (Rear)**

17. **Rear Guard** — Remove to access right side of engine and internal components for service and maintenance.
18. **Seat Switch** — Recognizes when the operator is seated. Trowel blades will not turn and engine speed will not rise above idle unless an operator is seated.
19. **Right-Side Spider** — Consists (basic) of trowel arms, blades, wear plate, and thrust collar etc.
20. **Left-Side Spider** — Consists (basic) of trowel arms, blades, wear plate, and thrust collar etc.
21. **Fuel Selection Switch** — When the rocker switch is pressed to the right, **PROPANE** mode is selected, and the **GREEN** light is **ON**. When the rocker switch is pressed to the left, **GAS** mode is selected, and the **GREEN** light is **OFF**.
22. **Fuel Filler Cap/Fuel Gauge** — Remove this cap to add fuel when fuel gauge indicates low fuel level.
23. **Engine Status Gauge** — Multi-Cluster gauge indicates the following:
  - Low Pressure Oil LED
  - Overheat LED
  - Auxiliary LEDs
  - Glow-Plug Pre-Heat LED
  - Battery Charge LED
24. **Exhaust Outlet** — Exhaust gases routed through muffler and out the back of the rear guard.
25. **Air Filter Assembly** — Helps prevent dirt and debris from entering the fuel system. Lift Locking Latch on canister to gain access to filter element.
26. **Documentation Canister** — Storage for documentation and other information regarding the trowel.
27. **Propane Tank** — Holds 33.5 lbs (36.3 liters) of propane when used to fuel engine instead of gasoline. Uses HD-5 of HD-10 liquid propane. HD-5 is recommended
28. **Fuel Tank (Gasoline)** — Holds 9.5 gallons (36 liters) of gasoline. Use either 87 or 89 octane rated gasoline.

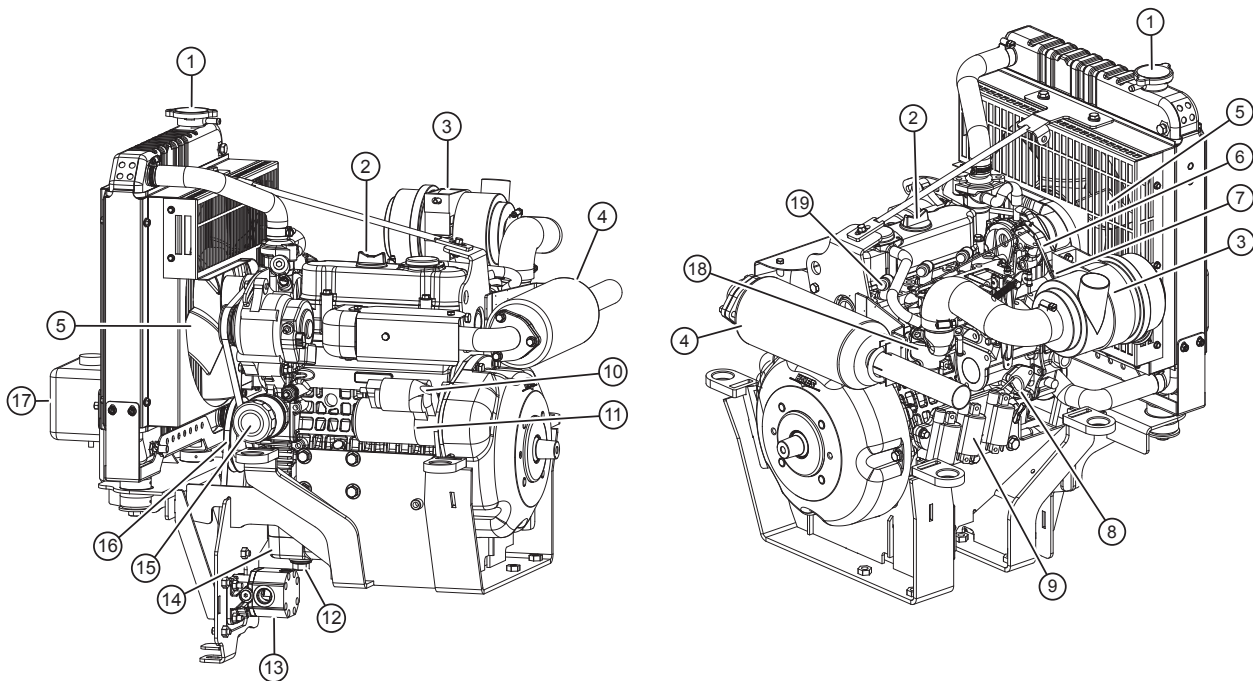


**Figure 4. HHXDF4-DF5**

- 29. **Foot Pedal** — Controls blade speed. Slow blade speed is accomplished by slightly pressing the foot pedal. Maximum blade speed is accomplished by fully pressing the foot pedal.
- 30. **Clamshell Securing Bolt Location (4 places)** — Remove to open clamshell.
- 31. **Battery**— Provides +12V DC power to the electrical system
- 32. **Retardant Spray Filler Cap** — Remove this cap to add spray retardant.
- 33. **Spray Nozzles** — Two retardent spray nozzles are used with the trowel.
- 34. **Hydraulic Oil Reservoir** — Hydraulic fluid top-off point.
- 35. **Test Port-Hydraulic Pressure** — Hook test guage to test port to determine hydraulic pressure during operation.
- 36. **Retardant Spray Control Buttons (Left and Right)** — When pressed, allows retardant spray to flow through the spray nozzle located at the front of the machine.
- 37. **12VDC Power Port** — Accessory power port used to charge personal electronic devices.
- 38. **Lift Points** — Located on both the left and right sides of the main frame. Used when the trowel must be lifted onto a concrete slab.

The following section is intended as a basic guide to the ride-on trowel operation, and is not to be considered a complete guide to concrete finishing. It is strongly suggested that all operators (experienced and novice) read "Slabs on Grade " published by the American Concrete Institute, Detroit Michigan.

# ENGINE COMPONENTS (GASOLINE)

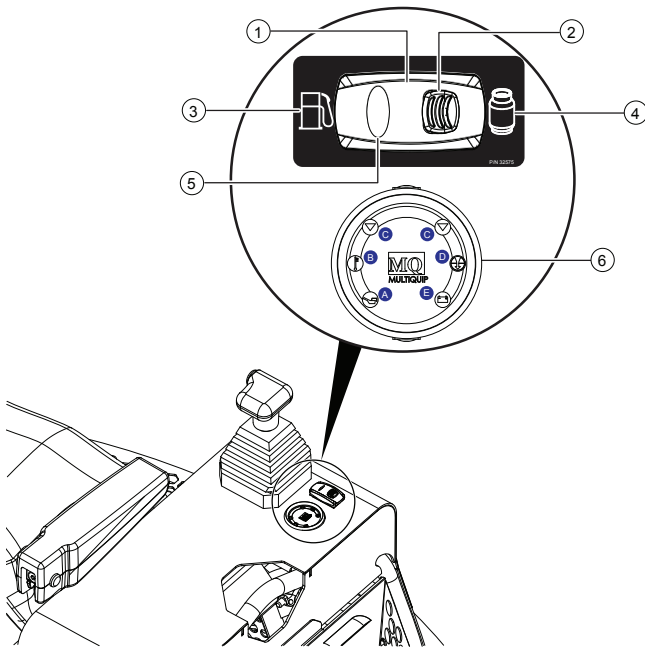


**Figure 5. Engine Components**

1. **Radiator/Filler Cap** — Holds coolant/water necessary to keep the engine at a safe operating temperature. Remove this cap to add water/antifreeze when cool.
2. **Engine Oil Filler Cap** — Remove to add engine oil.
3. **Air Filter** — Helps provide clean source of air flow to engine.
4. **Muffler** — Used to reduce noise and emissions. **DO NOT** touch the muffler while the engine is running.
5. **Fan** — Provides cooling air to the radiator.
6. **Governor Lever** — This lever restricts engine speed (high idle or low idle) through a speed control device linked to the accelerator system.
7. **Vaporizer** — Used for vaporizing liquid fuel gases. Primary function is to heat up LPG.
8. **Oil Dip Stick** — Remove to check amount and condition of oil in crankcase. Lift Seat to access. Add oil as required.
9. **Ignition Coil** — Regulates coolant temperature.
10. **Electric Starter** — Starts engine when ignition key is rotated to the "START" position.
11. **Alternator** — Provides current to the electrical system and charges the battery.
12. **Oil Drain Plug** — Used to drain crankcase oil. Always dispose of used oil and oil filters in an environmentally safe manner. **DO NOT** allow used oil to drain onto the ground or into a water runoff drain. Torque to 33-37 N•m (24-27 lbf-ft).
13. **Hydraulic Pump** — Helps to distribute hydraulic oils through the engine system.
14. **Oil Pan** — Holds a maximum of 3.6 quarts (3.4 liters) of motor oil.
15. **Oil Filter** — Prevents dirt and other debris from entering the engine oil. Provides oil filtering for the engine.
16. **Fan Belt** — Driven by the engine crankshaft during operation, drives the water pump/fan as well as the alternator.
17. **Coolant Recovery Tank** — Holds a maximum of 1.0 quarts (0.95 liters) of excess radiator coolant.
18. **Carburetor** — Low-emission carburetor equipped with an ideal fuel-air mixture valve with a limiter which allows adjustment.
19. **Spark Plug** — Provides spark to the ignition system. Set spark plug gap to 0.024 ~ 0.027 inch (0.6~0.7 mm). Clean spark plug once a week.



# RIGHT FRAME SEAT CONTROLS AND INDICATORS



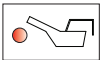
**Figure 6. Control Box**

The definitions below describe the controls and functions on the right seat frame (Figure 6).

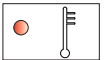
1. **Fuel Selection Rocker Switch** — Two position rocker switch, selects either gasoline or propane fuel systems. When pressed to the right, **PROPANE** mode is selected. When the rocker switch is pressed to the left, **GAS** mode is selected.
2. **Fuel Selection Rocker Switch Lock** — Sliding lock tab prevents unwanted fuel system changes during operation. Slide the **switch lock** to the left and hold, then select desired gas mode. Once mode has been selected release fuel selection rocker switch.

3. **Gas Mode** — Indicates the required position of the fuel selection rocker switch to use **GAS** during operation.
4. **LPG Mode** — Indicates the required position of the fuel selection rocker switch to use **PROPANE** during operation.
5. **Fuel Selection Indicator** — **GREEN LED** indicator illuminates when **PROPANE** is selected. **GREEN LED** indicator **NOT** illuminated when **GAS** is selected
6. **Engine Status Gauge** — Multi Cluster gauge, indicates the following:

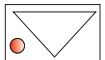
- a. **Low Oil Pressure LED** — When **ON** indicates that the oil pressure has dropped to 7 psi (48.3 kPa). This condition will cause the engine to shutdown. During normal operation of the trowel this LED should remain **OFF**.



- b. **Overheat LED** — This LED goes **ON** when the cooling water temperature rises above 239°F, ± 37.4°F (115°C, ± 3°C). If this LED comes **ON** during normal operation of the pump, the emergency shutdown device will stop the engine automatically.



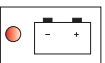
- c. **Auxiliary LEDs** — These status LEDs are not used on this trowel.



- d. **Glow Plug Pre-Heat LED** — This LED goes **ON** when the preheat system is in process. When LED extinguishes, the preheat period is complete and the engine may be cranked.



- e. **Battery Charge LED** — When **ON** indicates that the charging system is not working properly. This condition will cause the engine to shutdown



## NOTICE

The following sections are intended to assist the operator with inspection of the trowel. It is extremely important that these sections are read carefully before attempting to use the trowel in the field. **DO NOT** use your trowel until these sections are thoroughly understood.

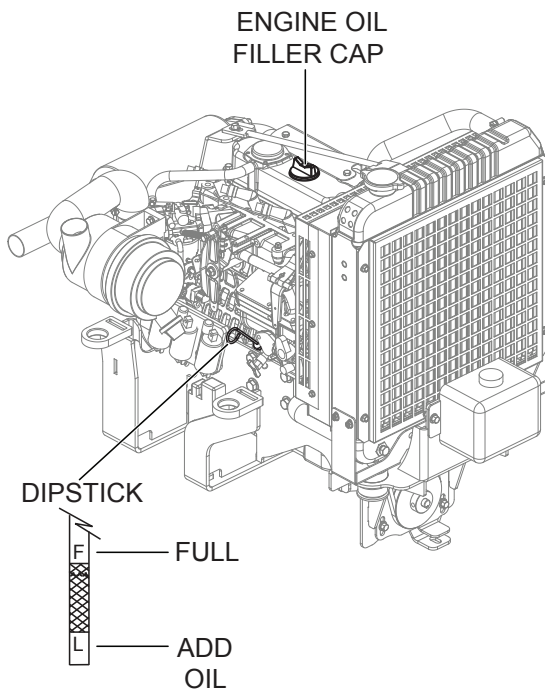
## WARNING

Failure to understand the operation of this trowel may result in personal injury or severe damage to the trowel.

## CAUTION

**DO NOT** overfill the oil pan with engine oil. Always keep the engine oil level between the upper and lower limit lines on the dipstick.

## ENGINE OIL

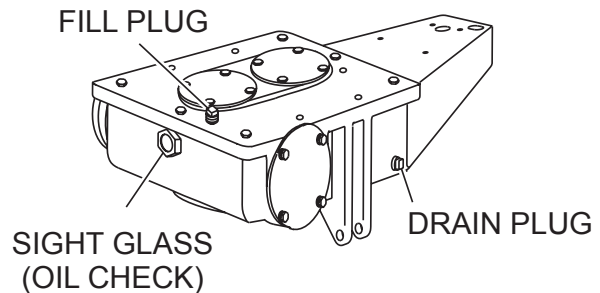
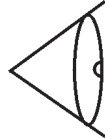


**Figure 7. Engine Oil Check and Fill**

1. When checking or adding oil, place the machine so the engine is level.
2. Pull the engine oil dipstick from its holder (Figure 7).
3. Determine if engine oil is low. Oil should be between the upper limit and lower limit (add oil) lines.
4. If oil is below the "Add Engine Oil" line add oil up to upper limit on the dipstick. Allow enough time for any added oil to make its way to the oil pan before rechecking.

## GEARBOX OIL LEVEL

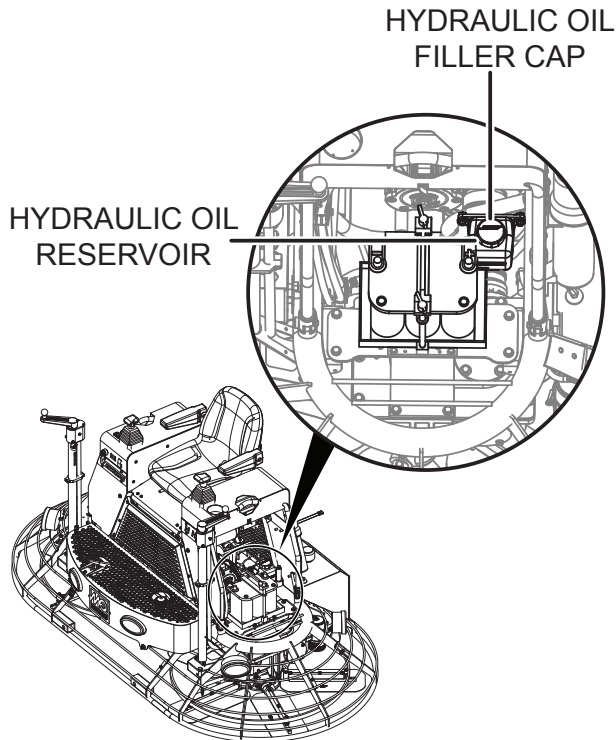
1. Check the gearbox oil level in both gearboxes by viewing the sight glass at the rear of the gearbox. See Figure 8.
2. The oil level of the gear box should be at the half-way point of the sight glass. The gear box oil capacity is 1 U.S. Gallon, (3.79 liters). If additional oil is required, unscrew the oil fill plug located on top of the gearbox, and refill with ISO 220 AGMA GR 5 EP oil.



**Figure 8. Gearbox Oil Plugs**

## HYDRAULIC OIL


1. Check the hydraulic oil condition through the *hydraulic oil reservoir* (Figure 9) next to the battery. Replace hydraulic oil if dirty or if bubbles are present.



**Figure 9. Hydraulic Oil Reservoir**


2. Determine if the hydraulic oil is low in the hydraulic reservoir. **DO NOT** remove the fill cap when the oil is hot or spillage will occur.

**CAUTION**



Hydraulic oil can get **HOT!** **ALWAYS** allow hydraulic oil to cool before removing fill cap.

**CAUTION**



Removal of the fill cap during operation will cause hydraulic oil to spill. Clean up hydraulic oil spills immediately.

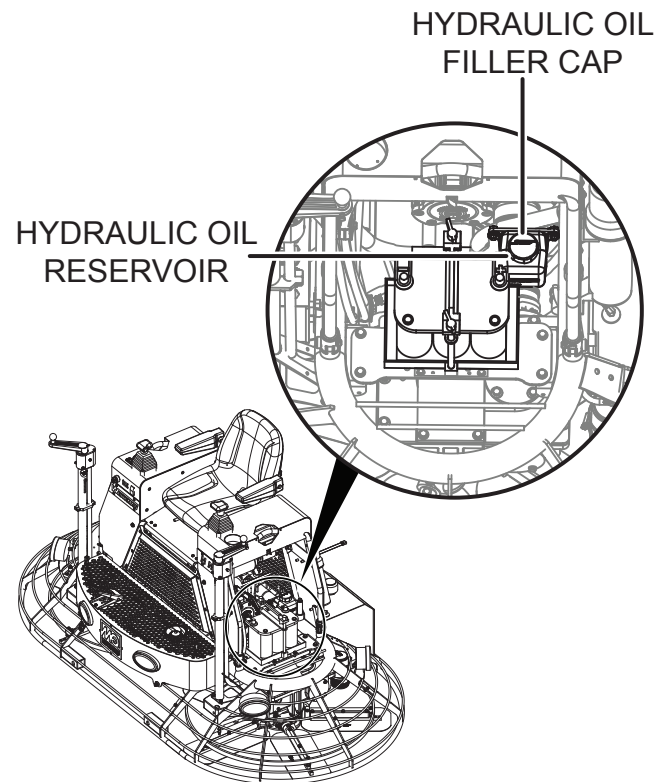
3. To add hydraulic oil, remove fill cap on the hydraulic oil reservoir. Use Chevron Rando HDZ ISO 68 or equivalent.

## HYDRAULIC FLUID FILTER

To determine if the hydraulic fluid filter needs to be changed, view the sight gauge above the hydraulic filter located beneath the foot platform. If the gauge reads in the red area, indicating a filter by-pass condition, the filter needs to be replaced.

### Hydraulic Oil Check

1. To check the hydraulic oil level, place the trowel on a secure flat surface with the engine stopped.
2. Visually inspect the hydraulic oil reservoir (Figure 10). For normal operation the fluid level should be visible when the filler cap is removed.



**Figure 10. Hydraulic Oil Reservoir**

3. If the hydraulic oil level is low, remove the hydraulic oil cap and fill with type Chevron Rando HDZ ISO 68 anti-wear type hydraulic oil to the recommended operating level (0.1 gallons/0.35 liters).

## FUEL CHECK (GASOLINE)

**DO NOT** smoke while refueling, **gasoline** fuel is highly flammable and can be dangerous if mishandled.

### **! DANGER**



Fuel spillage on a **hot** engine can cause a **fire** or **explosion**. If fuel spillage occurs, wipe up the spilled fuel completely to prevent fire hazards. **NEVER** smoke around or near the trowel.

1. To check the engine fuel level, place the trowel on a secure flat surface with the engine stopped.
2. Turn ignition key to the start position and read the fuel gauge to determine if the engine fuel level is low (Figure 11).



**Figure 11. Fuel Gauge**

3. If fuel level is low, remove the fuel filler cap (**RED**), located at the top of the fuel tank (**BLACK**) behind the operator's seat, and fill with unleaded 87 or 89 octane rated (anti-knock index) gasoline fuel. Handle fuel safely. Motor fuels are highly flammable and can be dangerous if mishandled. Wipe up any spilled fuel immediately.

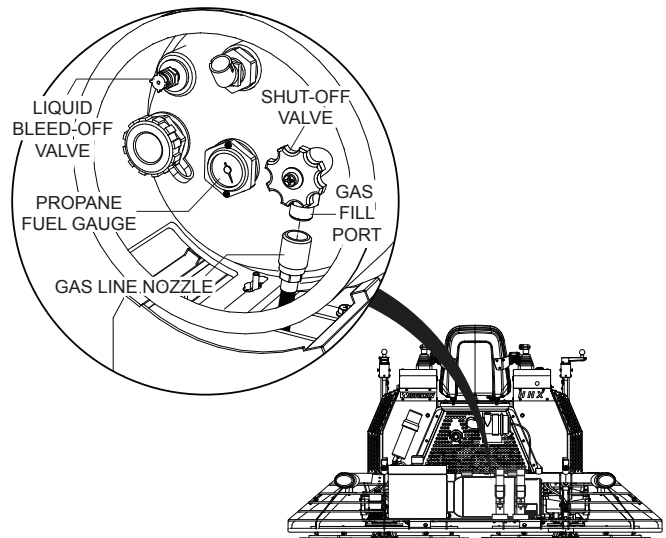
### **NOTICE**

Using lower than 87 octane gasoline may cause heavy pinging resulting in engine damage.

4. Replace the fuel filler cap when done adding fuel.

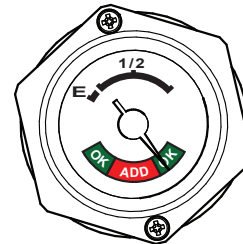
## Fuel Check (LPG\Propane)

1. Turn the shutoff valve knob (Figure 12) clockwise to release propane gas.



**Figure 12. Propane Tank Shut-Off Valve**

2. Read the **propane fuel gauge** (Figure 13) located on top of propane tank.



**Figure 13. Propane Tank Fuel Gauge**

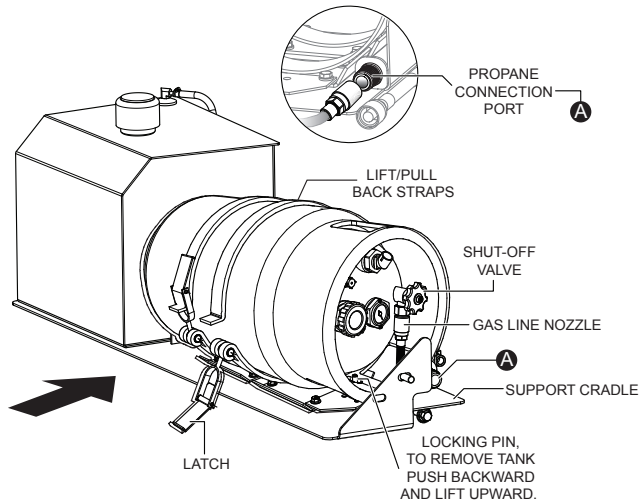
3. If the propane fuel level is low, removal of the empty propane tank from the trowel is required.

### **NOTICE**

HD-5 Propane is the highest grade propane available. HD-10 Propane is a grade below HD-5 Propane. HD-5 Propane is recommended as HD-10 Propane may cause engine components to "gum," or stick, during operation resulting in engine damage.

## Procedure For Removing Propane Tank

1. Place trowel on secure level ground where it will not slip or slide.
2. **CLOSE** shutoff valve on propane tank.



**Figure 14. Propane Tank Removal**

3. Disconnect LPG gas line nozzle from propane tank fill port.
4. Secure LPG gas nozzle/hose to the propane connection port below the propane tank.
5. Release propane tank strap latches.
6. To remove propane tank, push backward and lift upward.
7. Align the propane tank locking slot with the locking pin on the tank support cradle and place new propane tank into the support cradle.
8. Secure propane tank using straps with locking latches.
9. Reconnect LPG gas line nozzle to propane tank fill port.
10. **OPEN** shutoff valve on propane tank.

The purpose of this section is to assist the user in setting up a new trowel. If your trowel is already assembled, (seat, handles, knobs and battery), this section can be skipped.

### NOTICE

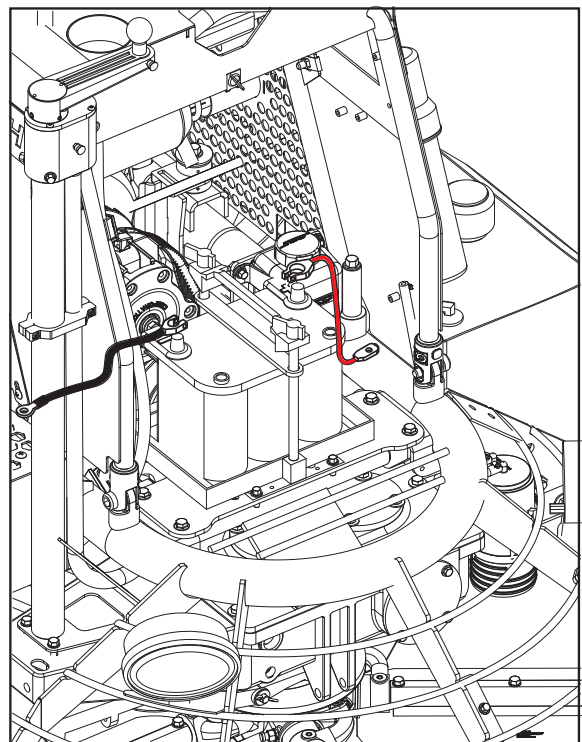
The trowel cannot be put into service until the setup instructions are completed. These instructions only need to be performed at the time of unpacking.

## BATTERY SETUP

### CAUTION

Use all safety precautions specified by the battery manufacturer when working with the battery. See Safety Information section of this manual for more details on battery safety.

1. This trowel is shipped with an installed unconnected wet charged battery. This battery may need to be charged for a brief period of time as per manufacturer's instructions.
2. Connect the positive cable (**RED**) to the positive terminal on the battery first, then connect the negative cable (**BLACK**) to the negative terminal (Figure 15).



**Figure 15. Battery Box**

## STARTING THE ENGINE

### NOTICE

This trowel is equipped with a seat switch. The trowel will not start unless an operator is sitting in the seat.

### WARNING

**NEVER** disable or disconnect the seat switch. It is provided for the operator's safety. Injury may result if it is disabled, disconnected or improperly maintained.

### WARNING



**NEVER** operate the trowel in a confined area or enclosed area structure that does not provide ample free flow of air.

### CAUTION



**ALWAYS** wear approved eye and hearing protection before operating the trowel.

### CAUTION

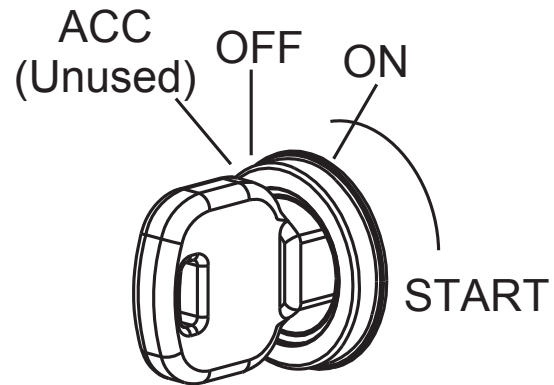
**NEVER** place hands or feet inside the guard rings while the engine is running. **ALWAYS** shut the engine down before performing any kind of maintenance service on the trowel.

1. With one foot on the ground and the other foot placed on the footstep, grasp the lifting handles lifting yourself onto the trowel. Then sit down in the operator seat.

### NOTICE

**DO NOT** grab hold of the joysticks to lift yourself onto the trowel. Pulling on the joysticks repeatedly will weaken the units. **ALWAYS** use the lifting handles to lift yourself on the trowel.

2. Insert the ignition key into the ignition switch (Figure 16).



**Figure 16. Ignition Switch and Key**

3. Turn the ignition key clockwise to the **ON** position.

4. Select the desired fuel mode: **GAS** or **LPG**.
5. Slide the rocker switch lock (Figure 17) to the left and hold. This unlocks the fuel selection rocker switch.

## NOTICE

The **fuel selection rocker switch** must be unlocked before **Gas** or **LPG** mode can be selected. Slide the **switch lock** to the left and hold, then select desired gas mode. Once mode has been selected release fuel selection rocker switch.

6. To select the **GAS** mode, press down on the left side of the fuel selection rocker switch. The **GREEN** light is **OFF** (Figure 17).

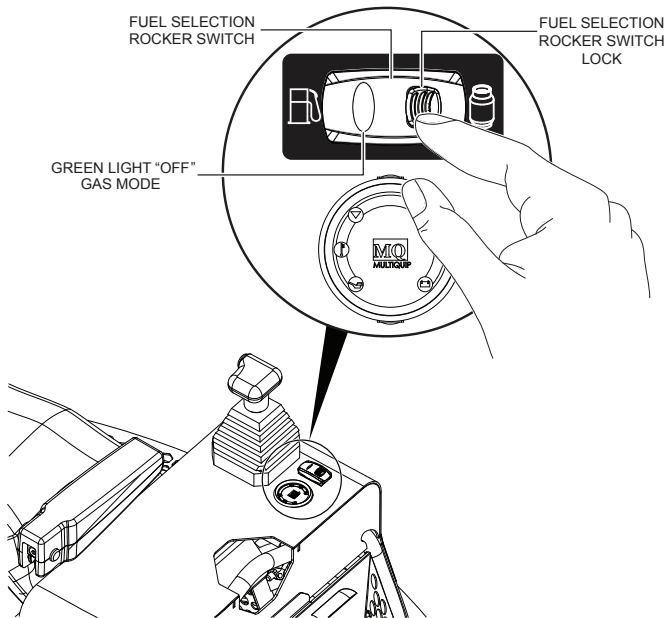


Figure 17. Fuel Selection Switch (Gas Mode)

7. To select the **LPG** mode, press down on the right side of the fuel selection rocker switch. The **GREEN** light is **ON** (Figure 18).

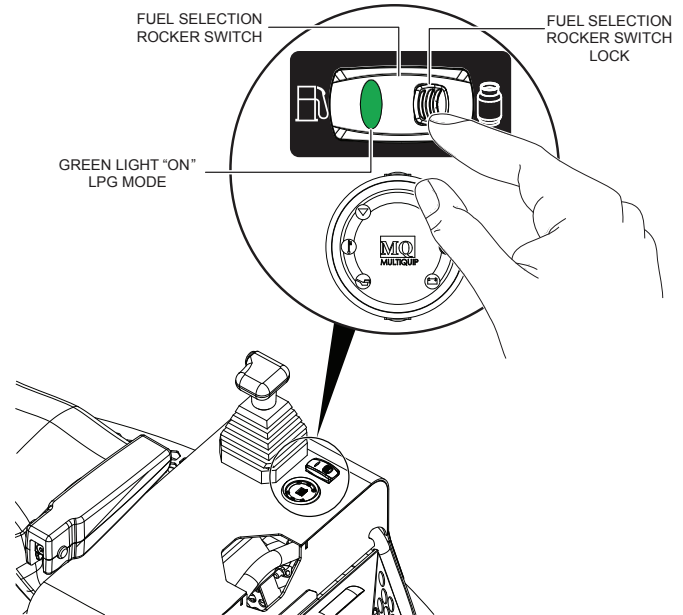
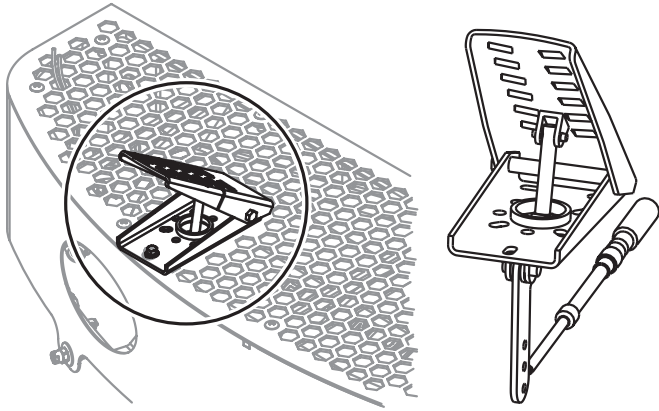


Figure 18. Fuel Selection Switch (LPG Mode)

## NOTICE

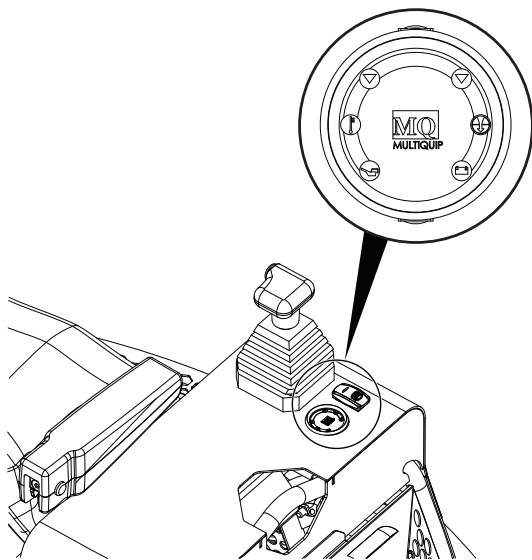
When the changing of gas modes is desired during operation, the engine does not need to be stopped. Gas mode switching may be performed during trowel operation.

- The foot pedal (Figure 19) solely controls blade speed. The position of the foot pedal determines the blade speed. Slow blade speed is obtained by slightly pressing the pedal. Maximum blade speed is obtained by fully pressing the pedal.



**Figure 19. Blade Speed Control Foot Pedal**

- Keep your foot **OFF** the foot pedal. If the engine is cold, adjust the choke but in all circumstances, start the engine at idle (without touching foot pedal).
- Turn the ignition key fully clockwise to the **START** position. Once the engine has started, release the ignition key. The throttle speed defaults to idle to allow the engine to warm to operating temperature.
- Verify that the oil pressure and charge lamps (Figure 20) are **ON**.



**Figure 20. Oil Pressure/Charge Lamps**

- Let engine idle for 3 to 5 minutes. Listen for any abnormal sounds. If choke is applied, push the choke to the open position as soon as the engine will run smoothly.
- If the engine fails to start in this manner, consult the engine owner's manual supplied with the trowel.
- Repeat this section a few times to get fully acquainted with the engine starting procedure. Then test the **seat switch**.

## TESTING SEAT SWITCH

### **WARNING**

**NEVER** disable or disconnect the seat switch. It is provided for the operator's safety. Injury may result if it is disabled, disconnected or improperly maintained.

- With the engine running press the foot pedal to begin blade (rotor) rotation. Observe that the blade are rotating.
- Rise from the operator seat.
- Verify blade rotation stops and engine is still running.
- If blade rotation has stopped, this verifies that the seat switch is working.
- If blade rotation continues, this verifies that the seat switch is not working. Stop machine immediately and correct problem.



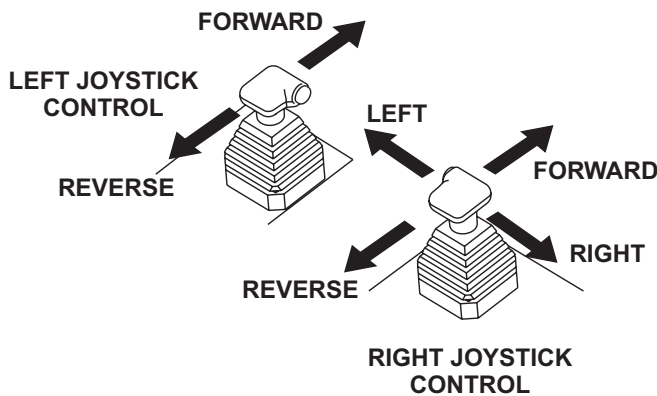
## STEERING

Two joysticks (Figure 21) located to the left and right of the operator's seat provide directional control for the trowel. Table 4 illustrates the various directional positions of the joysticks and their effect on the trowel.

### NOTICE

All directional references with respect to the steering Control Joysticks are from the **operator's** seat position.

1. Push both the left and right Control Joysticks forward. See Figure 21.



**Figure 21. Left and Right Control Joysticks**

2. With your right foot quickly press the right foot pedal halfway. Notice that the trowel begins to move in a forward direction. Return both joystick controls to their neutral position to stop forward movement, then remove your right foot from the right foot pedal.
3. Practice holding the machine in one place as you increase blade speed. When about 75% of maximum blade speed has been reached, the blade will be moving at proper finishing speed. The machine may be difficult to keep in one place. Trying to keep the trowel stationary is a good practice for operation.
4. Practice maneuvering the trowel using the information listed in Table 4. Try to practice controlled motions as if you were finishing a slab of concrete. Practice edging and covering a large area.
5. Try adjusting the pitch of the blades. This can be done with the trowel stopped or while the trowel is moving, whatever feels comfortable. Test the operation of optional equipment like retardant spray and lights if equipped.

6. Push both the left and right joysticks backward and repeat steps 3 through 6 while substituting the word reverse for forward.

**Table 4. Control Joystick Directional Positioning**

CONTROL JOYSTICK & DIRECTION	RESULT
Move <b>LEFT</b> Joystick FORWARD ↑	Causes only the left side of the ride-on trowel to move forward. ↗
Move <b>LEFT</b> Joystick BACKWARD ↓	Causes only the left side of the ride-on trowel to move backward. ↖
Move <b>RIGHT</b> Joystick FORWARD ↑	Causes only the right side of the ride-on trowel to move forward. ↘
Move <b>RIGHT</b> Joystick BACKWARD ↓	Causes only the right side of the ride-on trowel to move backward. ↙
Move <b>BOTH</b> Joysticks FORWARD ↑      ↑	Causes the ride-on trowel to move forward in a straight line. ↑      ↑
Move <b>BOTH</b> Joysticks BACKWARD ↓      ↓	Causes the ride-on trowel to move backward in a straight line. ↓      ↓
Move <b>RIGHT</b> Joysticks to the RIGHT →      →	Causes the ride-on trowel to move to the right. →      →
Move <b>RIGHT</b> Joysticks to the LEFT ←      ←	Causes the ride-on trowel to move to the left. ←      ←

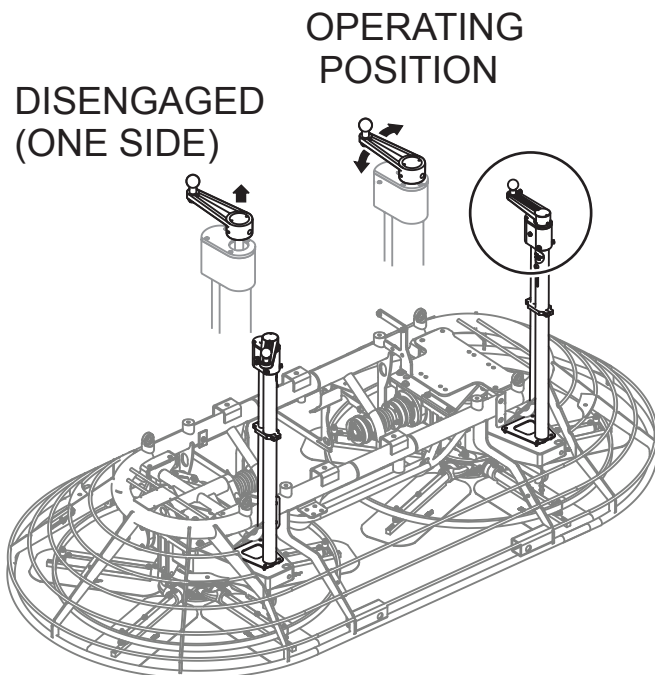
## BLADE PITCH

Sometimes it may be necessary to match blade pitch between the two sets of blades. There are some signs that this may be necessary. For example, the differences in pitch could cause a noticeable difference in finish quality between the two sets of blades. Or, the difference in blade pitch could make the machine difficult to control. This is due to the surface area in contact with the concrete (the blade set with the greater contact area tends to stick to the concrete more).

### *Matching Blade Pitch for Both Sets of Blades*

Trowels equipped with Twin Pitch™ Controls may need to have blade pitch between the two sets of blades "synchronized." If the blades need to be synchronized this is easily accomplished by performing the following. Refer to Figure 22.

1. Lift the pitch adjustment handle on either side. Once lifted, that side is now disconnected from the Twin Pitch™ system.
2. Adjust to match the opposite side.
3. When adjusted, lower the handle to Twin Pitch™ operating position.



**Figure 22. Pitch Towers**

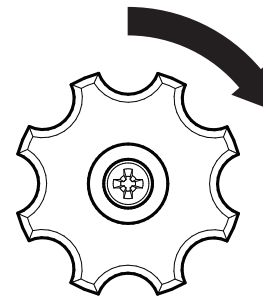
## ENGINE SHUTDOWN

1. Release the foot pedal to stop blade (rotor) rotation and idle the engine. Let engine idle for 3-5 minutes.
2. Verify blade rotation has stopped and the engine is still running.

### **NOTICE**

Failure to allow the engine to idle for 5 minutes before shutting engine **OFF** may lead to damage.

3. Turn the ignition key counterclockwise to the **OFF** position. Then remove the key.
4. If LPG mode was in use, turn shut off valve knob clockwise to **CLOSE** (Figure 23).



**Figure 23. Propane Tank Shut-Off Valve (Closed)**

5. Clean and remove any foreign debris from the trowel.

# MAINTENANCE

**Table 5. Engine Maintenance Schedule**

Item	Daily	Every 50 Hours	Every 100 Hours	Every 200 Hours	Every 1 Year	Every 1000 Hours	Every After 1000 Hours	Every 2 Years
Checking Engine Oil Level	X							
Checking And Replenish Coolant	X							
Checking Air Cleaner Element	If Necessary							
Checking LPG Tank Setting Condition	If Necessary							
Checking LPG Fuel Connector	X							
Cleaning Air Cleaner		X						
Checking Gasoline Fuel Hose and Clamp Bands		X						
Checking LPG Fuel Hose And Clamp Bands		X						
LPG Fuel Check		X						
Checking Battery Electrolyte Level		X						

# MAINTENANCE

**Table 6. Engine Maintenance Schedule (Continued)**

Item	Daily	Every 50 Hours	Every 100 Hours	Every 200 Hours	Every 1 Year	Every 1000 Hours	Every After 1000 Hours	Every 2 Years
Cleaning Spark Plug			X					
Checking Fuel Filter			X					
Check Fan Belt Tension And Damage			X					
Changing Engine Oil		X		X				
Replacing Oil Filter Cartridge		X		X				
Checking LPG Tank Setting Condition				X				
Checking Radiator Hoses And Clamp Bands				X				
Replacing Air Cleaner Element (Replace After 6 Times Cleaning)					X			
Replacing Gasoline Fuel Hose, Clamp Bands And Fuel Filter					X			

# MAINTENANCE

**Table 7. Engine Maintenance Schedule (Continued)**

Item	Daily	Every 50 Hours	Every 100 Hours	Every 200 Hours	Every 1 Year	Every 1000 Hours	Every After 1000 Hours	Every 2 Years
Cleaning Fuel Tank Inside					X			
Cleaning Water Jacket And Radiator Interior					X			
Replacing Spark Plugs							X	
Checking Coolant Hose of LPG Vaporizer							X	
Checking Vacuum Lock Hose of LPG Vaporizer							X	
Draining Tar							X	
Checking Valve Clearance							X	
Cleaning Combustion Chamber							If Necessary	
Replacing Intake Air Line								X
Replacing Breather Hose								X

# MAINTENANCE

**Table 8. Engine Maintenance Schedule (Continued)**

Item	Daily	Every 50 Hours	Every 100 Hours	Every 200 Hours	Every 1 Year	Every 1000 Hours	Every After 1000 Hours	Every 2 Years
Replacing LPG Fuel Hose And Clamp Bands								X
Replacing Coolant Hose of LPG Vaporizer								X
Replacing Vacuum Lock Hose of LPG Vaporizer								X
Checking Primary Chamber								X
Checking Air Tight of Secondary Chamber								X
Checking Vacuum Lock System								X
Replacing Radiator Hoses and Clamp Bands								X
Replacing Battery								X
Replacing Ignition Wires								X
Changing Radiator Coolant (L.L.C.)								X

## MAINTENANCE

When performing any maintenance on the trowel or engine, follow all safety messages and rules for safe operation stated at the beginning of this manual. See the engine manual supplied with your machine for appropriate engine maintenance schedule and troubleshooting guide for problems.

At the front of the book there is a “Daily Pre-Operation Checklist”. Make copies of this checklist and use it on a daily basis.

### **WARNING**

Certain maintenance operations or machine adjustments require specialized knowledge and skill. Attempting to perform maintenance operations or adjustments without the proper knowledge, skills or training could result in equipment damage or injury to personnel. If in doubt, consult your dealer.

## MAINTENANCE SCHEDULE

### Daily (8-10 Hours)

1. Thoroughly remove dirt and oil from the engine and control area.
2. Check the fluid levels in the engine and gearboxes, fill as necessary. Check air filter. See section on air filter servicing.

### Weekly (30-50 Hours)

1. Relube arms, thrust collar and steering links.
2. Replace blades if necessary.
3. Check and clean or replace the engine air filter as necessary. (See following section on air Filter Maintenance.)
4. Replace engine oil and filter as necessary. (See following section on Oil and Filter)
5. Check and retighten all fasteners as necessary.

### Monthly (100-150 Hours)

1. Remove, clean, reinstall and relube the arms and thrust collar. Adjust the blade arms.
2. Replace gearbox lubricant after the first 100 hours of operation. Replace every 500-600 hours.
3. Check drive belt for excessive wear.
4. Replace engine oil and filter as necessary, see engine manual.

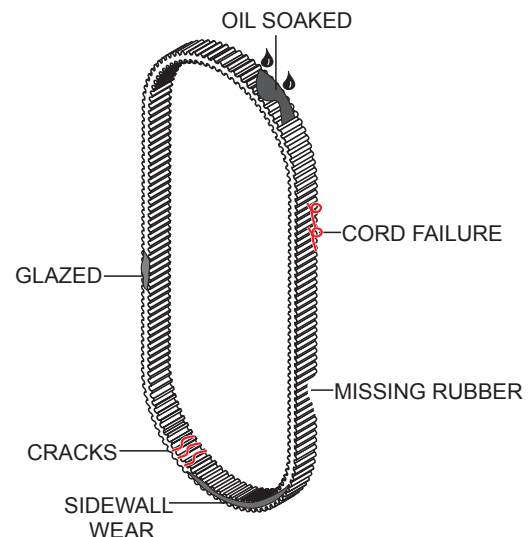
### Yearly (500-600 Hours)

1. Check the arm bushings, thrust collar bushings, shaft seals and belts. Replace if necessary
2. Check pitch control cables for wear.
3. Replace gearbox lubricant.
4. Check and adjust blade speed.

## CHECKING THE SERPENTINE DRIVE BELT

The drive belt needs to be changed as soon as it begins to show signs of wear. **DO NOT** reuse a belt under any circumstances. Indications of excessive belt wear are fraying, squealing when in use, belts that emit smoke or a burning rubber smell when in use.

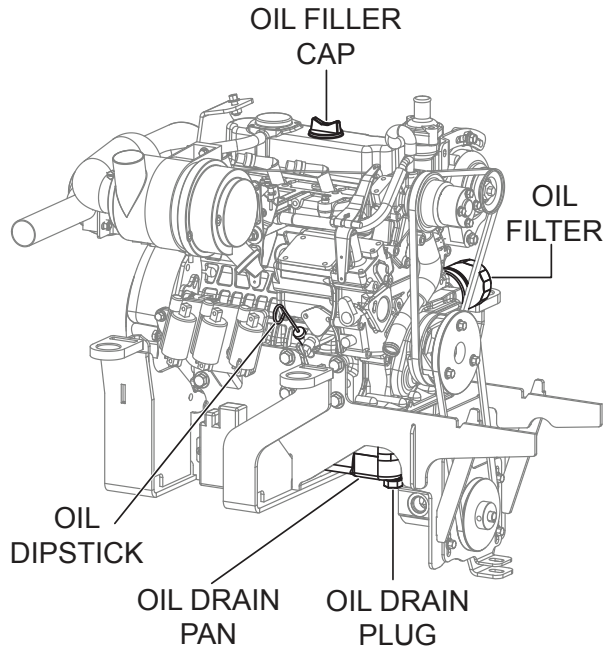
To gain access to the drive belt (Figure 24), remove the drive belt guard cover, then visually inspect the drive belt for signs of damage or excessive wear. If the drive belt is worn or damaged, replace the drive belt.



**Figure 24. Drive Belt Inspection**





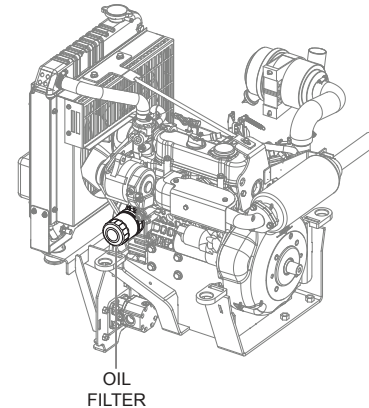


**Figure 26. Engine Service Oil Components**

1. Remove the oil filler cap while draining the oil to allow the engine to drain easily.
2. Remove the drain plug to drain the oil.
3. After oil is sufficiently drained, securely tighten the drain plug.
4. Using a filter wrench, turn the oil filter counterclockwise to remove.
5. Clean sealing surface on engine where filter mounts.
6. Coat the seal of the new oil filter with clean engine oil. Install new filter first by hand until it contacts the engine sealing surface. Tighten it another 3/4 turn using the filter wrench.
7. Fill engine with oil until it shows between the upper and lower limits on the dipstick. **DO NOT** overfill.
8. Crankcase oil capacity with oil filter replacement is 3.5 qts. (3.3 liters).
9. Run the engine briefly for several minutes. Watch for oil leakage. Shut the engine down and allow it to sit for several minutes. Top off the oil to the upper limit on the dipstick.

## Oil Filter (200 Hours)

1. Replace the engine oil filter (Figure 27) every other oil change or 200 hours. Refer to your engine manual for specific details to perform this operation.

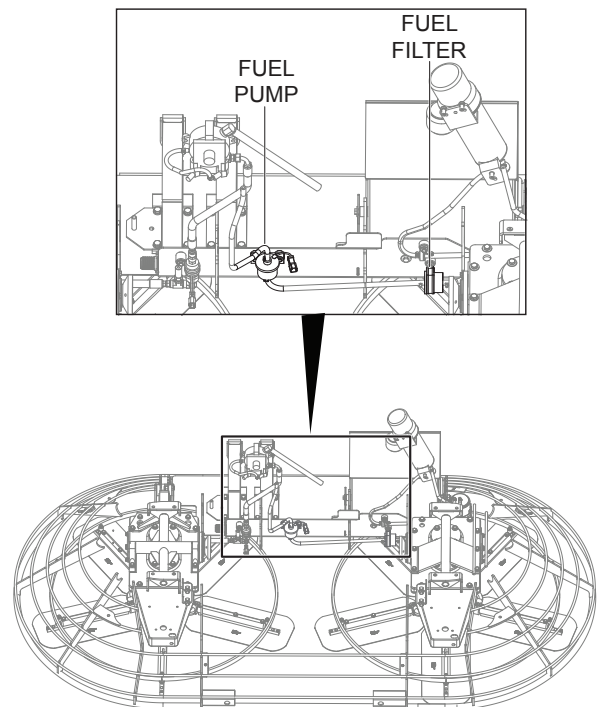


**Figure 27. Oil Filter**

2. Be sure to coat the seal (Figure 27) of the new oil filter with clean engine oil.

## Fuel Filter

- Replace the engine fuel filter (Figure 28) every 1 year. Refer to your engine manual for specific details to perform this operation.



**Figure 28. Fuel Filter**

## FUEL TANK

### CAUTION

**DO NOT** store the trowel with fuel in the tank for an extended period of time. Completely drain the fuel system (tank, lines, etc.) if the unit is to be put into long term storage.

For shorter or intermediate periods of time the tank should be filled to avoid condensation that could cause contamination of the fuel.

### Removing Water from the Fuel Tank

After prolonged use, water and other impurities accumulate in the bottom of the tank. Occasionally inspect the fuel tank for water contamination and drain the contents if required.

During cold weather, the more empty volume inside the tank, the easier it is for water to condense. This can be reduced by keeping the tank full with unleaded gasoline.

### Cleaning Inside the Fuel Tank

If necessary, drain the fuel inside the fuel tank completely. Using a spray washer wash out any deposits or debris that have accumulated inside the fuel tank.

### Adding Fuel

When adding fuel always use clean, fresh unleaded 87 or 89 octane rated fuel.

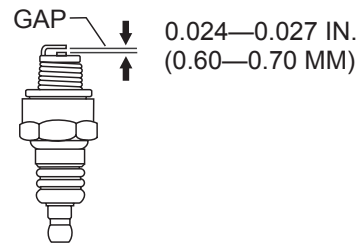
## FUEL TANK INSPECTION

In addition to cleaning the fuel tank, the following components should be inspected for wear:

- **Fuel Hoses** — Inspect nylon and rubber hoses for signs of wear, deterioration and hardening.
- **Fuel Tank Lining** — Inspect the fuel tank lining for signs of excessive amounts of oil or other foreign matter.

## Spark Plugs

1. Make sure the engine is cool before servicing the spark plugs.
2. Disconnect the spark plug caps. Check for dirt and remove any dirt from around the spark plug area.
3. Remove the spark plugs.
4. If the spark plugs are damaged, the sealing washer is in poor condition, or if the electrode is worn, replace the spark plugs.
5. Measure the spark plug electrode gap (Figure 29) with a wire-type feeler gauge. If needed, adjust the gap between 0.024—0.027 in. (0.60—0.70 mm) by carefully bending the side electrode.



**Figure 29. Spark Plug Gap Adjustment**

6. Install the spark plug carefully, by hand, to avoid cross threading.
7. After the spark plug is seated, tighten with a spark plug wrench to compress the sealing washer.
8. When installing a new spark plug, tighten 1/2 turn, after the spark plug seats, to compress the washer.
9. When reinstalling the original spark plug, tighten 1/8-1/4 turn after the spark plug seats to compress the washer.
10. Tighten the spark plugs between 20—24 N•m (15—18 lbf•ft; 2.0—2.5 kgf•m).
11. Reattach the spark plug caps.

## OIL AND FUEL LINES

1. Check the oil and fuel lines and connections regularly for leaks or damage. Repair or replace as necessary.
2. Replace the oil and fuel lines every two years to maintain the line's performance and flexibility.

### CAUTION

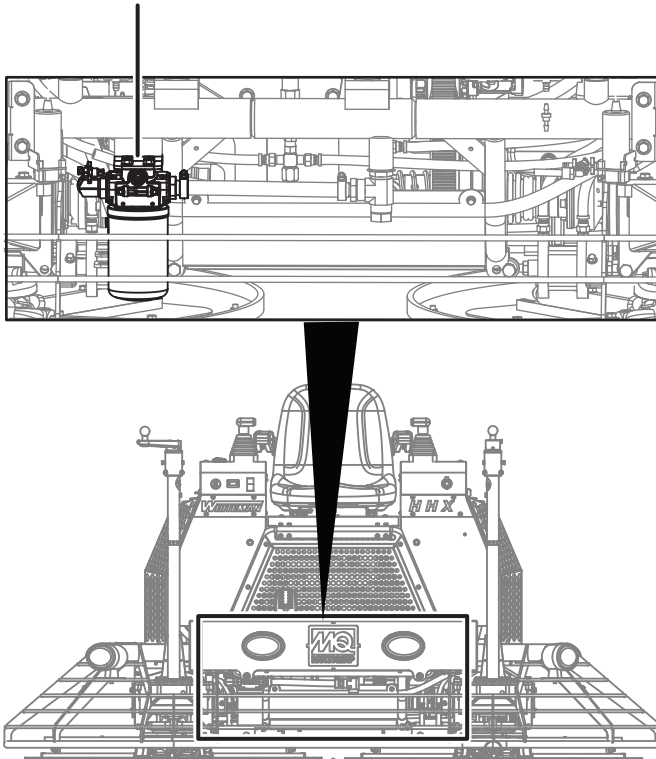


**NEVER** place hands near the belts or fan while the trowel is running.

## HYDRAULIC OIL FILTER

1. Change the hydraulic oil and filters (Figure 30) after the first 100 hours of use then change every 250 hours. Use 10 micron absolute synthetic media filters.

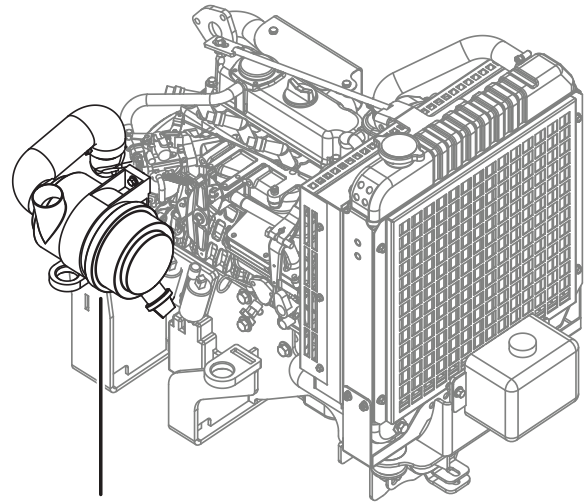
### HYDRAULIC OIL FILTER



**Figure 30. Hydraulic Oil Filter**

## Air Cleaner (Daily)

The Kubota WG972 engine is equipped with a replaceable, high-density paper air cleaner element. Check the air cleaner daily or before starting the engine everyday. Check for and correct heavy buildup of dirt and debris along with loose or damaged components every day, (Figure 31).



**AIR  
CLEANER**

**Figure 31. Air Cleaner**

1. Unlock the cover clamps and remove cover.
2. Remove cartridge from air cleaner body.
3. Clean cartridge by gently tapping the end with the handle of a screwdriver. Replace cartridge if very dirty or damaged.
4. Carefully clean out the air cleaner cover.
5. Install cartridge in body.
6. Install cover and lock cover clamps.

### NOTICE

Operating the engine with loose or damaged air cleaner components could allow unfiltered air into the engine causing premature wear and failure.

## RADIATOR/COOLING SYSTEM

### CAUTION



**HOT** coolant can cause severe burns. **DO NOT** remove cap if radiator is **HOT**.

### NOTICE

The engine manufacturer recommends the cooling system be filled with a 50/50 mixture of coolant and water.

1. Check radiator for leaks that would indicate corrosion or damage.
2. Check coolant/antifreeze level daily. Top off as necessary. Always use clean, soft water and add a long life coolant/antifreeze. Use the mixing ratios specified by the antifreeze manufacturer. Replace coolant/antifreeze at least once a year.
3. Check radiator hoses for fatigue or cracking. Replace if in doubt of the integrity of the hoses.
4. Check radiator cap seal and replace as necessary.

Refer to your engine manual for additional information.

## RADIATOR CLEANING

1. Blow off dirt and dust from fins and radiator with 28 psi (193 kPa) or less of compressed air (Figure 32). Be careful not to damage the fins with the compressed air.
2. If there a large amount of contamination on the fins, use detergent to clean and rinse thoroughly with tap water.

### CAUTION

**NEVER** use high-pressure water or compressed air at greater than 28 psi (193 kPa) or a wire brush to clean the radiator fins. Radiator fins damage easily.

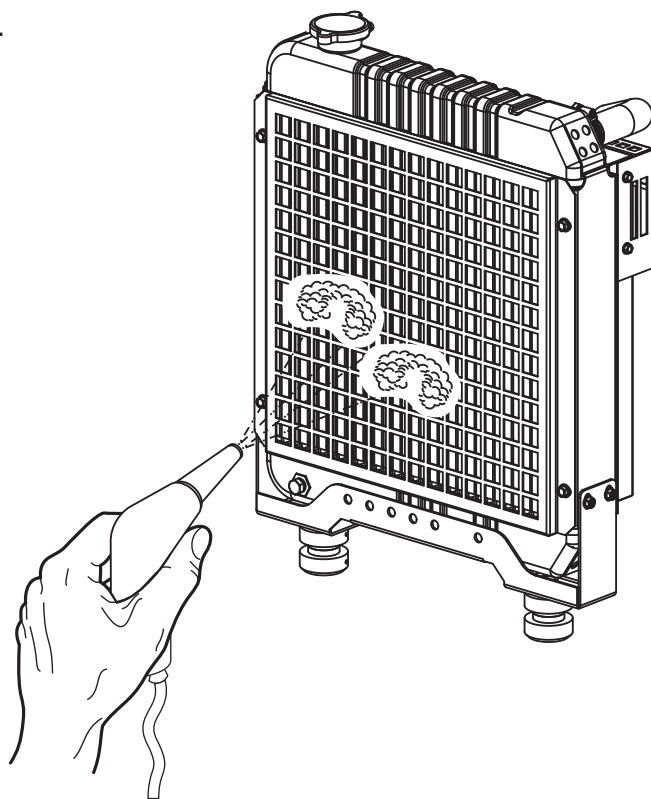


Figure 32. Radiator Cleaning

## OIL/WATER SEPARATOR

Drain water from the bottom of the fuel filter by loosening the drain plug and allowing the water to drain out. Refer to your engine manual for specific details to perform this operation.

## Oil And Fuel Lines

1. Check the oil and fuel lines and connections regularly for leaks or damage. Repair or replace as necessary.
2. Replace the oil and fuel lines every two years to maintain the line's performance and flexibility.

## Radiator/Cooling System

### **WARNING**

Hot coolant can cause severe burns. **DO NOT** remove cap if radiator is **HOT**.

1. Check and clean radiator fins.
2. Check cooling water.
3. Check radiator hoses for fatigue or cracking.
4. Check radiator cap seal.

## Battery/Charging System

1. Check and clean battery terminals for corrosion.
2. Check and keep battery electrolyte between upper and lower limits indicated on the battery. Never operate or recharge without sufficient fluid in the battery.
3. Never attempt to charge a battery that is frozen. The battery can explode unless first allowed to thaw.
4. Disconnect the negative terminal ( - ) of the battery during storage. If unit will be stored where ambient temperature will drop to -15°C or less, remove and store battery in a warm, dry place.

## Long Term Storage

- Remove the battery.
- Drain fuel from fuel tank.
- Clean exterior with a cloth soaked in clean oil.
- Store unit covered with plastic sheet in moisture and dust-free location out of direct sunlight.

### **CAUTION**

Never store the ride-on trowel with fuel in the tank for any extended period of time. Always clean up spilled fuel immediately.

## ENGINE TUNE-UP

At the front of this manual is a “**Daily Pre-Operation Checklist**”. Make copies of this checklist and use it on a daily basis.

### **NOTICE**

See the engine manual supplied with your machine for appropriate engine maintenance schedule and troubleshooting guide for problems.

**ALWAYS** disconnect battery cables before attempting any service or maintenance on the trowel.

# MAINTENANCE (TROWEL)

## Blade Pitch

### *Matching Blade Pitch for Both Sets of Blades*

Sometimes it may be necessary to match blade pitch between the two sets of blades. There are some signs that this may be necessary. For example, the differences in pitch could cause a noticeable difference in finish quality between the two sets of blades, or, the difference in blade pitch could make the machine difficult to control. This is due to the surface area in contact with the concrete (the blade set with the greater contact area tends to stick to the concrete more).

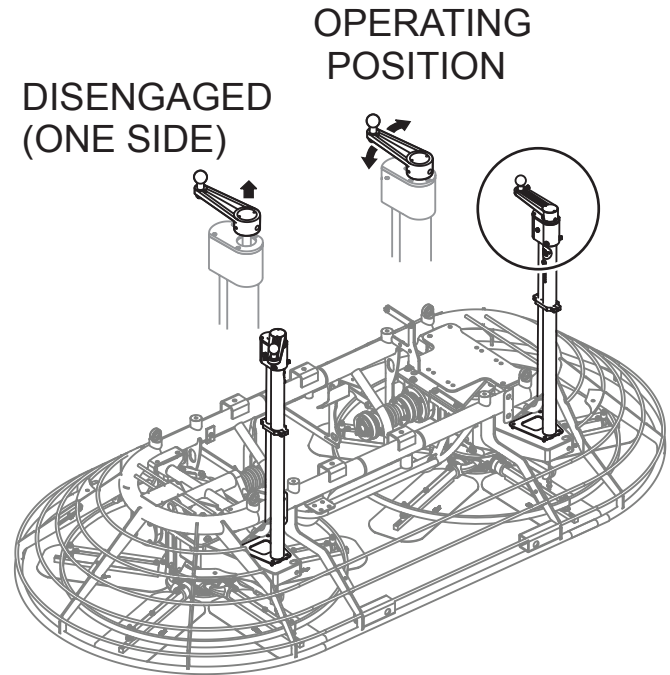
### Single Pitch

On a Single Pitch trowel each spider assembly can be pitched individually, forcing the operator to constantly make adjustments on each pitch tower.

### Twin Pitch™

Trowels equipped with Twin Pitch™ Controls may need to have blade pitch between the two sets of blades "synchronized". If the blades need to be synchronized this is easily accomplished by performing the following. Refer to Figure 33.

1. Lift the pitch adjustment handle on either side. Once lifted, that side is now disconnected from the Twin Pitch system.
2. Adjust to match the opposite side.
3. When adjusted, lower the handle to Twin Pitch operating position.



**Figure 33. Pitch Towers**

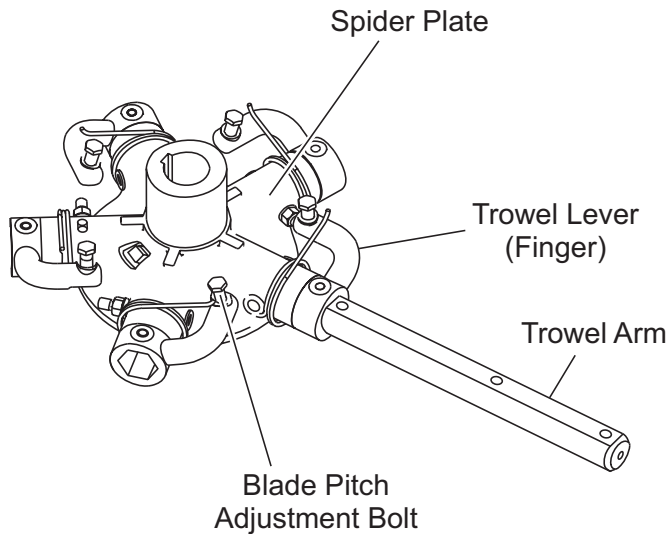
### Blade Pitch Adjustment Procedure

Maintenance adjustment of blade pitch is made by adjusting a bolt (Figure 34) on the arm of the trowel blade finger. This bolt is the contact point of the trowel arm to the lower wear plate on the thrust collar. The goal of adjustment is to promote consistent blade pitch and finishing quality.

Look for the following indications if blades are wearing unevenly. If so, adjustment may be necessary.

- Is one blade is completely worn out while the others look new?
- Does the machine have a perceptible rolling or bouncing motion when in use?
- Look at the machine while it is running, do the guard rings "rock up and down" relative to the ground?
- Do the pitch control towers rock back and forth?

## MAINTENANCE (TROWEL)



**Figure 34. Blade Pitch Adjustment Bolt**

The easiest and most consistent way to make adjustments on the trowel arm fingers is to use the Trowel Arm Adjustment Fixture (P/N 9177). It comes with all the hardware necessary to properly accomplish this maintenance and instructions on how to utilize this tool.

If a trowel arm adjustment fixture is not available and immediate adjustment is necessary, temporary field adjustment can be made if you can see or feel which blade is pulling harder by adjusting the bolt that corresponds to that blade.

A better way to determine which blades need adjustment is to place the machine on a known FLAT surface (steel metal plate) and pitch the blades as flat as possible. Look at the adjustment bolts. They should all barely make contact with the lower wear plate on the spider. If you can see that one of them is not making contact, some adjustment will be necessary.

Adjust the “high” bolts down to the level of the one that is not touching, or adjust the “low” bolt up to the level of the higher ones. If possible, adjust the low bolt up to the level of the rest of the bolts. This is the fastest way, but may not always work. Verify after adjustment the blades pitch correctly.

Blades that are incorrectly adjusted often will not be able to pitch flat. This can occur if the adjusting bolts are raised too high. Conversely, adjusting bolts that are too low will not allow the blades to be pitched high enough for finishing operations.

If, after making Blade Pitch adjustments the machine is still finishing poorly, blades, trowel arms, and trowel arm bushings may be suspect and should be looked at for adjustment, wear, or damage. See the following sections.

### Changing Blades

It is recommended that ALL the blades on the entire machine are changed at the same time. If only one or some of the blades are changed, the machine will not finish concrete consistently and the machine may wobble or bounce.

1. Place the machine on a flat, level surface. Adjust the blade pitch control to make the blades as flat as possible. Note the blade orientation on the trowel arm. This is important for ride-on trowels as the two sets of blades counter-rotate. Lift the machine up, placing blocks under the main guard ring to support it.
2. Remove the bolts and lock washers on the trowel arm, and then remove the blade.
3. Scrape all concrete and debris from the trowel arm. This is important to properly seat the new blade.
4. Install the new blade, maintaining the proper orientation for direction of rotation.
5. Reinstall the bolts and lock washers.
6. Repeat steps 2-5 for all remaining blades.

### Steering Adjustment

The steering assist adjustment should be performed only by qualified service technicians. For HHX-G5 steering adjustment instructions, reference MQ Whiteman service bulletin 200925.

### Clean-Up

Never allow concrete to harden on the power trowel. Immediately after use wash any concrete off the trowel with water, be careful not to spray a hot engine or muffler. An old paint brush or broom may help loosen any concrete that has started to harden.

# MAINTENANCE (TROWEL)

## Trowel Arm Adjustment

Use the following procedure to check and adjust trowel arms, and check for worn or damaged components when it becomes apparent that the trowel is finishing poorly or in need of routine maintenance.

Look for the following indications. Trowel arm alignment, worn spider bushings or bent trowel arms may be the cause.

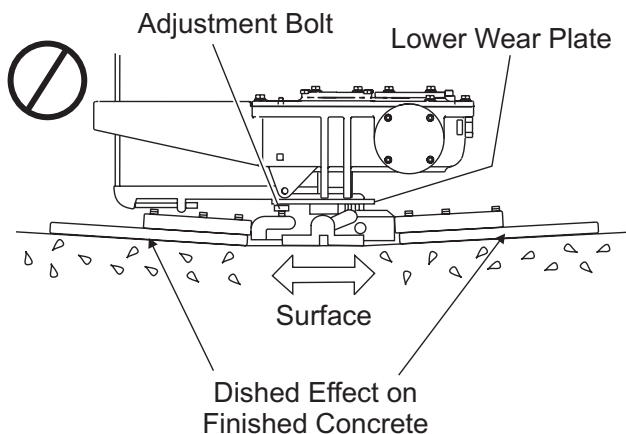
- Are blades wearing unevenly? Is one blade completely worn out while the others look new?
- Does the machine have a perceptible rolling or bouncing motion when in use?
- Look at the machine while it is running; do the guard rings "rock up and down" relative to the ground?

1. Place the trowel in a FLAT, LEVEL area.

A level, clean area to test the trowel prior to and after is essential. Any unlevel spots in the floor or debris under the trowel blades will give an incorrect perception of adjustment. Ideally, a 5 x 5 Ft. (1.5 x 1.5 Meter) three-quarter inch (19 mm) thick FLAT steel plate should be used for testing.

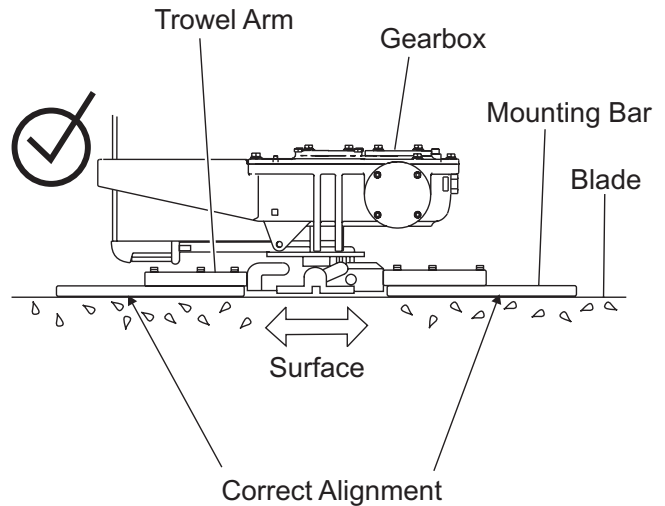
2. Pitch the blades as flat as possible. The adjustment bolts should all barely make contact with the lower wear plate on the spider. If one is not making contact, adjustment will be necessary. (Figure 35).

Figure 35 illustrates, "incorrect alignment", worn spider bushings or bent trowel arms. Check that the adjustment bolt is barely touching (0.10" max. clearance) lower wear plate. All alignment bolts should be spaced the same distance from the lower wear plate.



**Figure 35. Incorrect Spider Plate Alignment**

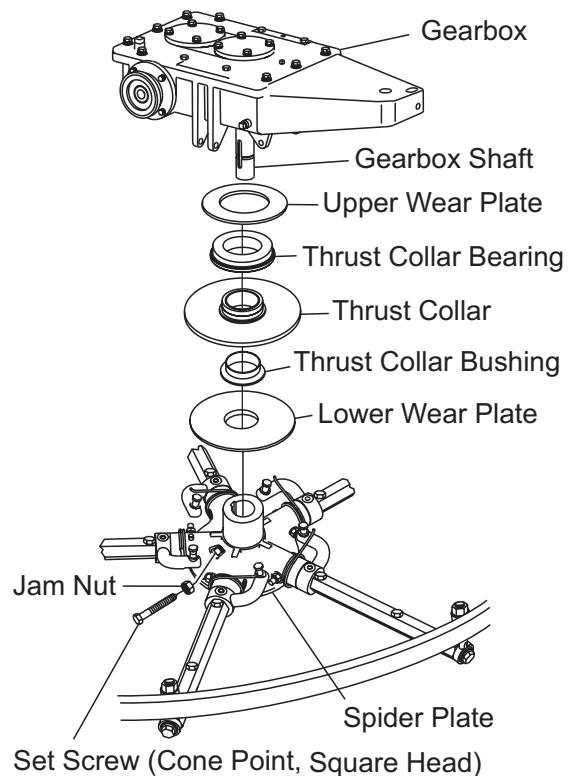
Figure 36 illustrates the "correct alignment" for a spider plate (as shipped from the factory).



**Figure 36. Correct Spider Plate Alignment**

Remove the spider assembly from the gearbox shaft as follows:

1. Locate the cone point square head set screw (Figure 37) and attached jam nut found on the side of the spider assembly.



**Figure 37. Spider/Gearbox Removal**

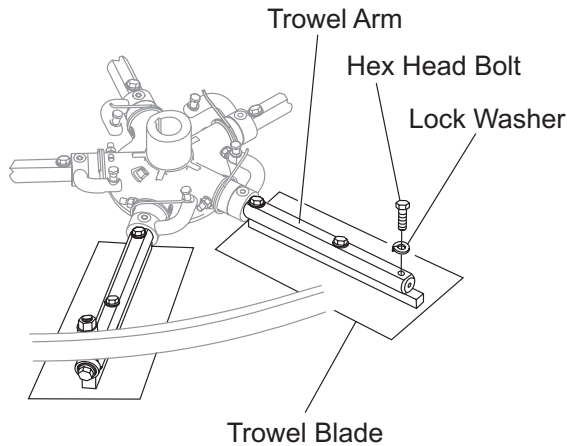


# MAINTENANCE (TROWEL)

2. Loosen the jam nut and cone point square head set screw.
3. Carefully lift the upper trowel assembly off of the spider assembly. A slight tap with a rubber mallet may be necessary to dislodge the spider from the main shaft of the gearbox.

## Trowel Blade Removal

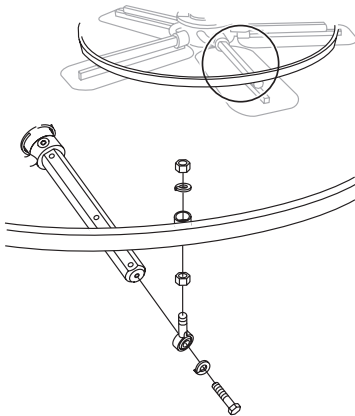
Remove the trowel blades by removing the three hex head bolts (Figure 38) from the trowel arm. Set blades aside.



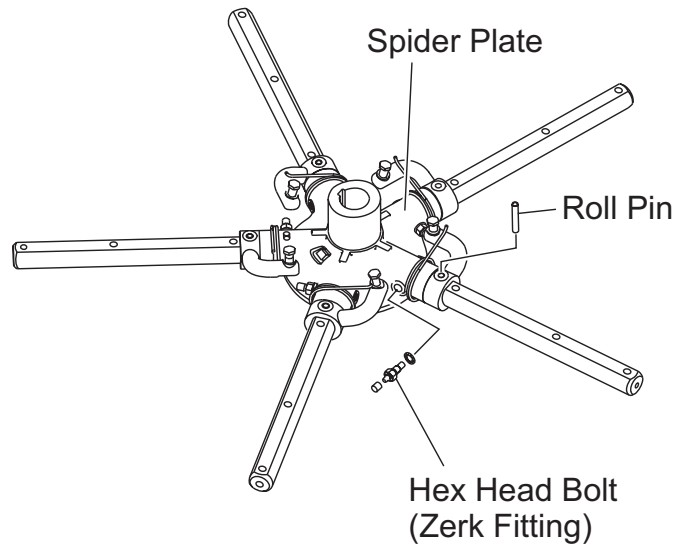
**Figure 38. Trowel Blades**

## Trowel Arm Removal

1. Remove the hardware securing the stabilizer ring to the trowel arm. (Figure 39)
2. Each trowel arm is held in place at the spider plate by a hex head bolt (zerk grease fitting) and a roll pin. Remove both the hex head bolt and the roll pin (Figure 35) from the spider plate.
3. Remove the trowel arm from the spider plate.

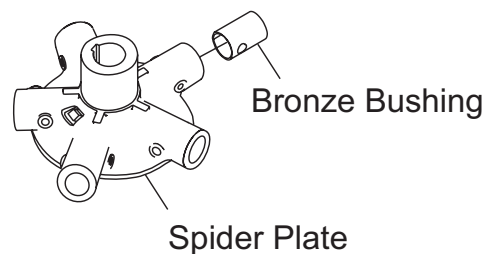


**Figure 39. Stabilizer Ring**



**Figure 40. Removing Roll Pin and Grease Zerk Fitting**

4. Should the trowel arm inserts (bronze bushing) come out with the trowel arm, remove the bushing from the trowel arm and set aside in a safe place. If the bushing is retained inside the spider plate, carefully remove the bushing.
5. Examine the bronze trowel arm bushing (Figure 41), and clean if necessary. Replace bushing if out-of-round or worn.



**Figure 41. Bronze Bushings**

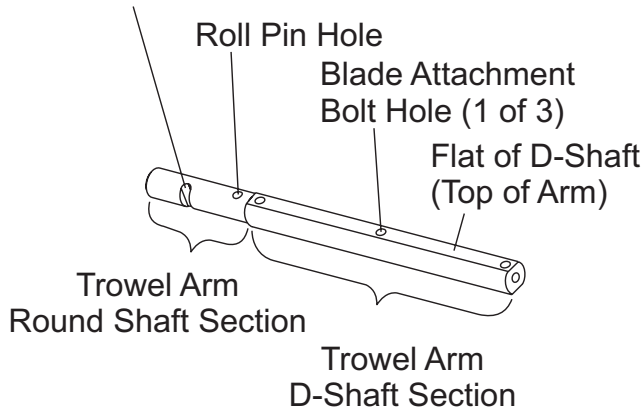
6. Wire brush any build-up of concrete from all six sides of the trowel arm. Repeat this for the remaining arms.

# MAINTENANCE (TROWEL)

## Checking Trowel Arm Straightness

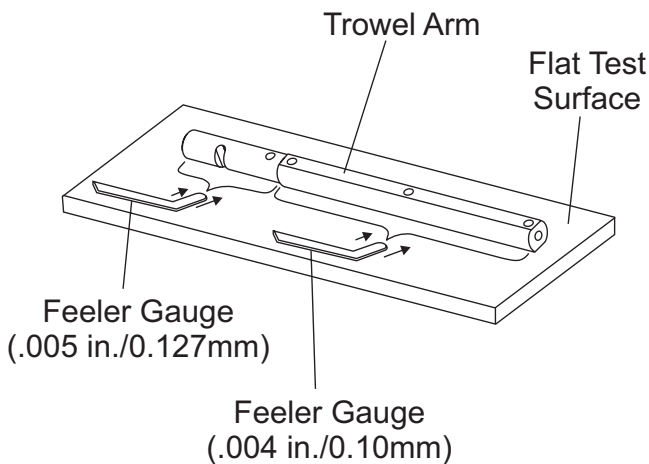
Trowel arms can be damaged by rough handling, (such as dropping the trowel on the pad), or by striking exposed plumbing, forms, or rebar while in operation. A bent trowel arm will not allow the trowel to operate in a smooth fluid rotation. If bent trowel arms are suspect, check for flatness as follows, refer to Figure 42 and Figure 43:

Lever Mounting Slot  
(Left Arm Shown)



**Figure 42. Trowel Arm**

1. Use a thick steel plate, granite slab or any surface which is true and flat, to check all six sides of each trowel arm for flatness.
2. Check each of the six sides of the trowel arm (hex section). A feeler gauge of .004" (0.10 mm) should not pass between the flat of the trowel arm and the test surface along its length on the test surface. (Figure 43) .



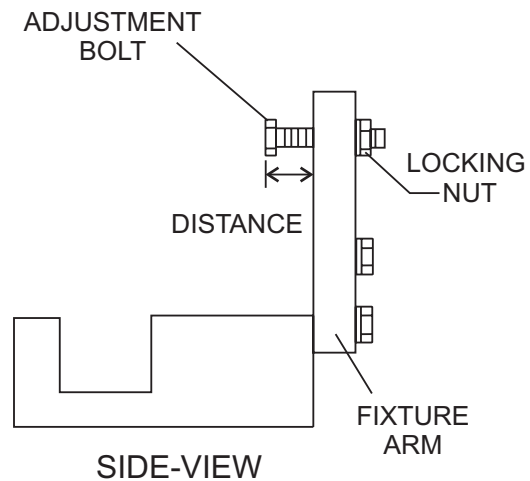
**Figure 43. Checking Trowel Arm Flatness**

3. Next, check the clearance between the round shaft and the test surface as one of the flat hex sections of the arm rests on the test surface. Rotate the arm to each of the flat hex sections and check the clearance of the round shaft. Use a feeler gauge of .005" (0.127 mm). Each section should have the same clearance between the round of the trowel arm shaft and the test surface.
4. If the trowel arm is found to be uneven or bent, replace the trowel arm.

## Trowel Arm Adjustment

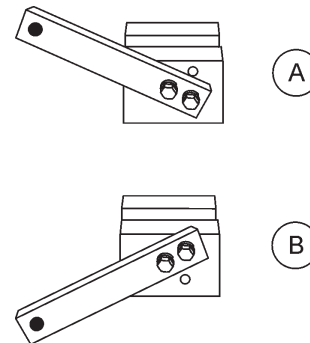
Shown in (Figure 44) is the adjustment fixture with a trowel arm inserted. As each trowel arm is locked into the fixture, the arm bolt is adjusted to where it contacts a stop on the fixture. This will consistently adjust all of the trowel arms, keeping the finisher as flat and evenly pitched as possible.

1. Locate the trowel arm adjustment tool P/N 9177.



**Figure 44. Trowel Arm Adjustment Tool Side View**

2. Ensure the fixture arm is in the proper setting (up or down) for your trowel arm rotation as shown in Figure 45.



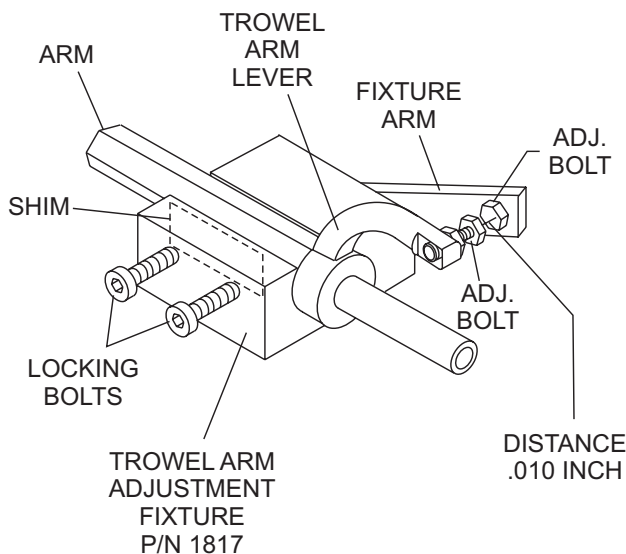
**Figure 45. Trowel Arm Adjustment Setup**

# MAINTENANCE (TROWEL)

## NOTICE

Arms with CLOCK-WISE blade rotation use the fixture arm in the UP position (A in Figure 45). Arms with COUNTER CLOCK-WISE blade rotation use the fixture with the fixture arm in the DOWN position. (B in Figure 45).

3. Unscrew the locking bolts on the adjustment tool and place the trowel arm into the fixture channel as shown in Figure 46. A thin shim may be required to cover the blade holes on the trowel arm. Make sure to align the trowel adjustment bolt with the fixture adjustment bolt.



**Figure 46. Trowel Arm Adjustment Fixture Components**

4. Use an allen wrench to tighten the locking bolts securing the trowel arm in place.
5. Adjust the bolt "distance" shown in Figure 44 to match one of the arms. The other arms will be adjusted to match this distance.
6. Loosen the locking nut on the trowel arm lever, then turn the trowel arm adjusting bolt until it barely touches (.010") the fixture adjusting bolt.
7. Once the correct adjustment is made, tighten the lock nut on the trowel arm to lock in place.
8. Loosen locking nuts on the adjustment fixture, and remove trowel arm.
9. Repeat steps for the remaining trowel arms.

## Re-Assembly

1. Clean and examine the upper/lower wear plates and thrust collar. Examine the entire spider assembly. Wire brush any concrete or rust build-up. If any of the spider components are found to be damaged or out of round, replace them.
2. Make sure that the bronze trowel arm bushing is not damage or out of round. Clean the bushing if necessary. If the bronze bushing is damaged or worn, replace it.
3. Reinstall bronze bushing onto trowel arm.
4. Repeat steps 2 -3 for each trowel arm.
5. Make sure that the spring tensioner is in the correct position to exert tension on the trowel arm.
6. Insert all trowel arms with levers into spider plate (with bronze bushing already installed) using care to align grease hole on bronze bushing with grease hole fitting on spider plate.
7. Lock trowel arms in place by tightening the hex head bolt with zerk grease fitting and jam nut.
8. Re-install the blades onto the trowel arms.
9. Install stabilizer ring onto spider assembly.
10. Lubricate all grease points (zerk fittings) with premium "Lithum 12" based grease, conforming to NLG1 Grade #2 consistency.

## Installing Pans Onto Finisher Blades

These round discs sometimes referred to as "pans" attach to the spiders arms and allow early floating on wet concrete and easy movement from wet to dry areas. They are also very effective in embedding large aggregates and surface hardeners. There are two methods to install the pans: z-clip installation or latch pin installation.



### WARNING



Lifting/Crush Hazard. **DO NOT** lift trowel with pans attached.

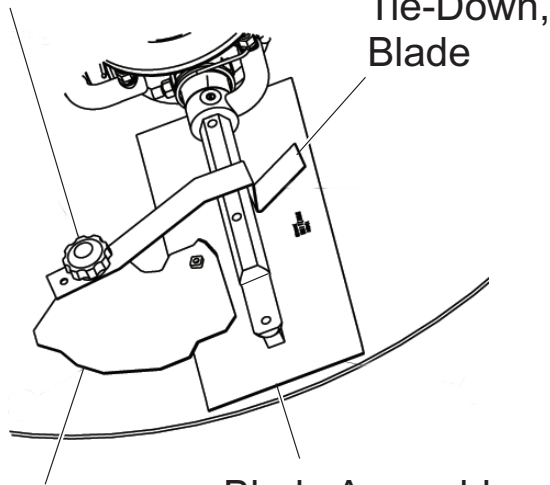
## MAINTENANCE (TROWEL)

### WARNING

ALWAYS install pans either on the work area or on an area that is next to and level with the work area. DO NOT lift the trowel when the pans are attached.

For the z-clip installation, refer to Figure 47 when installing pans onto finisher blades.

### Tie-Down Knob



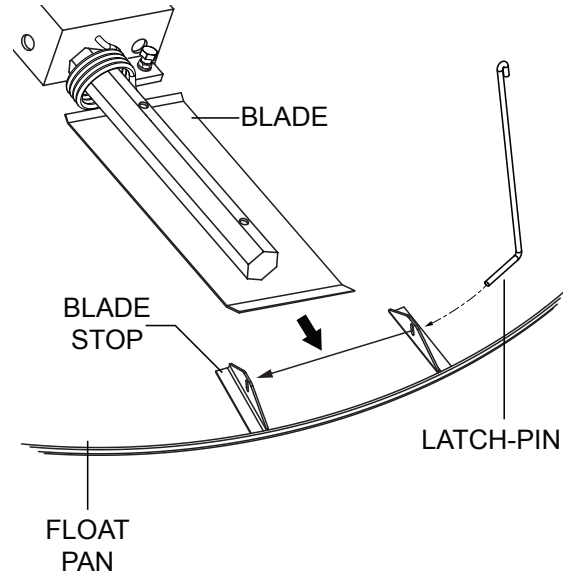
### Z-Clip, Pan

### Blade Assembly

**Figure 47. Z-Clip Finisher Pan Installation**

1. Lift trowel just enough to slide pan under blades. Lower finisher onto pan with blades assembly adjacent to Z-Clips.
2. Rotate blades into position under Z-Clips. Ensure that the blades are rotated in the direction of travel when the machine is in operation or use the engine to rotate the blades into position.
3. Attach the blade tie-downs to the far side of the Z-Clip brackets with tie-down knobs as shown in Figure 47.
4. Check to make certain that the blade edges are secured under the Z-Clips and the tie-downs are secured completely over the edges of the blade bar before the machine is put back into operation.

For the latch pin installation refer to Figure 48 when installing pans onto finisher blades.



**Figure 48. Latch Pin Finisher Pan Installation**

1. Lift trowel just enough to slide pan under blades. Lower finisher onto pan with blades between the blade stops.
2. Fit blades between the blade stops. Ensure that the blades are rotated in the direction of travel when the machine is in operation or use the engine to rotate the blades into position.
3. Route the latch pin through the blade stop holes as shown in Figure 48.
4. Check to make certain that the blade edges are secured between the blade stops and the latch pins are secured completely over the blade before the machine is put back into operation.

# MAINTENANCE (TROWEL)

## Hydraulic Steering Pressure

### **! WARNING**

NEVER use your hand to find hydraulic leaks. Use a piece of wood or cardboard. Hydraulic fluid injected into the skin must be treated by a knowledgeable physician immediately or severe injury or death can occur.

Many hydraulic problems are a result of low fluid levels. Before checking any other possibilities, make sure the hydraulic fluid is at the proper level in the hydraulic fluid tank.

## Checking Steering Pressure

### **! CAUTION**

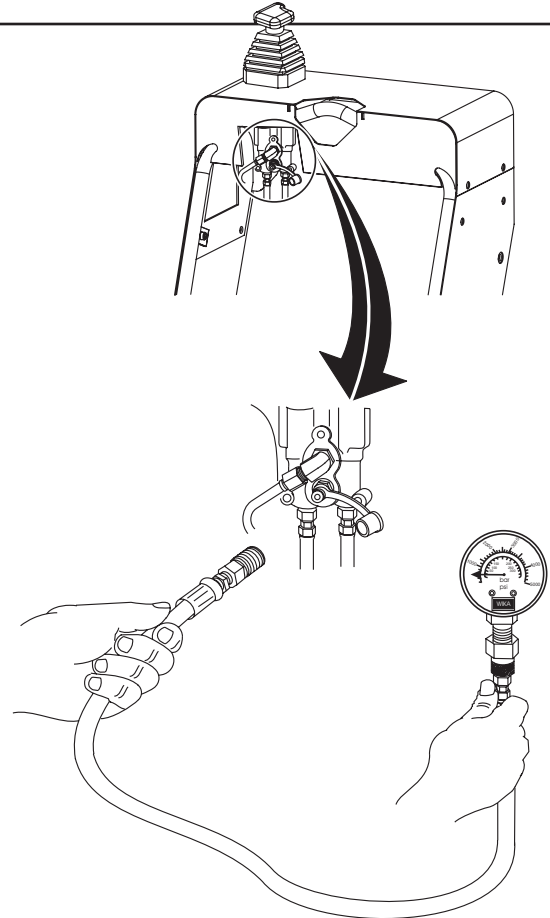
This procedure will require two or more people. The trowel will need to be "run up" while remaining stationary or otherwise held in position. If a "hover" is difficult to maintain the trowel can be butted up to 2 or 3 stakes or to some other none-moveable items.

1. Remove the Left Side Access Cover and insert the test pressure gauge (300 to 600 PSI) as shown in Figure 49 into the left steering valve's diagnostic quick coupler.
2. Verify the hydraulic fluid level is correct.
3. Start the engine and allow the unit to warm up.
4. Move the throttle lever to **FULL** engine RPM.
5. View the gauge and record the reading.

## Interpreting the Pressure Reading

### **! WARNING**

Charge/Steering Pressure must NEVER exceed 300 PSI nor go below 150 PSI. Pressure too high may result in pressure leaks while pressure too low may result in system damage.

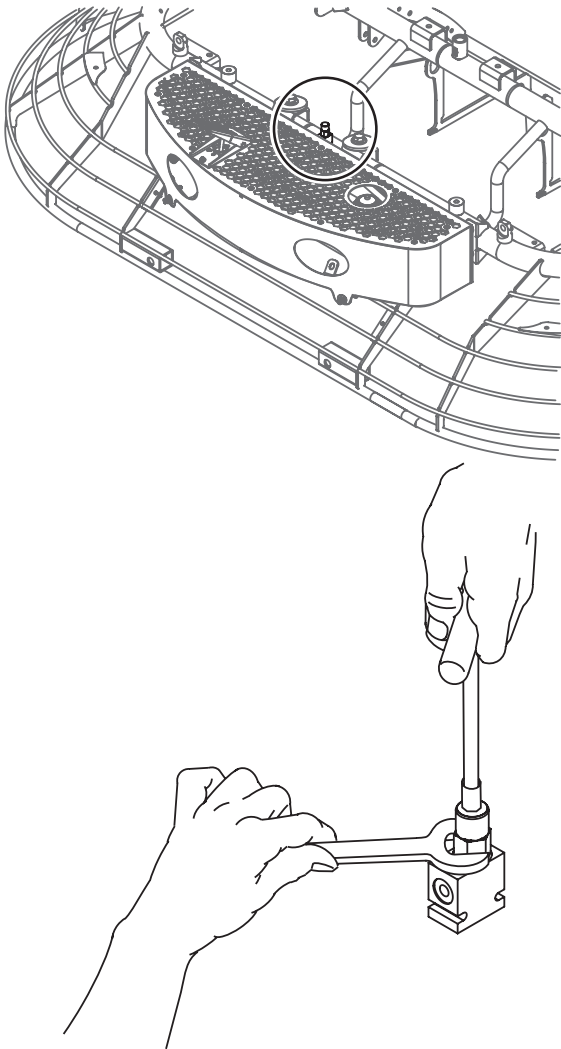


**Figure 49. Steering Pressure Check**

The left steering valve's factory setting is 230 PSI, however some operators may prefer a more responsive steering (higher pressure required; 300 PSI maximum) and some operators may prefer a "softer feel" (lower pressure required; not less than 150 PSI)

# DECOMMISSIONING TROWEL

## Steering Pressure Adjustment



**Figure 50. Steering Pressure Adjustment**

Remember, the trowel will need to be kept stationary during "run-up" while checking the pressure.

1. Remove front grille guard.
2. Loosen jam nut on pilot relief valve (Figure 50).
3. Use allen wrench to adjust the steering pressure to the desired setting. (between 150 and 300 PSI) See **Checking Steering Pressure** procedures.
4. Retighten jam nut.
5. Remove pressure gauge and reinstall access grilles.

## Decommissioning Trowel/Components

Decommissioning is a controlled process used to safely retire a piece of equipment that is no longer serviceable. If the equipment poses an unacceptable and unrepairable safety risk due to wear or damage or is no longer cost effective to maintain, (beyond life-cycle reliability) and is to be decommissioned, (demolition and dismantlement), the following procedure must take place:

1. Drain all fluids completely. These may include oil, gasoline, hydraulic oil and antifreeze. Dispose of properly in accordance with local and governmental regulations. Never pour on ground or dump down drains or sewers.
2. Remove battery and bring to appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid, (See "Safety Information" Section).
3. The remainder can be brought to a salvage yard or metal reclamation facility for further dismantling.



# TROUBLESHOOTING

<b>Troubleshooting (Ride-On Trowel)</b>		
<b>Symptom</b>	<b>Possible Problem</b>	<b>Solution</b>
Engine running rough or not at all.	Stop switch malfunction?	Make sure that the stop switch is functioning when the operator is seated. Replace switch if necessary.
	Fuel?	Look at the fuel system. Make sure there is fuel being supplied to the engine. Check to ensure that the fuel filter is not clogged.
	Ignition?	Check to ensure that the ignition switch has power and is functioning correctly.
Safety stop switch not functioning.	Bad contacts?	Replace switch.
	Loose wire connections?	Check wiring. Replace as necessary.
	Other problems?	Consult engine manufacturer's manual.
Trowel bounces, rolls concrete, or makes uneven swirls in concrete.	Blades?	Make sure blades are in good condition, not excessively worn. Finish blades should measure no less than 2 inches (50mm) from the blade bar to the trailing edge, combo blades should measure no less than 3.5 inches (89mm). Trailing edge of blade should be straight and parallel to the blade bar.
	Pitch Adjustment?	Check that all blades are set at the same pitch angle as measured at the spider. A field adjustment tool is available for height adjustment of the trowel arms (contact Parts Department).
	Bent trowel arms?	Check the spider assembly for bent trowel arms. If one of the arms is even slightly bent, replace it immediately.
	Trowel arm bushings?	Check the trowel arm bushings for tightness. This can be done by moving the trowel arms up and down. If there is more than 1/8 inch (3.2 mm) of travel at the tip of the arm, the bushings should be replaced. All bushings should be replaced at the same time.
	Thrust collar?	Check the flatness of the thrust collar by rotating it on the spider. If it varies by more than 0.02 inch (0.5 mm) replace the thrust collar.
	Thrust collar bushing?	Check the thrust collar by rocking it on the spider. If it can tilt more than 1/16 inch (1.6 mm) - as measured at the thrust collar O.D., replace the bushing in the thrust collar.
	Thrust bearing worn?	Check the thrust bearing to see that it is spinning freely. Replace if necessary.
Machine has a perceptible rolling motion while running.	Main shaft?	The main output shaft of the gearbox assembly should be checked for straightness. The main shaft must run straight and cannot be more than 0.003 inch (0.08 mm) out of round at the spider attachment point.
	Yoke?	Check to make sure that both fingers of the yoke press evenly on the wear cap. Replace yoke as necessary.
	Blade Pitch?	Check to ensure that each blade is adjusted to have the same pitch as all other blades. Adjust per maintenance section in manual.



# TROUBLESHOOTING

Troubleshooting (Ride-On Trowel) - continued		
Symptom	Possible Problem	Solution
Lights (optional) not working.	Wiring?	Check all electrical connections in the lighting circuit. Verify wiring is in good condition with no shorts. Replace defective wiring or components immediately.
	Lights?	If +12VDC is present at light fixture connector when light switch is activated and light does not turn on, replace light bulb.
	Bad switch?	Check the continuity of light switch. Replace light switch if defective.
	Bad fuse?	Check fuse. Replace fuse if defective.
Retardant spray (optional) not working.	Retardant?	Check retardant level in tank. Fill tank as required.
	Wiring?	Check all electrical connections in the spray pump circuit. Verify wiring is in good condition with no shorts. Replace defective wiring or components immediately.
	Bad switch?	Check the continuity of both left and right spray switches (palm handles). Replace spray switch if defective..
	Bad spray pump?	If +12VDC is present at pump connector when spray switch is activated and pump does not operate, replace spray pump.
	Bad fuse?	Check fuse. Replace fuse if defective.
Steering is unresponsive.	Blade speed out of adjustment?	See section on blade speed adjustment.
	Pivots?	Check to ensure free movement of hydraulic drive motors.
	Hydraulic pressure?	Check to ensure that hydraulic pressure is adequate. See section on checking hydraulic pressure.
Operating position is uncomfortable.	Seat adjusted for operator?	Adjust seat with lever located on the front of the seat.
Linkage on Twin Pitch Tower not working.	Broken pitch tower components?	Inspect all pitch tower components. Replace all defective components immediately.
	Defective drive pitch cable?	Inspect drive pitch cable. Replace if defective or broken.
Clutch slipping or sluggish response to engine speed change.	Worn belts?	Replace belt.
	Clutch out of adjustment?	Adjust per instructions in maintenance section of this manual.
	Worn or defective clutch parts?	Replace parts as necessary.
	Worn bearings in gearbox?	Rotate input shaft by hand. If shaft rotates with difficulty, check the input and output shaft bearings. Replace as necessary.
	Worn or broken gears in gearbox?	Verify that the gearbox shaft rotates when the input shaft is rotated. Replace both the worm and worm gear as a set.

# TROUBLESHOOTING

Troubleshooting (Engine)		
Symptom	Possible Problem	Solution
Difficult to start, fuel is available, but no spark at spark plug.	Spark plug bridging?	Check gap, insulation or replace spark plug.
	Carbon deposit on spark plug?	Clean or replace spark plug.
	Short circuit due to deficient spark plug insulation?	Check spark plug insulation, replace if worn.
	Improper spark plug gap?	Set to proper gap.
	Spark plug is red?	Check transistor ignition unit.
	Spark plug is bluish white?	If insufficient compression, repair or replace engine. If injected air leaking, correct leak. If carburetor jets clogged, clean carburetor.
	No spark present at tip of spark plug?	Check transistor ignition unit is broken, and replace defective unit. Check if voltage cord cracked or broken and replace. Check if spark plug if fouled and replace.
	No oil?	Add oil as required.
	Oil pressure alarm lamp blinks upon starting? (if applicable)	Check automatic shutdown circuit, "oil sensor". (if applicable)
Difficult to start, fuel is available, and spark is present at the spark plug.	ON/OFF switch is shorted?	Check switch wiring, replace switch.
	Ignition coil defective?	Replace ignition coil.
	Improper spark gap, points dirty?	Set correct spark gap and clean points.
	Condenser insulation worn or short circuiting?	Replace condenser.
	Spark plug wire broken or short circuiting?	Replace defective spark plug wiring.
Difficult to start, fuel is available, spark is present and compression is normal.	Wrong fuel type?	Flush fuel system, replace with correct type of fuel.
	Water or dust in fuel system?	Flush fuel system.
	Air cleaner dirty?	Clean or replace air cleaner.
	Choke open?	Close choke.
Difficult to start, fuel is available, spark is present and compression is low.	Suction/exhaust valve stuck or protruded?	Reseat valves.
	Piston ring and/or cylinder worn?	Replace piston rings and/or piston.
	Cylinder head and/or spark plug not tightened properly?	Torque cylinder head bolts and spark plug.
	Head gasket and/or spark plug gasket damaged?	Replace head and spark plug gaskets.
No fuel present at carburetor.	No fuel in fuel tank?	Fill with correct type of fuel.
	Fuel cock does not open properly?	Apply lubricant to loosen fuel cock lever, replace if necessary.
	Fuel filter/lines clogged?	Replace fuel filter.
	Fuel tank cap breather hole clogged?	Clean or replace fuel tank cap.
	Air in fuel line?	Bleed fuel line.

# TROUBLESHOOTING

<b>Troubleshooting (Engine) - continued</b>		
<b>Symptom</b>	<b>Possible Problem</b>	<b>Solution</b>
Weak in power, compression is proper and does not misfire.	Air cleaner dirty?	Clean or replace air cleaner.
	Improper level in carburetor?	Check float adjustment, rebuild carburetor.
	Defective spark plug?	Clean or replace spark plug.
	Improper spark plug?	Set to proper gap.
Weak in power, compression is proper but misfires.	Water in fuel system?	Flush fuel system and replace with correct type of fuel.
	Dirty spark plug?	Clean or replace spark plug.
	Ignition coil defective?	Replace ignition coil.
Engine overheats	Wrong type of fuel?	Replace with correct type of fuel.
	Cooling fins dirty?	Clean cooling fins.
	Intake air restricted?	Clear intake of dirt and debris. Replace air cleaner elements as necessary.
	Oil level too low or too high?	Adjust oil to proper level.
Rotational speed fluctuates.	Governor adjusted incorrectly?	Adjust governor.
	Governor spring defective?	Replace governor spring.
	Fuel flow restricted?	Check entire fuel system for leaks or clogs.
Recoil starter malfunctions. (if applicable)	Recoil mechanism clogged with dust and dirt?	Clean recoil assembly with soap and water.
	Spiral spring loose?	Replace spiral spring.
Starter malfunctions.	Loose, damaged wiring?	Ensure tight, clean connections on battery and starter.
	Battery insufficiently charged?	Recharge or replace battery.
	Starter damaged or internally shorted?	Replace starter.
Burns too much fuel.	Over-accumulation of exhaust products?	Check and clean valves. Check muffler and replace if necessary.
	Wrong spark plug?	Replace spark plug with manufacturer's suggested type.
Exhaust color is continuously "white".	Lubricating oil is wrong viscosity?	Replace lubricating oil with correct viscosity.
	Worn rings?	Replace rings.
Exhaust color is continuously "black".	Air cleaner clogged?	Clean or replace air cleaner.
	Choke valve set to incorrect position?	Adjust choke valve to correct position.
	Carburetor defective, seal on carburetor broken?	Replace carburetor or seal.
	Poor carburetor adjustment, engine runs too rich?	Adjust carburetor.
Will not start, no power with key "ON". (if applicable)	ON/OFF device not activated ON?	Turn on ON/OFF device.
	Battery disconnected or discharged?	Check cable connections. Charge or replace battery
	Ignition switch/wiring defective?	Replace ignition switch. Check wiring.

# TROUBLESHOOTING

**Table 10. Troubleshooting (General)**

Symptom	Probable Cause	Solution
<b>Engine Will Not Turn Over</b>	Engine Jammed	Check Engine To Find The Problem And Repair It
	Battery Discharged	Charge
	Starter Malfunctioning	Repair or Replace
	Wires Disconnected	Repair and Replace
<b>Engine Turns Over At Slowly But Does Not Start</b>	Increased Resistance of Moving Parts	Repair or Replace
	Excessively High Viscosity Engine Oil at Low Temperature	Use Specified Engine Oil
<b>Engine Turns Over At Normal Speed But Does Not Start</b>	Compression Leak	Check the Compression Pressure and Repair
	Improper Valve Clearance	Adjust
	Defective Ignition Coil	Replace
	Defective Spark Plug	Adjust Spark Plug Gap or Replace
	Defective Ignitor	Replace
	Clogged Air Cleaner	Clean or Replace
<b>Rough Low-Speed Running and Idling</b>	Defective Ignition Coil	Replace
	Defective Spark Plug	Adjust Spark Plug Gap or Replace
	Defective Ignitor	Replace
	Incorrect Governor Adjustment	Adjust
	Improper Valve Clearance	Adjust
<b>Rough High-Speed Running</b>	Defective Ignitor	Replace
	Defective Spark Plug	Adjust Spark Plug Gap or Replace
	Defective Ignition Coil	Replace
	Incorrect Governor Adjustment	Adjust
<b>Engine Speed Does Not Increase</b>	Incorrect Governor Adjustment	Adjust
	Defective Ignitor	Replace
	Clogged Air Cleaner	Clean or Replace
<b>Deficient Output</b>	Improper Intake or Exhaust Valve Settings	Replace
	Incorrect Governor Adjustment	Adjust
	Excessive Carbon in Engine	Remove Carbon
	Improper Valve Clearance	Adjust
	Piston Ring and Cylinder Worn	Replace
	Clogged Air Cleaner	Clean or Replace

# TROUBLESHOOTING

**Table 11. Troubleshooting (General) (Continued)**

<b>Symptom</b>	<b>Probable Cause</b>	<b>Solution</b>
<b>Engine Noise</b>	Improper Valve Clearance	Adjust
	Spark Knock Due to Low-Octane Fuel or Carbon	Use Higher-Octane Fuel and Remove Carbon
	Rattles from Loosely Mounted External Components	Retighten
<b>Exhaust Flames</b>	Defective Ignition Coil	Replace
	Defective High Tension Cord	Replace
	Defective Spark Plug	Adjust Spark Plug or Replace
	Wires Disconnected or Defective Wire	Reconnect/Replace
	Bad Connection of the High Tension Cord and Spark Plug	Reconnect

# TROUBLESHOOTING

**Table 12. Troubleshooting (Gasoline and LPG Fuel)**

Fuel Type	Symptom	Probable Cause	Solution
<b>Gasoline Fuel</b>	<b>Engine Turns Over at Normal Speed but Does Not Start</b>	No Fuel	Replenish Fuel
		Defective Fuel System	Check Fuel Line and Carburetor and Repair
		Over Choked	Clean Spark Plug
		Flooding Carburetor	Check Carburetor and Repair/Replace
	<b>Rough Low-Speed Running and Idling</b>	Incorrect Carburetor Idle Adjustment	Adjust
<b>Engine Speed Does Not Increase</b>	Incorrect Carburetor Adjustment	Adjust	
<b>LPG Fuel</b>	<b>Engine Turns Over at Normal Speed but Does Not Start</b>	No LPG Fuel	Replenish LPG Fuel. Check LPG Tank Valve. Check shutoff Solenoid Valve.
		Defective Vacuum Lock System	Check Vacuum Hose. Replace Vaporizer.
		Defective Throttle Lever Position	Set Throttle Lever to the Low Idle Position
	<b>Rough Low-Speed Running and Idling</b>	Shortage of Gas Supply	Replenish LPG Fuel. Check Shutoff Solenoid Valve.
		Defective Idling	Replenish Vaporizer. Draining Tar from Vaporizer
	<b>Defection Output</b>	LPG Density is Rich	Replace Vaporizer
		Shortage LPG	Repair or Replace of Fuel System. Replace Vaporizer.



# OPERATION MANUAL

## HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL  
NUMBER ON-HAND WHEN CALLING

### UNITED STATES

#### ***Multiquip Corporate Office***

18910 Wilmington Ave.  
Carson, CA 90746  
Contact: mq@multiquip.com

Tel. (800) 421-1244  
Fax (310) 537-3927

#### ***Service Department***

800-421-1244  
310-537-3700

#### ***Technical Assistance***

800-478-1244 Fax: 310-943-2238

#### ***MQ Parts Department***

800-427-1244  
310-537-3700

Fax: 800-672-7877

#### ***Warranty Department***

800-421-1244  
310-537-3700

Fax: 310-943-2249

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### CANADA

#### ***Multiquip***

4110 Industriel Boul.  
Laval, Quebec, Canada H7L 6V3  
Contact: infocanada@multiquip.com

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