OPERATION MANUAL

MULTIQUIP®

WHITEMAN

MODEL HTXG6DF

HYDRAULIC RIDE-ON TROWEL

(PSI 2.4L DUAL FUEL)

Gas and Propane Engine

Revision #5 (10/12/21)

To find the latest revision of this publication or associated parts manual, visit our website at:
www.multiquip.com

THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

PN: 42543


WARNING
CANCER &
REPRODUCTIVE HARM
www.P65Warnings.ca.gov
P/N 38707

⚠ 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.

HTXG6DF Ride-On Trowel

NOTICE

Specifications are subject to change without notice.

NOTES

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		
9	Maintaining a hover		
10	Maneuvering		
11	Pitching		
12	Matching blade pitch. Smart Pitch™		
13	Concrete finishing techniques		
14	Shutdown of machine		
15	Lifting of machine (lift loops)		

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						

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

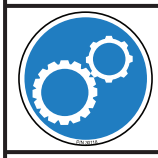
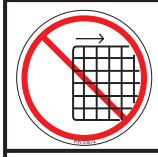
Addresses practices not related to personal injury.

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.

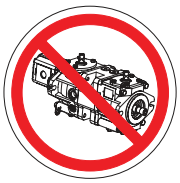
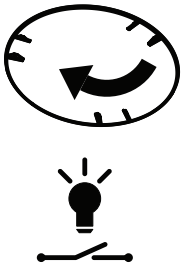
Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
 	Rotating parts hazards
	Pressurized fluid hazards
	Hydraulic fluid hazards

DECALS

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

DECAL	DEFINITION
	**WARNING** Read Manual To avoid injury you must read and understand operator's manual before using this machine.
	**NOTICE** Lift Point Attach lifting strap to this point.
	**NOTICE** Protective Clothing Wear appropriate clothing before operating trowel.
	**WARNING** Entanglement/Crush Hazard. **DO NOT** operate equipment with guards removed. Keep hands and fingers clear of gears. Serious bodily injury could result.
	**DANGER** Guard Hazard **DO NOT** operate equipment with guards removed. Serious bodily injury could result.
	**DANGER** Rotating Blade Hazard Keep hands and fingers clear from engine fan blades. Moving parts can cut. **DO NOT** remove guards.
	**DANGER** Lifting/Crush Hazard Keep persons clear from a lifted trowel. **DO NOT** stand below the trowel. **DO NOT** lift trowel with pans attached.
	**NOTICE** Fuel Type The engine used in this equipment requires ***unleaded gasoline.***
	**DANGER** Fire Hazard **DO NOT** light matches around or near this equipment. This equipment contains highly flammable fuel. If ignited, could start a ***fire*** causing equipment damage and severe bodily harm even death!

DECAL	DEFINITION
	**DANGER** Fire Hazard **DO NOT** smoke around or near this equipment. This equipment contains highly flammable fuel. If ignited, could start a ***fire*** causing equipment damage and severe bodily harm — even ***death!***
	**DANGER** Inhalation Hazard **DO NOT** use this equipment in an ***enclosed area***. The engine used with this equipment emits harmful levels of carbon monoxide which can cause severe bodily harm — even ***death!***
	**DANGER** Explosion Hazard Hot steam or coolant may escape when radiator cap is removed, causing severe burns. Allow radiator to cool before removing cap.
	**DANGER** Fire Explosion Hazard **DO NOT** smoke around or near this equipment. This equipment contains highly flammable fuel. If ignited, could start an ***explosion*** causing equipment damage and severe bodily harm — even ***death!***
	**WARNING** Ask for Help/Training This machine to be operated by qualified personnel only. Ask for training as needed.
	**NOTICE** Noise Level Indicates value of sound pressure of equipment. Measured at operator's seat.

DECAL	DEFINITION
	**WARNING** Hydraulic Pump Trowel rotor speeds are factory set. Tampering with settings can lead to damage and void machine warranty.
	**WARNING** 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.
	**WARNING** Drive Bypass Switch When drive bypass switch is activated, equipment working lights will flash indicating that blades may be turned without an operator in the seat. **USE EXTREME CAUTION** in this drive mode!

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.

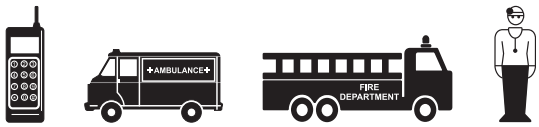
- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.
- No one other than the operator is to be in the working area when the equipment is in operation.
- **DO NOT** use the equipment for any purpose other than its intended purposes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

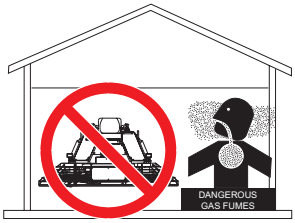
- **ALWAYS** know the location of the nearest phone or **keep a phone on the job site.** Also, know the phone numbers of the nearest **ambulance, doctor** and **fire department.** This information will be invaluable in the case of an emergency.



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.**

⚠ 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.

  Order FORM PT-160

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.

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.

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 use two lifting straps and the lift points indicated by the tie-down strap symbol on the left and right guard rings. Lifting at another point may result in machine or bodily injury.

  Lifting straps can be routed over the tie-down strap location, allowing a forklift or crane to lift the trowel up onto and off of a slab of concrete. Two straps should have a minimum of 2,120 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.

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 emmission 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.

WORK SAFELY!

⚠ WARNING

Failure to comply with these lifting instructions may result in **sling failure** and **severe personal injury or death**.

Only **qualified personnel** with proper training should perform this procedure. Follow all rigging and lifting safety rules when performing this procedure.

LIFTING SAFETY

⚠ CAUTION

- **NEVER** allow any person 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 the trowel with the operator on the machine.

NOTICE

- **NEVER** hoist the trowel more than three feet off of the ground with float pans attached.
- Before lifting, make sure that the lift loops are not damaged.
- **ALWAYS** make sure any lifting device has been properly secured to the lift loops of the trowel.
- **DO NOT** lift the trowel to unnecessary heights.
- **ALWAYS** shut down the engine before transporting.
- **NEVER** lift the trowel while the engine is running.
- Tighten the fuel tank cap securely and close the fuel cock to prevent fuel from spilling.

SLING INSPECTION

Inspect the lifting slings provided with your trowel (Figure 1) **before each use**. If replacement slings are needed, refer to the parts manual included with your trowel for part numbers, and order from your Multiquip parts dealer or importer.

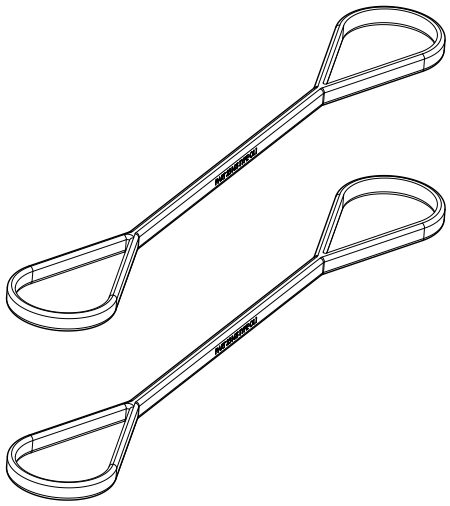
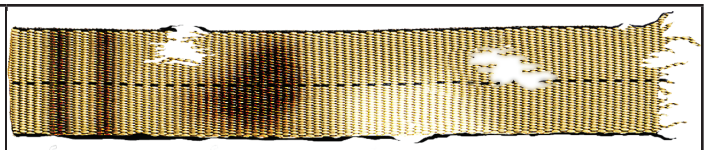
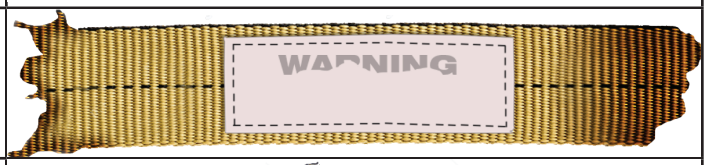
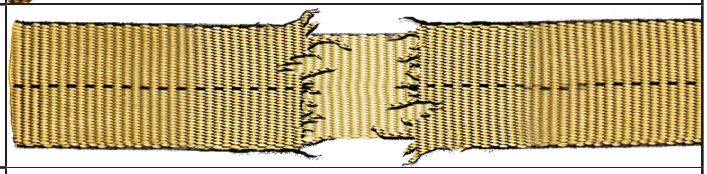
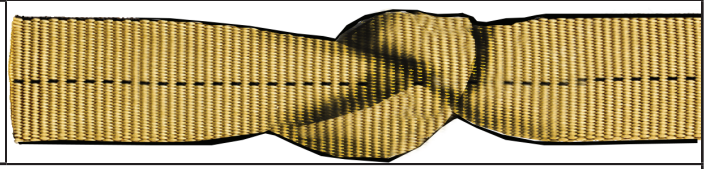


Figure 1. Lifting Slings

The Occupational Safety and Health Administration (OSHA) Regulation 29 CFR Part 1926.251 (e)(8)—*Removal from service* requires that the slings be inspected prior to each use, and **removed from service immediately** if any of the following conditions are found:

■ Holes, tears, cuts, or snags ■ Embedded particles ■ Abrasive wear that exposes core fibers	
■ Missing or unreadable Rated Capacity tags ■ Melting, charring, weld spatter, or chemical burns	
■ Broken or worn stitching that exposes the core fibers	
■ Knots	
■ Any other condition which may cause doubt as to the strength of the sling	

LIFTING PROCEDURE

The correct lifting slings (Figure 1) have been supplied with your trowel, in accordance to its weight per Occupational Safety and Health Administration (OSHA) Regulation 29 CFR Part 1926.251—*Rigging equipment for material handling*.

⚠ WARNING

ALWAYS inspect the lifting slings **before each use**.

NOTICE

MAKE SURE the forklift has adequate lifting capacity to lift the trowel.

The proper sling hitch method for connecting the lifting slings to the ride-on trowel is the **choker hitch**. The rated capacity of the slings for this method is indicated on the sling labels. **DO NOT** use any other type of sling hitch!

1. Secure the two lifting slings to the lift loops located on the left and right side of the trowel (Figure 2).

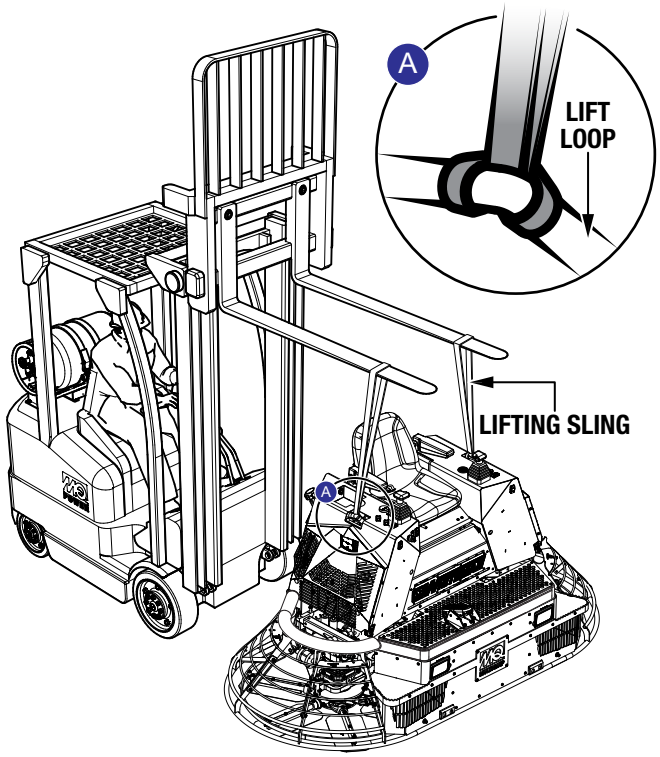


Figure 2. Lifting the Trowel

2. Insert forklift forks through the loops at the ends of the lifting slings (Figure 2). Keep the slings as close to vertical as possible. If the choke angle (Figure 3) is 120 degrees or less, the lifting strength of the slings must be de-rated as shown in Table 1, in accordance with ASME Standard B30.9.

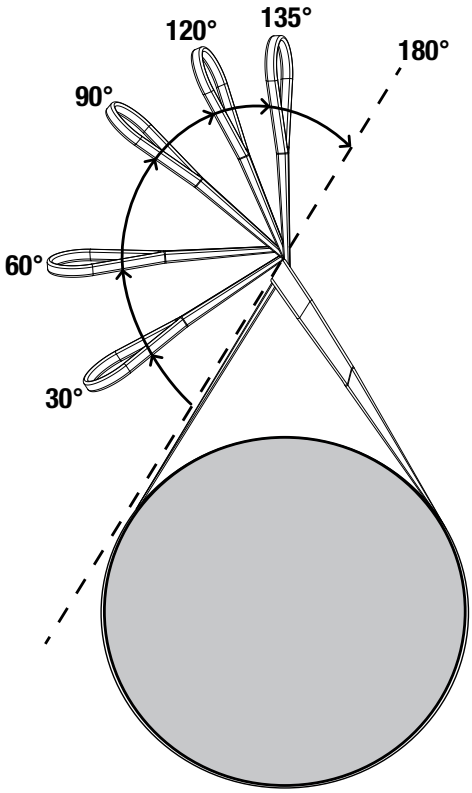


Figure 3. Choke Angle

Table 1. Choker Hitch Sling Capacity

Choke Angle (°)	Rated Capacity (%)
Over 120	100
90–120	87
60–89	74
30–59	62
0–29	49

TRANSPORTING THE TROWEL

After the trowel has been lifted onto a flatbed truck, do the following:

1. Locate the tie-down strap symbols (Figure 4) on the top left and right trowel guard rings.

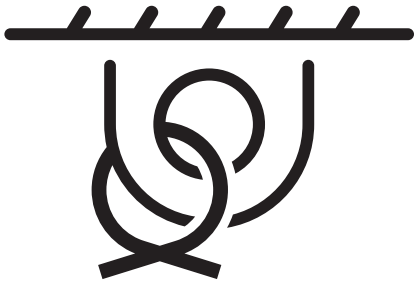


Figure 4. Tie-Down Strap Symbol

2. Attach suitable tie-down straps to the trowel. Route tie-down straps on both sides as shown in Figure 5.

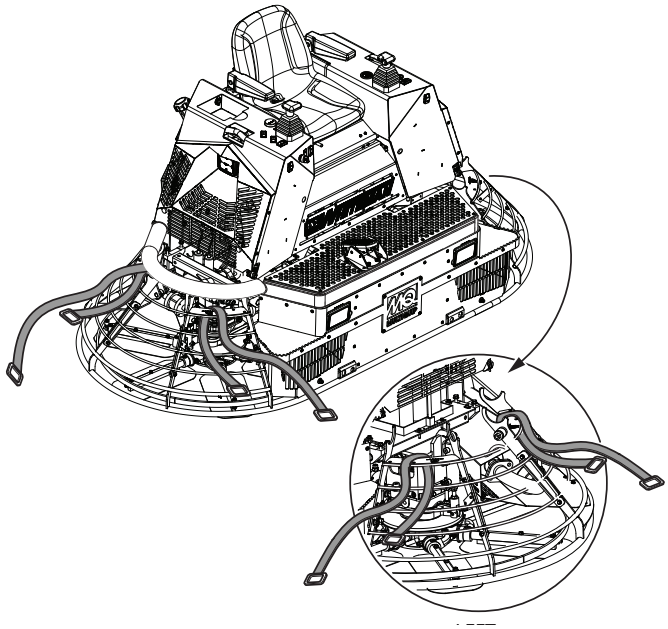


Figure 5. Routing Tie-Down Straps

3. Secure the trowel to the flatbed with the two straps, making sure they are properly tied to prevent movement of the trowel during transport.

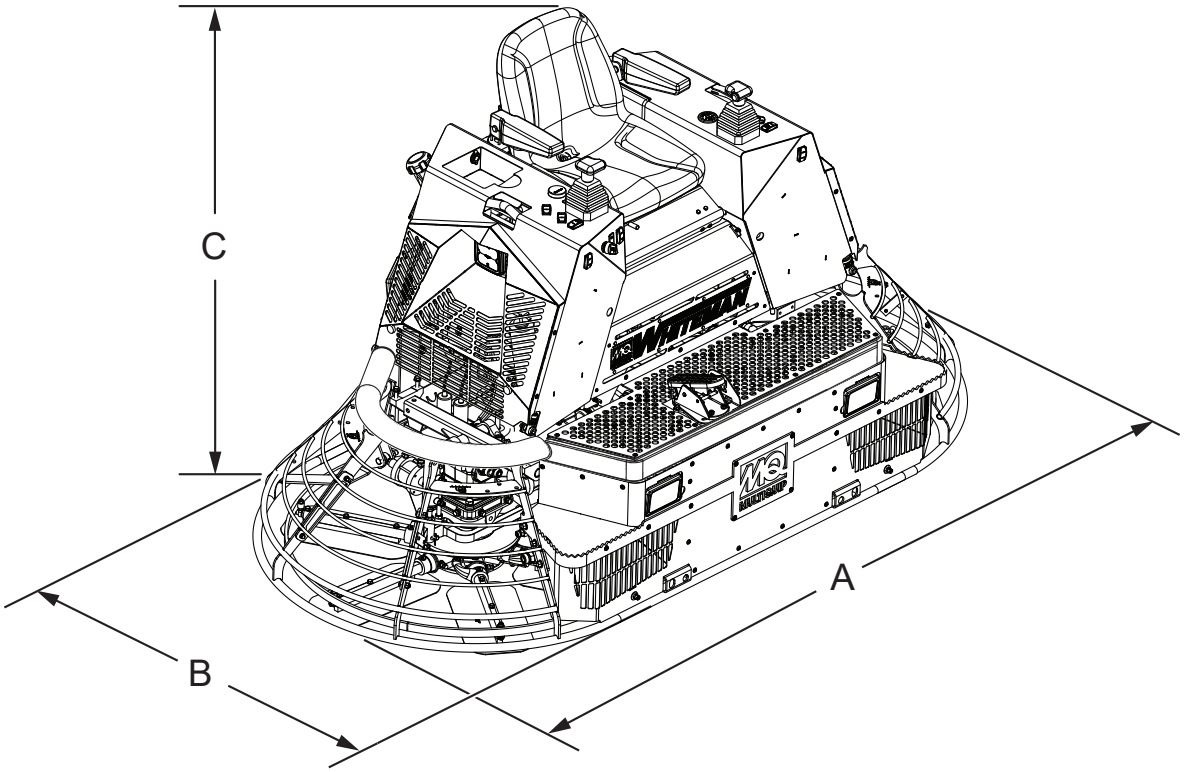


Figure 6. HTXG6DF Dimensions

Table 2. Trowel Dimensions	
A – Length – in. (mm)	95 (2,413)
B – Width – in. (mm)	48 (1,219)
C – Height – in. (mm)	57 (1,448)

Table 3. Trowel Specifications	
Weight – lb. (kg) Operating	2,174 (986.1)
Weight – lb. (kg) Shipping	(less pallet material) 2,077 (942)
Blade Tip Speed – ft./min. (m/s)	1,924 (9.9)
Fuel Tank – gallons (liters)	10.7 (40.5)
Rotor – RPM	0 to 160
Path Width – in. (mm)	92 (2,330)
Hydraulic Oil Capacity — gallons (liters)	8 (30.3)
Hydraulic Oil	Parker DuraClean™ ISO 46

Table 4. Engine Specifications		
MODEL		**PSI 2.4L**
Type		2.4L L4
No. of Cylinders		4
Displacement (cid/cc)		143 (2,351)
Compression Ratio		9.5:1
Bore x Stroke (in./mm)		3.41 x 3.94 (86.5 x 100)
Max Output		68 hp (50.7 kW @ 2,800 rpm)
Oil Capacity With Oil Filter (liters/qt.)		5.4 (4.75)
Oil Type		API Service SM 10W-30, 5W-30
Minimum Oil Pressure (Hot)		10 psi @ 800 rpm
Coolant Capacity (Engine) (liters/qt.)		1.4 (1.5)
Engine Rotation (Flywheel End)		CCW
Ignition System		Coil on Plug
Spark Plugs		Torch # DK7RTC-1401
Spark Plug Gap		12 mm Plug = 0.035 in.
Fuel Type	Gasoline	Octane Rating/Anti-Knock Index Unleaded 87 **or** 89
	Liquid Propane	HD-5 **or** HD-10
Fuel Capacity	Gasoline (gal./liters)	11 (42)
	Liquid Propane (lb./kg/liters)	33.5 (15.2/36.3)

Table 5. HTXG6DF Noise and Vibration	
Guaranteed ISO 11201:2010 Based Sound Pressure Level at Operator Station in dB(A)	90
Guaranteed ISO 3744:2010 Based Sound Power Level in dB(A)	115
Whole Body Vibration per ISO 2631-1:1997+A1:2010 in m/s^2 $\Sigma A(8)$	0.04

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 $\Sigma A(8)$.*

INTENDED USE

Operate the HTXG6DF ride-on trowel, tools, 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.

FAMILIARIZATION

The HTXG6DF ride-on power trowel is designed for the floating and finishing of concrete slabs.

Take a walk around your trowel. Take notice of all the major components (Figure 7 — Figure 10) like the engine, blades, air cleaner, fuel system, fuel shut-off valve, ignition switch etc. Check that there is always a proper level of oil in the engine and a proper level of hydraulic oil in the hydraulic oil reservoir.

Read all the safety information 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.

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

This trowel is equipped with a ***PSI 2.4-liter*** engine which operates on gasoline or liquid propane gas (LPG). The use of both gasoline and LPG makes this PSI 2.4-liter engine a Dual Fuel (DF) engine. Refer to the engine owner's manual for specific instructions regarding engine operation.

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) or finish (6 inches wide). This trowel is equipped with six blades per rotor equally spaced in a radial pattern and attached to a vertical rotating shaft by means of a spider assembly.

Independent hydrostatic drive motors are coupled to the engine-powered hydrostatic pump. Each motor drives a spider assembly.

HYDRAULIC STEERING

Dual palm grip joystick controls located to the left and right of the operator are provided for steering. The joysticks are linked to three hydraulic steering cylinders located within the frame of the machine.

HYDRAULIC PUMP

The hydraulic pump delivers controlled flow of hydraulic fluid to the hydraulic motors.

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.

TRAINING

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

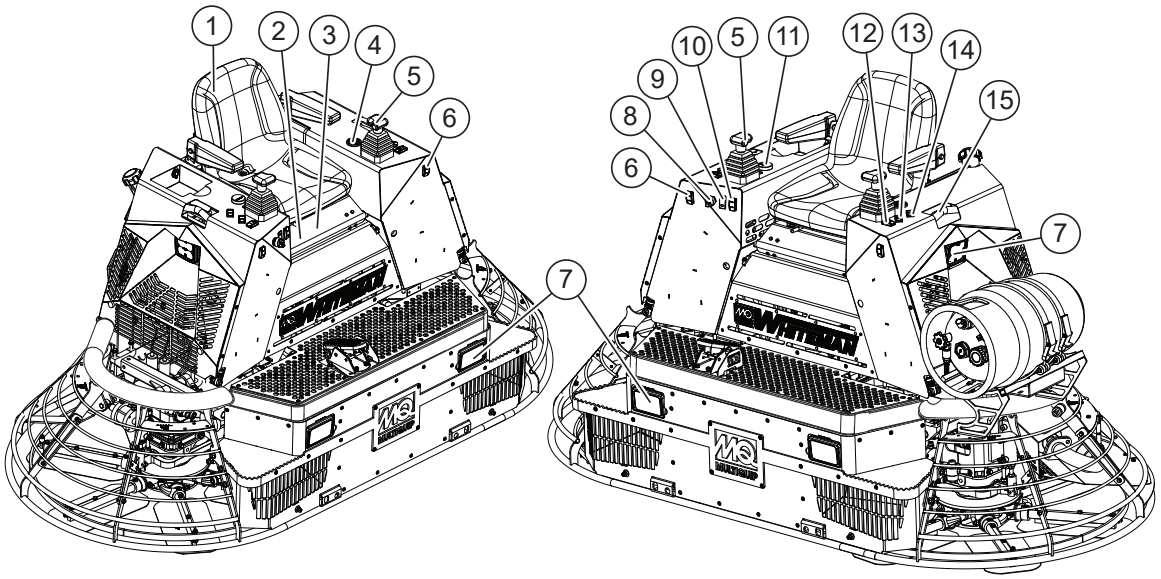


Figure 7. Components (Front)

1. **Seat** — Place for operator to sit. Trowel blades will not rotate unless operator is seated. Seat is adjustable.
2. **Fuse Box** — Contains fuses for control electronics.
3. **Relays** — Relays for lights and hydraulic fans.
4. **Fuel Gauge** — Indicates the amount of fuel in the fuel tank. Remove this cap to add fuel.
5. **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.
6. **Drive Bypass Switch** — Allows slow rotor rotation while the operator is out of the seat during removal from the concrete pad.
7. **Lights** — Six low voltage LED lights are provided with this unit. Two lights (4-LED lights) and four lights (6-LED lights) illuminate working area.
8. **Ignition Switch** — Turn key clockwise to start engine.
9. **Cold Start Lamp** — Illuminates in cold weather conditions and turns off as engine warms.
10. **Light Switch** — When activated, turns on six LED lights. Lights offer better visibility when working indoors.
11. **Diagnostic System Display Indicators:**
    - **Stop Lamp (RED)** — When lit **(RED)**, a major fault has occurred. The operator should immediately shut down the machine and correct the fault.
    - **Warning Lamp (AMBER)** — When lit **(AMBER)**, a minor fault has occurred. The operator should shut down the machine and correct the fault as soon as possible.
12. **Pitch Mode Switch** — Sets the mode of operation of the blade pitch system to either Smart Pitch™ or manual mode.
13. **Blade Pitch Control Switch (Twin Pitch)** — Adjusts the pitch on both rotors simultaneously.
14. **Blade Pitch Control Switch (Left Pitch)** — Adjusts the left-side blade pitch independently of the right side.
15. **Lift Loops** — Located on both the left and right sides of the main frame. Used when the trowel must be lifted onto a concrete slab.

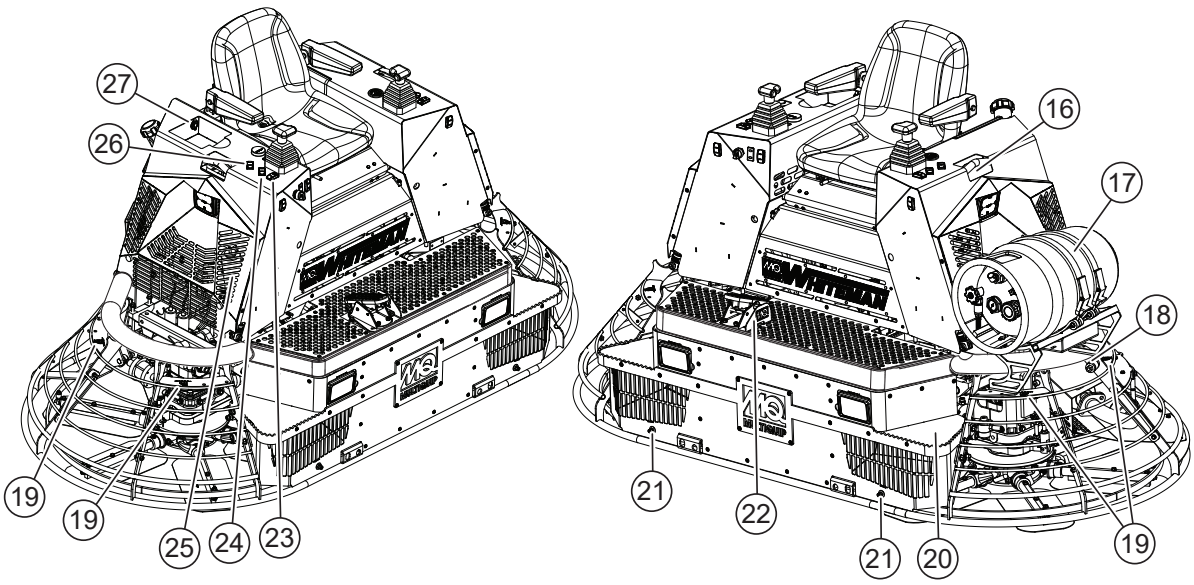


Figure 8. Components (Front Continued)

16. **Pitch Block** — Aluminum block that controls the flow of hydraulic oil to the pitch cylinders to tilt the rotors.
17. **Propane Tank** — Holds 33.5 lb. (36.3 liters) of propane when used to fuel the engine instead of gasoline. Uses either HD-5 or HD-10 liquid propane. HD-5 is recommended.
18. **Propane Tank Connection Port** — Connect an LPG hose to this port when refueling or removing the propane tank.
19. **Tie Down Strap Location** — Used to assist safe trowel transportation.
20. **Steps (Left and Right)** — Used for mounting and dismounting trowel.
21. **Spray Nozzles** — Two retardant spray nozzles are used with the trowel.
22. **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.
23. **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**.
24. **Engine Speed Switch** — Controls the speed of the engine. Press up to increase engine speed (high), and down to decrease engine speed (low).
25. **Overflow Bottle** — Supplies coolant to the radiator when radiator coolant level is low. Fill to indicated level as shown on bottle.
26. **Cruise Control Switch** — Press this switch to engage the cruise control. Press again to disengage.
27. **12VDC Power Port** — Accessory power port used to charge personal electronic devices.

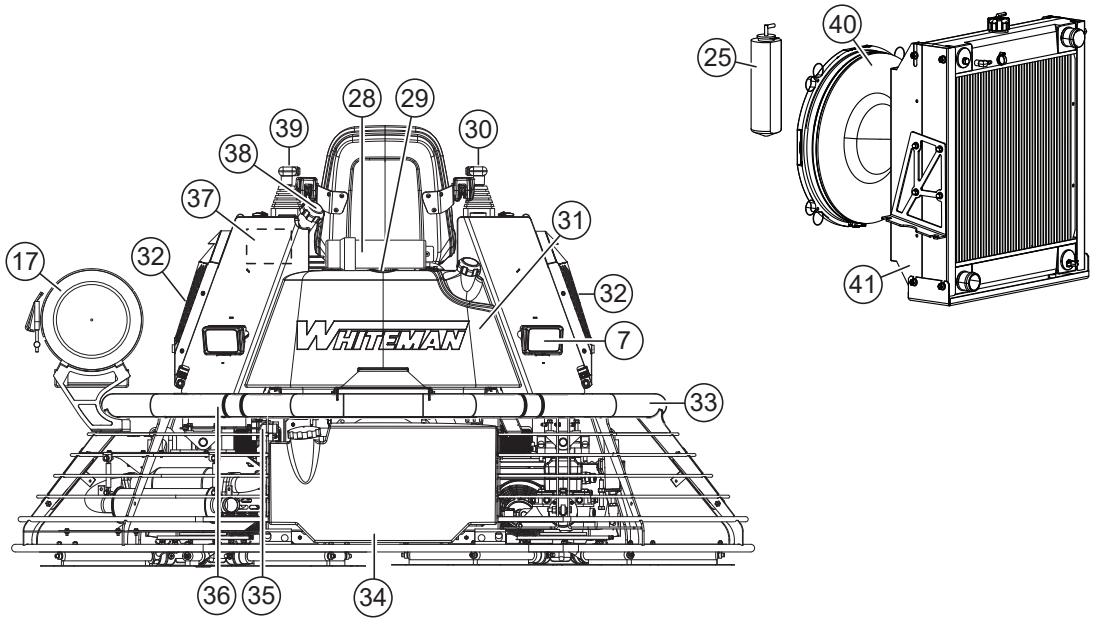


Figure 9. Components (Rear)

28. **Documentation Canister** — Storage for documentation and other information regarding the trowel.

29. **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 present, or a drive bypass switch is pressed.

30. **Steering Control (Right Side)** — Allows the right rotor to move forward or reverse. Allows the trowel to move left or right.

31. **Fuel Tank (Gasoline)** — Holds 11 gallons (41.6 liters) of gasoline. Use either 87 or 89 octane rated gasoline.

32. **Grill Guards (Left and Right)** — Protects operator from moving machine components. Remove for maintenance access. **DO NOT** operate the trowel with guards removed.

33. **Hydraulic Reservoir** — Part of the frame. Holds 8 gallons (30.3 liters) of hydraulic oil necessary for pump operation.

34. **Retardant Spray Tank** — Holds 5 gallons (18.9 liters) of retardant.

35. **Hydraulic Filter** — Filters hydraulic fluid prior to entering the system. (10-Micron Absolute Synthetic Media.)

36. **Battery** — Provides +12VDC to the electrical system.

37. **Hydraulic Oil Reservoir** — Allows for quick visual inspection.

38. **Hydraulic Oil Filler Cap** — Remove this cap to add hydraulic oil. Open **ONLY** when system is cooled down and all expanded oil has returned to the reservoir.

39. **Steering Control (Left Side)** — Allows the left rotor to move in a forward or reverse direction only.

40. **Engine Fan** — The electrically driven cooling fan pulls air through the radiator to remove heat from the engine.

41. **Radiator** — Holds coolant/water necessary to keep the engine at a safe operating temperature. Remove this cap **when cool** to add water/antifreeze.

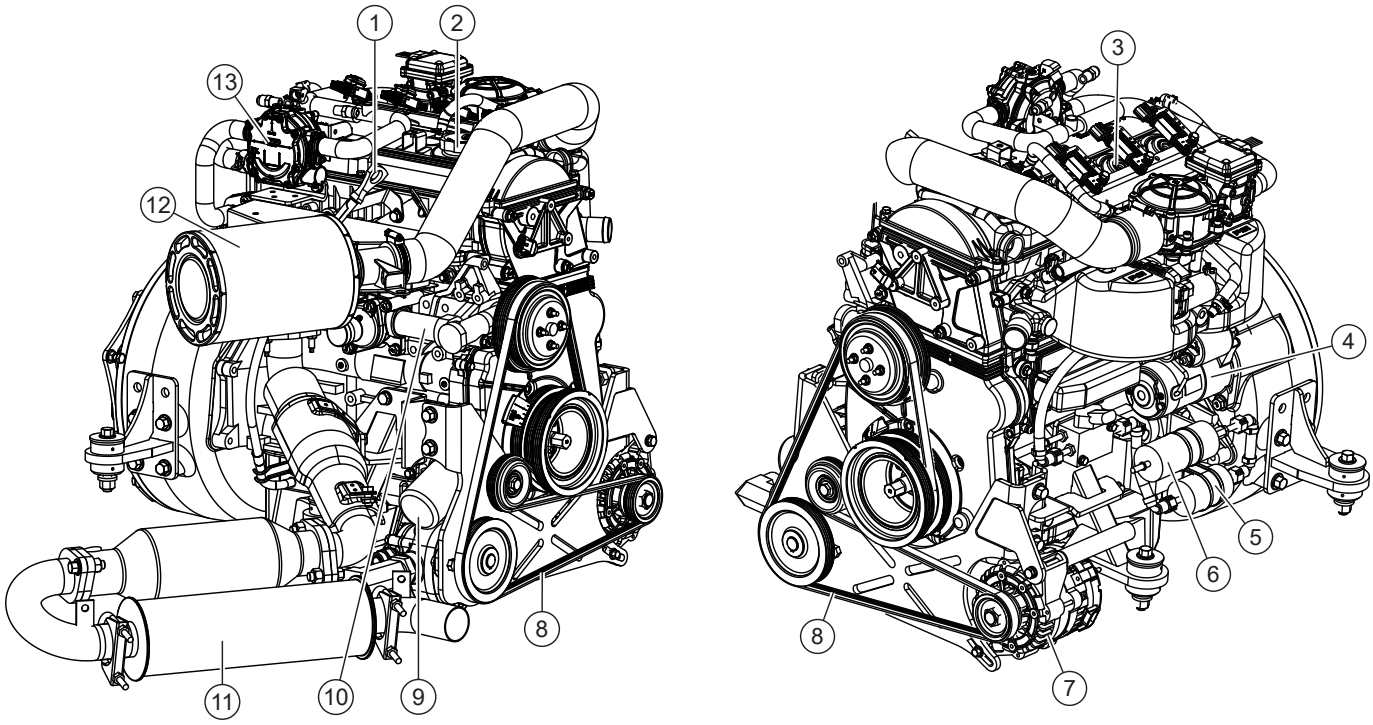


Figure 10. Basic Engine

1. **Oil Dip Stick** — Remove to check amount and condition of oil in crankcase.
2. **Oil Filler Port** — Remove to add fresh oil as specified in Table 4.
3. **Spark Plug** — Provides spark to the ignition system. Set spark plug gap to 0.035 inches (0.89 mm).
4. **Starter** — Starts engine when ignition key is rotated to the **START** position.
5. **Fuel Filter** — Removes dirt and water from the fuel system.
6. **Electric Fuel Pump** — Pumps fuel to the fuel system.
7. **Alternator** — Provides current to the electrical system and charges the battery.
8. **Fan belt** — Driven by the engine crankshaft during operation. Drives the water pump/fan as well as the alternator.
9. **Oil Filter** — Filters out oil contaminants.
10. **Water Pump** — Circulates coolant through the engine block.
11. **Muffler** — Used to reduce noise and emissions. **DO NOT** touch the muffler while the engine is running.
12. **Air Filter** — Helps provide clean source of air flow to engine.
13. **Vaporizer** — Used for vaporizing liquid fuel gases. Primary function is to heat up LPG.

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.

ENGINE OIL

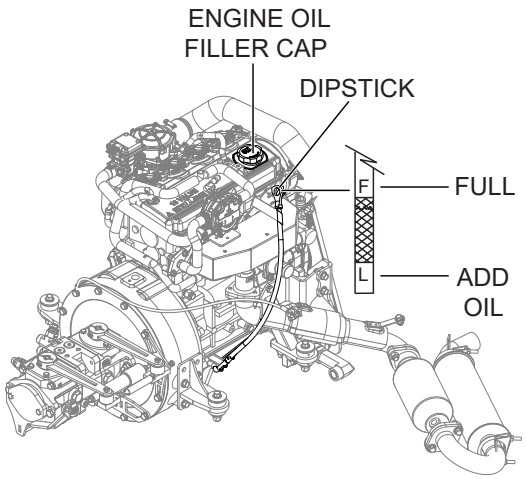


Figure 11. Engine Oil Check and Fill

1. When checking or adding oil, place the machine so the engine is level.
2. Pull the engine oil dipstick from its holder (Figure 11).
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.

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.

HYDRAULIC OIL

1. Check the hydraulic oil condition through the *hydraulic oil expansion tank fill cap* (Figure 12). Replace hydraulic oil if dirty.

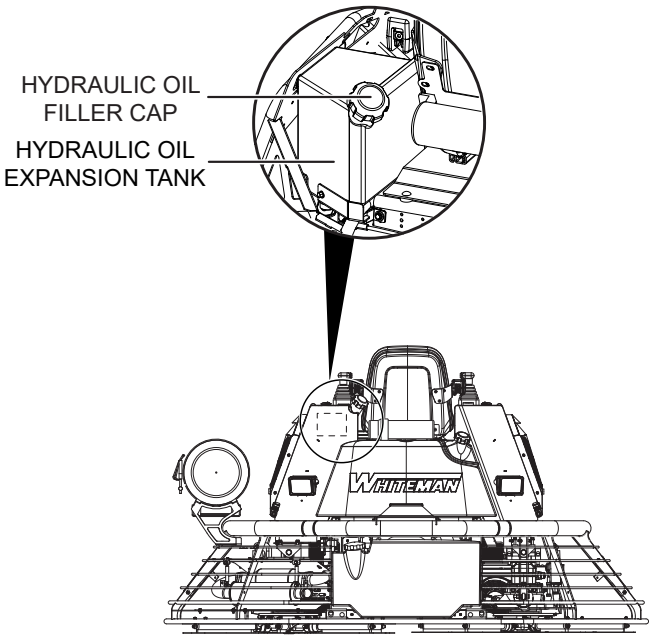


Figure 12. Hydraulic Oil Expansion Tank

2. Check that oil is visible in the tank. The hydraulic tank has an elevated overflow bottle. **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 the fill cap on the hydraulic oil expansion tank. Use Parker DuraClean™ ISO 46 or equivalent.

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 the ignition key to the start position and read the fuel gauge to determine if the engine fuel level is low (Figure 13).

Figure 13. 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 14) clockwise to release propane gas.

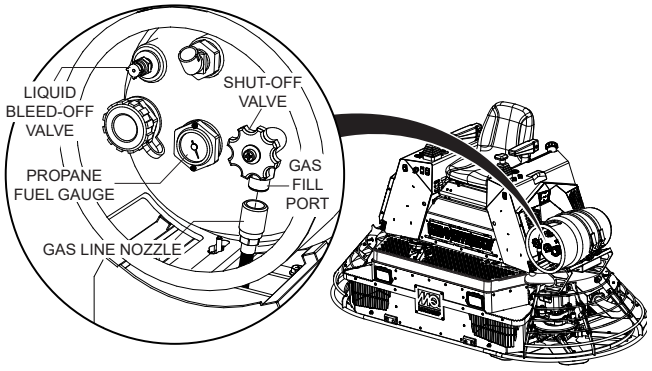


Figure 14. Propane Tank Shut-Off Valve

2. Read the ***propane fuel gauge*** (Figure 15) located on top of propane tank.

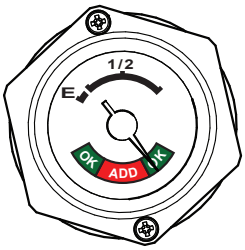


Figure 15. Propane Tank Fuel Gauge

3. If the propane fuel level is low, there are two methods for refueling. Method 1 will allow refueling of the propane tank in place (attached to trowel). Method 2 will require removal of the empty propane tank from the trowel.

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

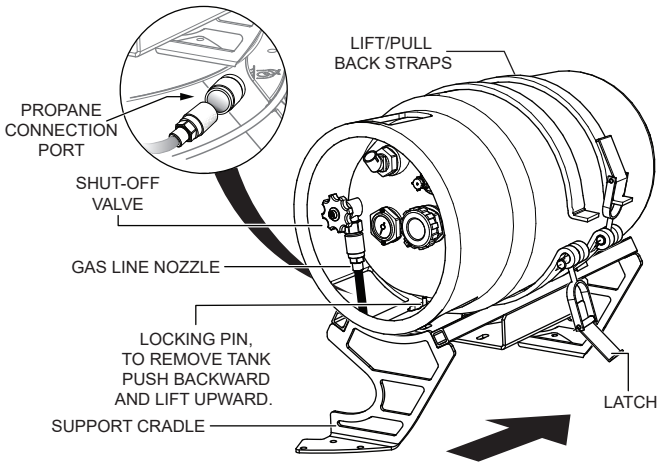


Figure 16. Propane Tank Removal

3. Disconnect the LPG gas line nozzle from the propane tank fill port.
4. Secure the LPG gas nozzle/hose to the propane connection port below the propane tank.
5. Release the propane tank strap latches.
6. To remove the 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 the new propane tank into the support cradle.
8. Secure the propane tank using the straps with locking latches.
9. Reconnect the LPG gas line nozzle to the propane tank fill port.
10. **OPEN** the shutoff valve on the 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 new trowel cannot be put into service until the setup instructions are completed. These instructions only need to be performed at the time of unpacking a new trowel.

BATTERY SETUP

CAUTION

Use all safety precautions specified by the battery manufacturer when working with the battery. See the ***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. First connect the positive cable (**RED**) to the positive terminal on the battery, then connect the negative cable (**BLACK**) to the negative terminal (Figure 17).

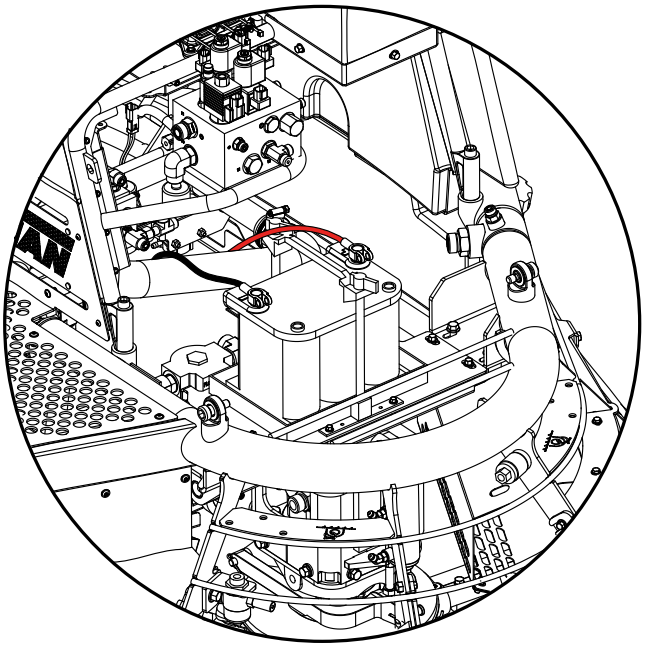


Figure 17. Battery Box

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 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 and lift yourself onto the trowel. Then sit down in the operator's seat.

NOTICE

DO NOT grab 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 18).

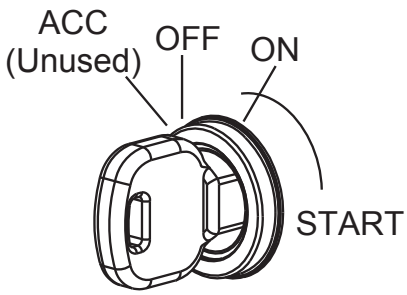


Figure 18. Ignition Switch and Key

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

4. All switch lamps, indicator lamps, and fans will turn on for 10 seconds to test outputs.The **AMBER** and **RED LEDs** on the ***diagnostic system display*** will flash until the engine is started (Figure 19).

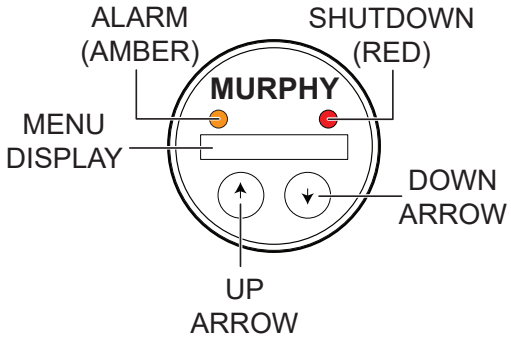


Figure 19. Diagnostic System Display Indicator Lights

5. The display menu will run through the preset parameters until the engine is started.

6. Select desired fuel mode: **GAS** or **LPG**.

7. Slide the rocker switch lock (Figure 20) 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.

8. To select the **GAS** mode, press down on the left side of the fuel selection rocker switch.The **GREEN** light is **OFF** (Figure 20).

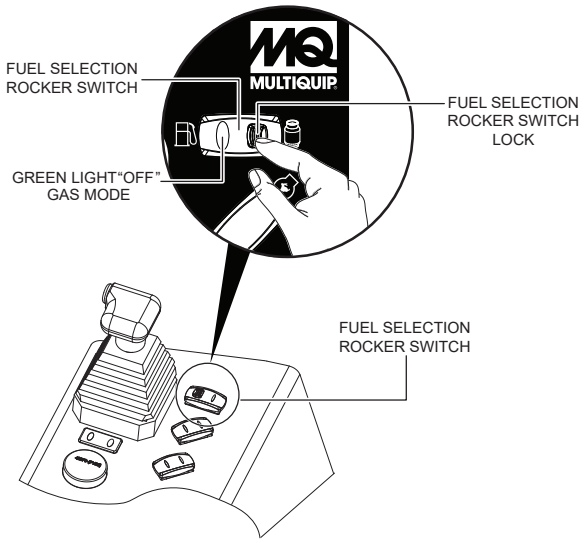


Figure 20. Fuel Selector Button (Gas Mode)

9. To select the **LPG** mode, press down on the right side of the fuel selection rocker switch.The **GREEN** light is **ON** (Figure 21).

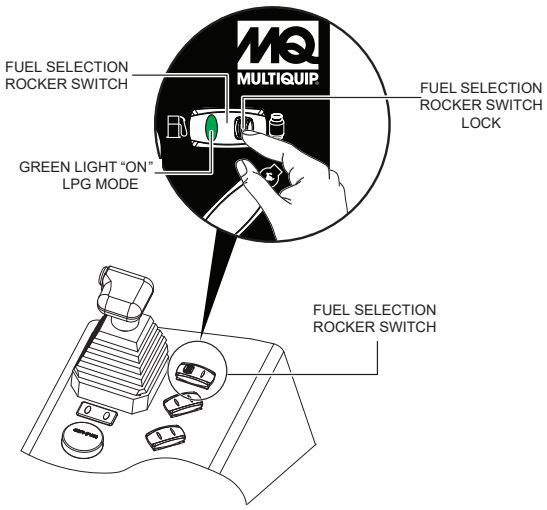


Figure 21. Fuel Selector Switch (LPG Mode)

> ***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.

10. 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.
11. Listen for the engine to start and release the key.
12. Let the engine idle for 2 to 3 minutes. Listen for any abnormal sounds.
13. The **AMBER** and **RED LEDs** are **OFF** if no engine or machine faults are present**.**
14. If the **AMBER** or **RED LEDs** are **ON**, shut down the engine and correct the problem. The diagnostic systems display will display a fault code (see Table 14 – Table 31).
15. Repeat this section a few times to get fully acquainted with the engine starting procedure.

Cold Start Lamp

- If the hydraulic oil temperature is below 125°F, or if the engine coolant temperature is below 160°F, the engine will rise to 1,750 rpm to warm the system.
- If the hydraulic oil temperature is below 125°F, oil will be forced over the pitch relief valve to raise the oil temperature.
- The cold start lamp indicator (**AMBER**) will remain on until the hydraulic oil reaches 130°F as shown in Figure 22 in the hydraulic system or at a 30-minute default time. The hydraulic cooling fan will come back on and the hydraulic fluid will be diverted away from the pitch relief valve.

NOTICE

The cold start lamp indicator is located in two locations on the right control console. An indicator is above the diagnostic system display, and the other is between the ignition key and light control rocker switch.

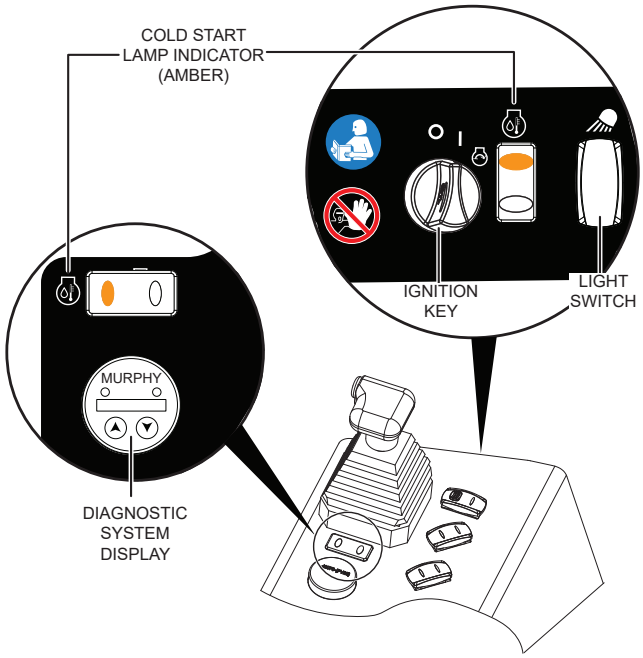


Figure 22. Cold Start Lamp Locations

TESTING THE 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.

1. With the engine running, press the foot pedal to begin blade (rotor) rotation. Observe that the blades are rotating.
2. Rise from the operator's seat.
3. Verify that blade rotation stops while the engine continues to run.
4. If blade rotation has stopped, the seat switch is working.
5. If blade rotation continues, the seat switch is not working. Stop the engine and correct the problem immediately.

PUMP STROKE

Stroke is proportionally controlled by the foot pedal input position via feedback from the stroke position sensor.

Pump Stroke Safety Interlock

1. The tandem pumps are automatically de-stroked if operator's presence is not detected.
2. If the foot pedal is pressed during engine startup the pump cannot be stroked until the foot pedal is first released, then pressed again. This prevents the machine from unintentionally moving when started.
3. The tandem pumps are automatically de-stroked if an error is detected from the foot pedal sensor.
4. Stroke command is directly controlled by foot pedal if an error is detected from the stroke sensor.

CRUISE CONTROL

Setting the ***cruise control*** will set and maintain a set pump stroke position command.

1. Press the foot pedal to raise the rotor speed.
2. Press down on the left side of the ***cruise control switch***. The **GREEN LED** on the cruise control switch turns **ON** (Figure 23).

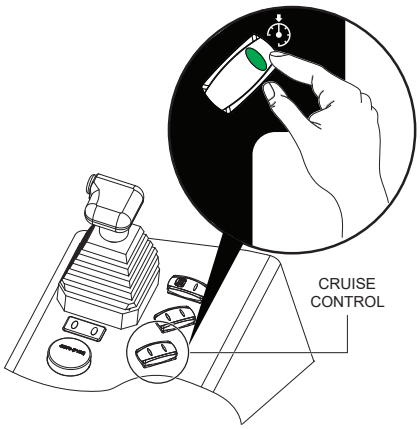


Figure 23. Cruise Control Switch

3. Release the foot pedal. The rotors should maintain the set speed.
4. The cruise control can be disengaged by:
   - Pressing the foot pedal after releasing.
   - Standing up from the operator's seat.
   - Pressing the cruise control switch again.
   - Pressing either the left or right drive bypass switch.
   - Changing the engine speed using the engine speed switch.

NOTICE

Cruise Control Safety Interlocks

Cruise control will be disabled if the following occurs:

Error has been detected in either the ***pedal position***, or ***stroke position*** sensors.

Operator presence is not detected (not sitting in seat).

Error code is received from the engine.

POWER MANAGEMENT

1. Pump stroke command is scaled back when engine load reaches a threshold capacity, maintaining maximum rotor speed and preventing the engine from stalling.
2. The pedal will not be able to fully stroke the pump until the engine load drops to the normal range.

TROWELING

1. Press down on the right side of the ***engine speed rocker switch*** (*rabbit*) until the desired engine speed is achieved (Figure 24).

NOTICE

Engine Speed Safety Interlocks

Full engine speed is allowed only when operator presence is detected (sitting in seat).

Engine speed changes to idle when the operator leaves the seat or the foot pedal is released for more than a set period of time.

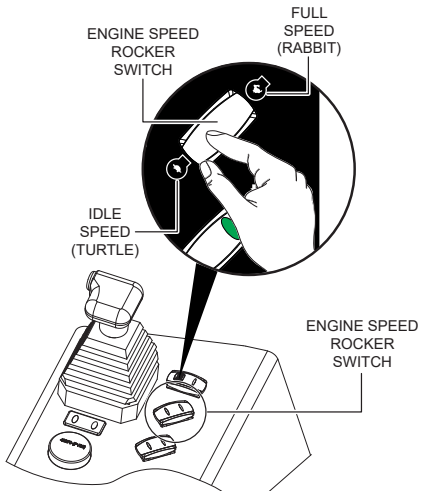


Figure 24. Engine Speed Rocker Switch

STEERING

Two joysticks (Figure 25 and Figure 26) located to the left and right of the operator's seat provide directional control for the trowel. Table 6 illustrates the various directional positions of the joysticks and their effect on the trowel.

NOTICE

All directional references with respect to the joysticks are from the operator's seat position.

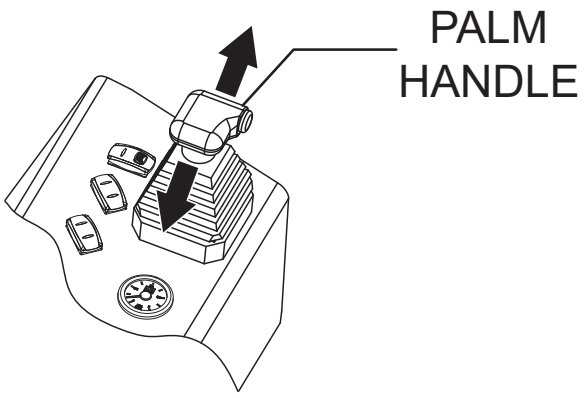


Figure 25. Left Joystick Control

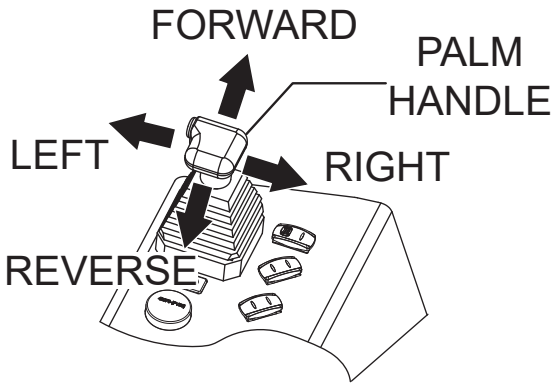


Figure 26. Right Joystick Control

See Table 6 for steering and directional relationship to joystick control movement.

Table 6. Joystick Directional Positioning

CONTROL JOYSTICK & DIRECTION	RESULT
Move **LEFT** Joystick FORWARD	Causes only the left side of the ride-on trowel to move forward.
Move **LEFT** Joystick BACKWARD	Causes only the left side of the ride-on trowel to move backward.
Move **RIGHT** Joystick FORWARD	Causes only the right side of the ride-on trowel to move forward.
Move **RIGHT** Joystick BACWARD	Causes only the right side of the ride-on trowel to move backward.
Move **BOTH** Joysticks FORWARD	Causes the ride-on trowel to move forward in a straight line.
Move **BOTH** Joysticks BACKWARD	Causes the ride-on trowel to move backard in a straight line.
Move **RIGHT**Joystick to the RIGHT	Causes the ride-on trowel to move to the right.
Move **RIGHT**Joystick to the LEFT	Causes the ride-on trowel to move to the left.

1. The foot pedal (Figure 27) solely controls blade speed (if cruise control is not enabled). 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.

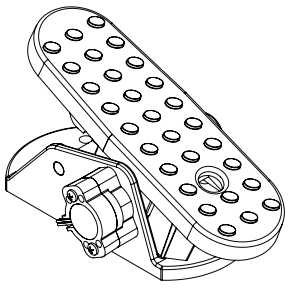


Figure 27. Blade Speed Control Foot Pedal

2. Push both the left and right joysticks forward (Figure 28).

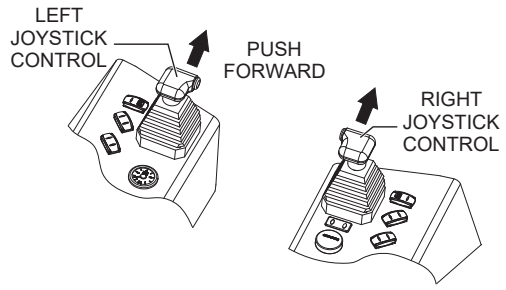


Figure 28. Joystick Control Forward Direction

3. With your right foot, slowly press the foot pedal halfway. Notice that the trowel begins to move in a forward direction. Release both joystick controls to stop forward movement then remove your right foot from the foot pedal.

4. Practice holding the machine in one place as you increase blade speed. When about 75% of maximum blade speed has been reached, the blades will be moving at proper finishing speed. The machine may be difficult to keep in one place. Trying to keep the trowel stationary is good practice for operation.

5. Practice maneuvering the trowel using the information listed in Table 6. Try to practice controlled motions as if you were finishing a slab of concrete. Practice edging and covering a large area.

6. Try adjusting the pitch of the blades. This can be done with the trowel stopped or while the trowel is moving. Test the operation of optional equipment like retardant spray and lights.

7. Pull both the left and right joysticks backward (Figure 29) and repeat steps 3 through 6 while substituting the word reverse for forward.

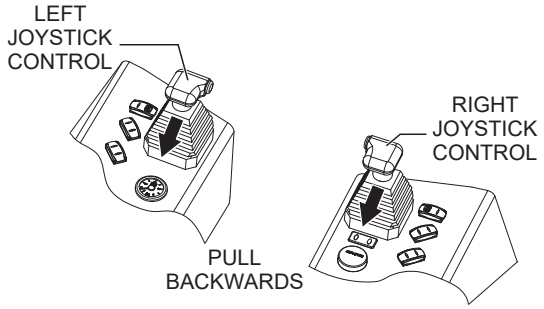


Figure 29. Joystick Control Reverse Direction

BLADE PITCH CONTROL

The blade pitch mode can be set by the ***pitch mode rocker switch*** (Figure 30): There are three modes of the blade pitch system:

- Smart Pitch™
- Manual Pitch
- Panning Mode

The trowel blades can be pitched for various finishing techniques with the aid of the left and twin-pitch rocker switches (Figure 30).

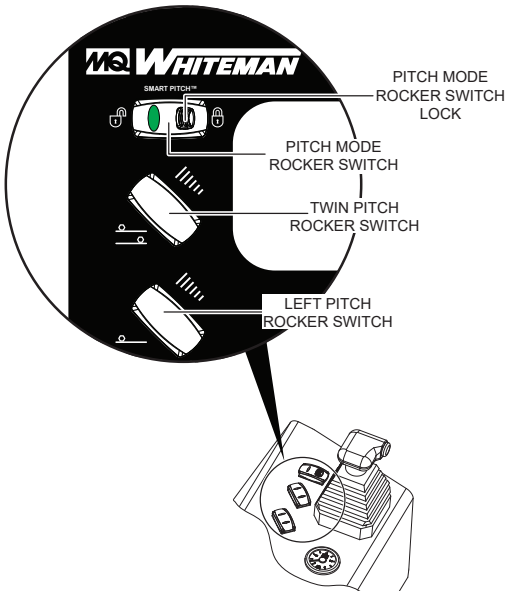


Figure 30. Blade Pitch Control

NOTICE

The ***pitch mode rocker switch*** must be unlocked before **Smart Pitch™** or **Manual Pitch** mode can be selected. Slide the ***switch lock*** to the left and hold, then select the desired gas mode. Once mode has been selected release the ***pitch mode rocker switch***.

Refer to Table 7 for a basic understanding of the **GREEN** status LED that is located on the pitch mode switch.

Table 7. Pitch Mode Light Function

Operator Action	Green Status LED	Trowel Action
N/A	Blinking	Pitch Calibration Error, Calibration Cycle Underway, Not Yet Calibrated
Panning Mode[1]	Blinking	Left and Right Rotors/Blades are flat .9s on, .1s off
Manual Pitch Mode Active (Left, Unlocked Position)	OFF	Pitch is manually controlled by Left Pitch switches
Smart Pitch™ Mode Active (Right, Locked Position)	ON	Left and Right rotors are synchronized.
	OFF	Left and Right rotors are not synchronized.
	Blinking	Left and Right rotor synchronization process is underway. .1s on, .1s off

[1] The position of the pitch mode switch does not affect the panning mode. Panning mode is terminated by pressing either the Left or Twin Pitch Switch in the upward direction.

Smart Pitch™ Mode

Smart Pitch™ is activated by pressing the switch to the right, locked position.

When the Twin Pitch switch is pressed (up or down), the right and left rotor pitch changes. When the operator achieves the desired pitch on the right blades and releases the Twin Pitch switch, the left pitch will synchronize with the right blades. The Pitch Mode light will flash (0.1s **ON**, 0.1s **OFF**) during synchronization.

The Pitch Mode light will remain **ON** when both rotors are synchronized.

Left Pitch switch activation changes the left rotor pitch while the right rotor pitch remains constant. The Pitch Mode light turns off during desynchronization. Momentary Twin Pitch switch activation re-synchronizes pitch.

Smart Pitch™ is disabled to prevent the pitch system from hunting and the Pitch Mode light will remain **ON** when left and right pitch position are above calibration points.

Manual Pitch Mode

Manual Pitch is activated by pressing the switch to the left, unlocked position.

The Pitch Mode light will remain **OFF**.

Twin Pitch switch activation changes left and right rotor pitch simultaneously, but non-synchronously.

Left Pitch switch activation changes left rotor pitch while the right rotor pitch remains constant.

Panning Mode

Panning Mode is activated by pressing and holding the Twin Pitch switch and Left Pitch switch in the down position for 10 seconds. Deactivate by pressing and holding the switches in the up direction.

Pitch systems are retracted. This deactivates the pitch system and allows the blades to float.

The Pitch Mode light will flash (0.9s **ON**, 0.1s **OFF**).

NOTICE

For installation of float pans, refer to the maintenance section ***Installing Float Pans***.

REMOVING THE TROWEL FROM A CONCRETE PAD

Care should be taken to not damage a concrete pad surface while removing the trowel from the pad. This will require at least two people—one to operate the forklift and one to carefully rotate the blades.

⚠ WARNING

Removal of the trowel from concrete **requires two people**. **NEVER** attempt to perform this procedure alone!

⚠ WARNING

DO NOT place any part of your body between the forklift and the trowel. **SERIOUS INJURY OR DEATH** may result.

1. Carefully attach a forklift to the trowel as shown in the ***Lifting and Transporting*** section of this manual.
2. **Without sitting in the operator's seat**, press and hold either drive bypass rocker switch (Figure 31) and press the foot pedal (by hand) to slowly rotate the trowel blades.

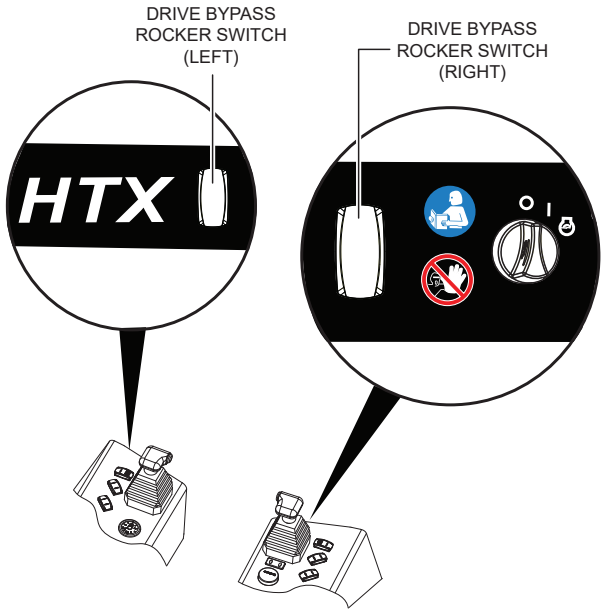


Figure 31. Drive Bypass Rocker Switches

NOTICE

DO NOT engage the seat switch by sitting in the operator's seat. The blades will not turn if an operator is in the seat while the drive bypass switch is pressed. In drive bypass mode, the rotors are only turned via drive bypass rocker switch and foot pedal engagement.

3. With the blades slowly spinning, use the forklift to slowly lift the trowel until all trowel blades are clear of the concrete pad surface. **REMEMBER** to keep all personnel out of the area between the forklift and the trowel.
4. Release the drive bypass switch and foot pedal, and stand clear of the forklift and trowel.

ENGINE SHUTDOWN

1. On the left side of the ***engine speed rocker switch*** (*turtle*), press down until the engine is at idle (Figure 32). Let engine idle for 3-5 minutes.

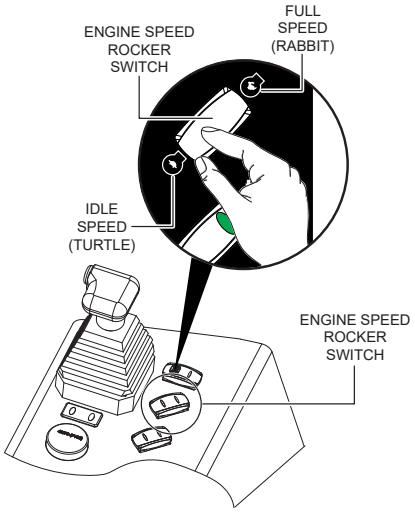


Figure 32. Engine Shutdown

NOTICE

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

2. Turn the ignition key counterclockwise to the **OFF** position then remove the key.
3. If LPG mode was in use, turn shut off valve knob clockwise to **CLOSE** (Figure 33).

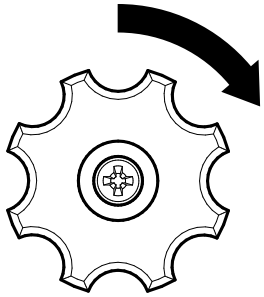


Figure 33. Propane Tank Shut-Off Valve (Closed)

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

Table 8. Maintenance Schedule												
System	Check Item	DAILY	Periodic Maintenance Interval									
			Every 200 Hrs	Every 400 Hrs	Every 800 Hrs	Every 1000 Hrs	Every 1,250 Hrs	Every 1,500 Hrs	Every 1,750 Hrs	Every 2,000 Hrs	Every 3,000 Hrs	Every 5,000 Hrs
	General Maintenance											
	Visual check for fluid leaks	X										
	Check engine oil level	X										
	Check coolant level	X										
	Change engine oil and filter (Severe duty)[5]	**Every 150 hours or 120 days of operation**										
	Change engine oil and filter (Standard duty)[5]	**Every 250 hours or 120 days of operation**										
	Check LPG system for leaks	Prior to any service or maintenance activity										
	Inspect accessory drive belts for cracks, breaks, splits or glazing[1]					X						
	Inspect electrical system wiring for cuts, abrasions or corrosion									X		
	Engine Coolant Section											
	Clean debris from radiator core	**Every 100 hours or 60 days of operation**										
	Change Coolant[2 & 4]											X
	Inspect coolant hoses for cracks, swelling or deterioration[1]					X						
	Engine Ignition System											
	Replace spark plugs Standard Duty									X		
	Replace spark plugs Severe Duty[3]					X						
	Replace Distributor CAP and Rotor[6]				X							
	Replace spark plug wires[6]				X							
	Inspect battery case for damage					X						

Table 9. Maintenance Schedule (Continued)												
System	Check Item	DAILY	Periodic Maintenance Interval									
			Every 200 Hrs	Every 400 Hrs	Every 800 Hrs	Every 1,000 Hrs	Every 1,250 Hrs	Every 1,500 Hrs	Every 1,750 Hrs	Every 2,000 Hrs	Every 3,000 Hrs	Every 5,000 Hrs
	Base Engine System											
	Replace camshaft belt (Mitsubishi Engine)											X
	Replace balance shaft belt (Mitsubishi Engine)											X
	Inspect PCV system					X						
	Fuel System Maintenance											
	Inspect air cleaner	**Every 200 hours, or every 100 hours in dusty environment**										
	Replace filter element	**Every 400 hours, or every 200 hours in dusty environment**										
	Replace fuel filter			X								
	Inspect shut-off valve for leaks and closing									X		
	Check fuel lines for leaks									X		
	Check air induction for leaks									X		
	Check manifold for vacuum leaks									X		
	Drain LPG vaporizer oil buildup	**Every 150 hours or 120 days of operation**										
	Engine Exhaust System											
	Inspect exhaust manifold for leaks									X		
	Inspect exhaust piping for leaks									X		
	Check HEGO sensor(s) connector and wires for burns, cuts or damage									X		
	Inspect catalyst for mechanical damage									X		

The Maintenance schedule represents manufacturer's recommended maintenance intervals to maintain proper engine/equipment function. Specified state and federal regulations may require equipment operators to conduct comprehensive engine/equipment inspections at more periodic intervals than those specified above.

Note 1 = Item should be checked yearly, replace as needed.

Note 2 = PSI requires the use of coolant meeting GM specification GM6277M. When used, this coolant change interval is 5,000 hours or 5 years (whichever occurs first).Changing of coolant types (typically indicated by color) and mixing of coolants is not allowed as this can result in a loss of coolant protection during the engine life. Consult the OEM for the correct replacement interval if you use coolant other than GM6277M.

Note 3 = Severe duty applications are units that receive high load, full-throttle operation for the majority of its operational life.

Note 4 = 5,000 hours or 5 years, whichever occurs first.

Note 5 = Oil life is highly dependent on oil quality, operating enviroment, and engine use.

Note 6 = GM Product Only.

CAUTION

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.

AIR CLEANER

This PSI 2.4L engine is equipped with replaceable elements. Some will have an safety element that is used as a backup filter should the air cleaner become dirty.

See Figure 34 for air cleaner components.

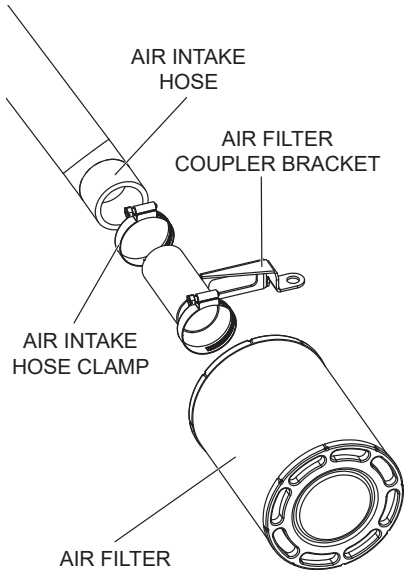


Figure 34. Air Cleaner Components

1. Check the air cleaner daily or before starting the engine.
2. Check for and correct heavy buildup of dirt and debris along with loose or damaged components.
3. Replace the element if it is damaged, excessively dirty, or oily.

NOTICE

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

Air Cleaner Service

CAUTION

Wear protective equipment such as approved safety glasses or face shields and dust masks or respirators when cleaning air filters with compressed air.

To service the air cleaner perform the following steps. See Figure 34 for location of components.

1. Release the cleaner dust pan. Remove the dust pan.
2. Remove the air cleaner element.
3. Blow low pressure air from the inside of the element to dislodge the dust and dirt. Do not use excessive air pressure or the element will become damaged and will need to be replaced.
4. Replace the element if it is damaged or excessively dirty.
5. Clean the inside of the dust pan.
6. Reinstall the element or, if equipped, the precleaner over the air cleaner element.
7. Reinstall the air cleaner dust pan.

NOTICE

DO NOT run the engine with the air cleaner removed or without an element.

RADIATOR/COOLING SYSTEM

CAUTION

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

NOTICE

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

1. Check the 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 the radiator cap seal and replace as necessary.

Refer to your engine manual for additional information.

RADIATOR CLEANING

1. Blow off dirt and dust from the fins and radiator with 28 psi (193 kPa) or less of compressed air (Figure 35). Be careful not to damage the fins with the compressed air.

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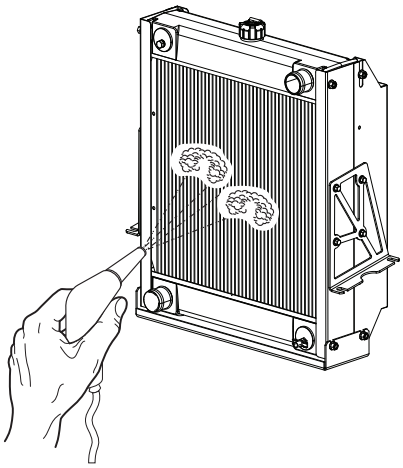


Figure 35. Radiator Cleaning

2. If there is a large amount of contamination on the fins, clean and rinse thoroughly with detergent and 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.

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 36), 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.

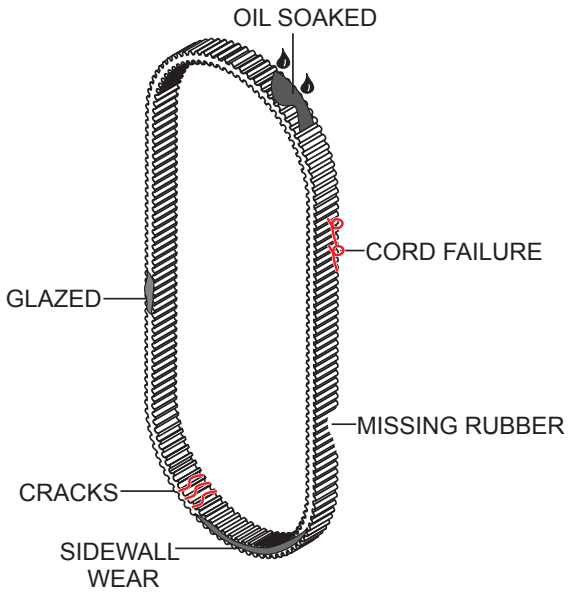


Figure 36. Drive Belt Inspection

⚠ WARNING

DO NOT attempt to insert hands or tools into the drive belt area while the engine is running and the safety guard has been removed. Keep fingers, hands, hair and clothing away from all moving parts to prevent bodily injury.

⚠ WARNING

DO NOT remove the drive belt guard cover until the muffler has cooled. Allow the entire trowel to cool down before performing this procedure.

FAN BELT TENSION

A slack fan belt may contribute to overheating, or to insufficient charging of the battery. Inspect the fan belt for damage and wear and adjust it in accordance with the Engine Owner's Manual.

The fan belt tension is proper if the fan belt bends 7 to 10 mm between the water pump and alternator when pressed with the thumb as shown in Figure 37.

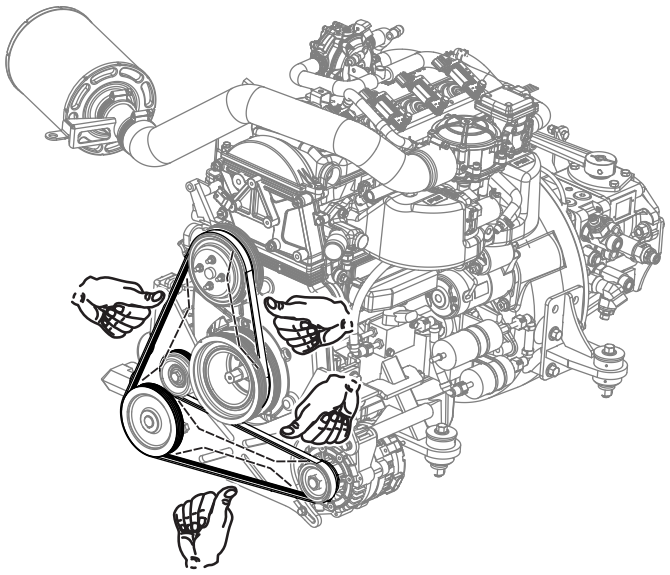


Figure 37. Fan Belt Tension

ENGINE OIL

NOTICE

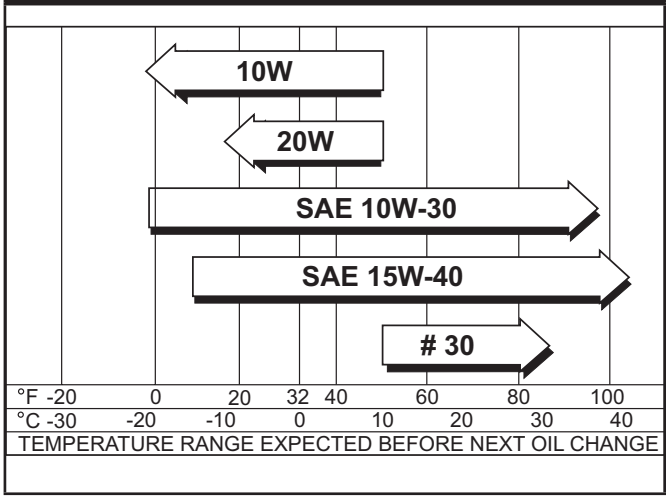
To achieve proper engine performance and durability, only use engine oils that have an API rating of SM or newer.

1. When checking or adding oil, place the machine so the engine is level.
2. Pull the engine oil dipstick from its holder.
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 the upper limit on the dipstick. Allow enough time for any added oil to make its way to the oil pan before rechecking.

Changing Engine Oil And Filter

Change the engine oil and filter after the first 50 hours of use, then every 3 months or 250 hours for standard operation (150 hours for severe duty operation). Refer to Table 10 for recommended oil viscosity. Refer to Figure 38 for location of components.

Table 10. Recommended Viscosity Grades



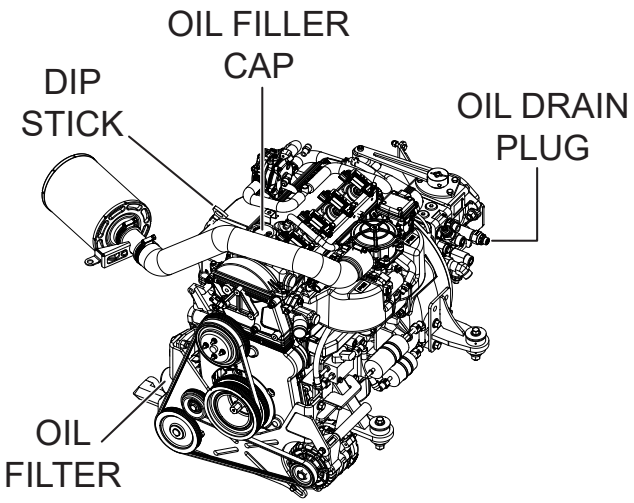


Figure 38. Engine Oil Service Components

1. Remove the oil filler cap while draining the oil to allow the oil 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 the sealing surface where the filter mounts on the engine.
6. Coat the seal of the new oil filter with clean engine oil. Install the new filter first by hand until it contacts the engine sealing surface. Tighten it another 3/4 turn using the filter wrench.
7. Fill the engine with oil until it shows between the upper and lower limits on the dipstick. **DO NOT** overfill.
8. Run the engine 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.

FUEL TANK

⚠ CAUTION

DO NOT store the trowel with fuel in the tank for any extended period of time. Completely drain the fuel system (tank, lines, etc.) if the unit is to be placed 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.

FUEL FILTER

1. Replace the engine fuel filter element (Figure 39) every 400 hours.

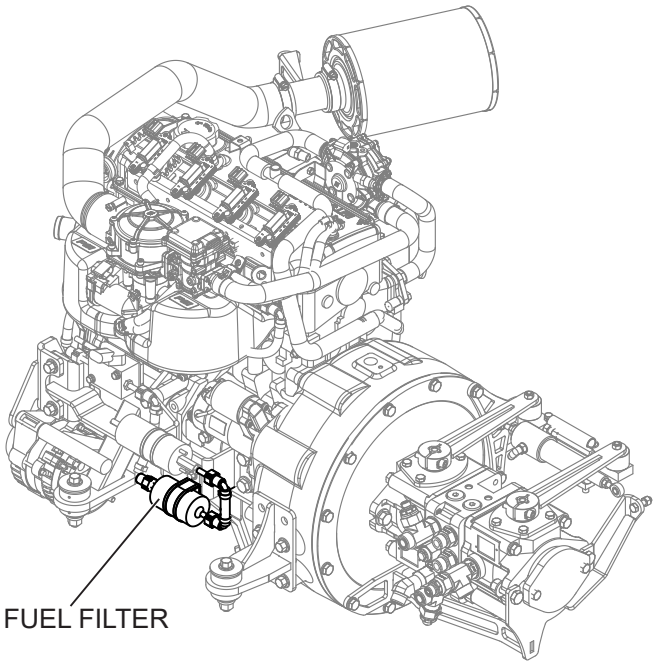


Figure 39. Fuel Filter

Refer to your engine manual for specific details to perform this operation.

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 the electrode is worn, replace the spark plugs.
5. Measure the spark plug electrode gap (Figure 40) with a wire-type feeler gauge. If needed, adjust the gap to .035 in. (0.89 mm), by carefully bending the side electrode.

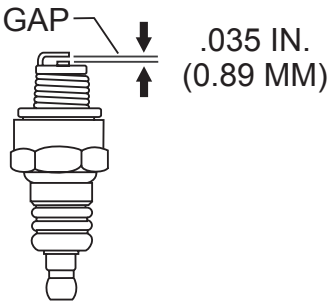


Figure 40. Spark Plug Gap Adjutsment

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. 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.

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.

HYDRAULIC OIL FILTER

1. Change the hydraulic oil and filters (Figure 41) after the first 100 hours of use, then change every 250 hours. Use 10-micron absolute synthetic media filters.

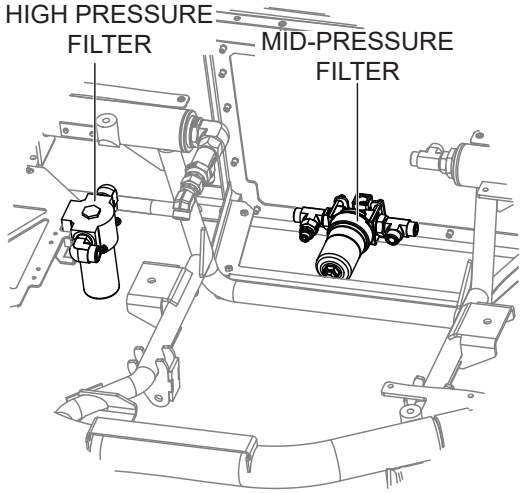


Figure 41. Hydraulic Oil Filter

BATTERY/CHARGING SYSTEM

1. Check and clean battery terminals for corrosion.
2. Never attempt to charge a battery that is frozen. The battery can explode unless first allowed to thaw.
3. Disconnect the negative (–) battery terminal during storage. If the unit will be stored where the ambient temperature will drop to –15°C or less, remove and store the battery in a warm, dry place.
4. Check the manufacturer's recommendations for maintaining and charging the battery.

LONG TERM STORAGE

1. Remove the battery.
2. Drain fuel from fuel tank.
3. Clean exterior with a cloth soaked in clean oil.

4. Store the trowel covered with a plastic sheet in a moisture- and dust-free location out of direct sunlight.

⚠ CAUTION

NEVER store the trowel with fuel in the tank for any extended period of time. Always clean up spilled fuel immediately.

TROWEL LUBRICATION

Regular lubrication is required to maintain your trowel in optimal working condition. Schedule maintenance lubrication according to Table 11 below.

Table 11. Trowel Lubrication Schedule

Location	# of Shots	Interval
Spiders	1 to 1½	Every day
Thrust collars	1	Every day

Spiders (Daily)

Perform the following lubrication procedure after **every 8 hours of use**.

1. Locate one of the Zerk grease fittings on either spider assembly (Figure 42). Remove the Zerk fitting cap and set it aside.

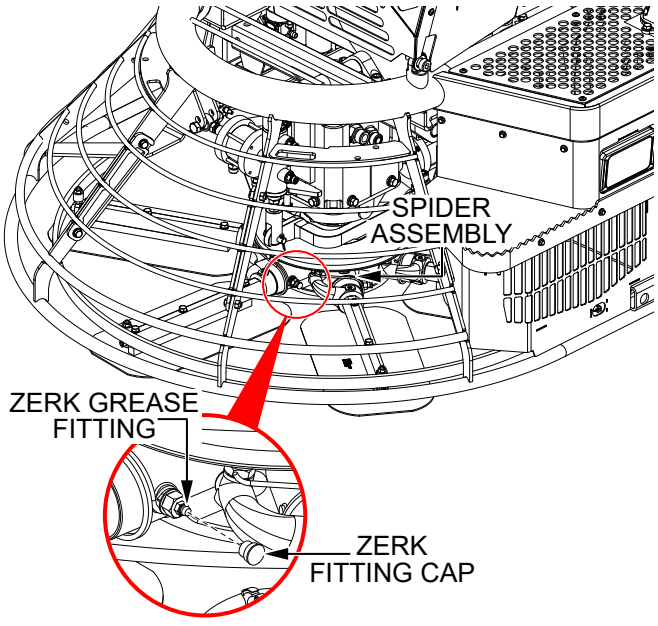


Figure 42. Spider Lubrication

2. Wipe the Zerk grease fitting clean to prevent abrasive material from entering the fitting during lubrication.
3. Lubricate the Zerk grease fitting with 1–1½ shots of multipurpose grade grease. Replace the Zerk grease fitting cap when finished.
4. Repeat steps 1–3 for the remaining grease fittings on both spider assemblies.

Thrust Collars (Daily)

Perform the following lubrication procedure after **every 8 hours of use**.

1. Locate the Zerk grease fitting on either thrust collar (Figure 43). Remove the Zerk grease fitting cap and set it aside.

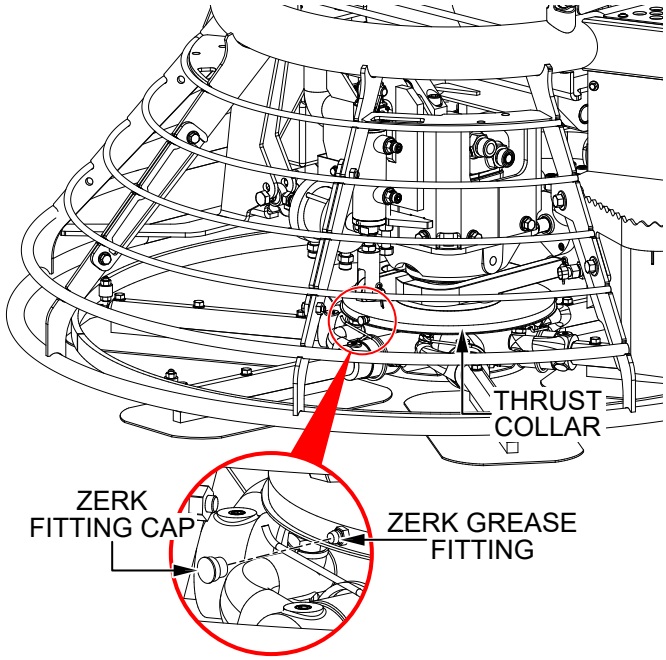


Figure 43. Thrust Collar Lubrication

2. Wipe the Zerk grease fitting clean to prevent abrasive material from entering the fitting during lubrication.
3. Lubricate the Zerk grease fitting with one shot of multipurpose grade grease. Replace the Zerk grease fitting cap when finished.
4. Repeat steps 1–3 for the grease fitting on the remaining thrust collar.

BLADE PITCH ADJUSTMENT PROCEDURE

Maintenance adjustment of blade pitch is made by adjusting a bolt (Figure 44) on the arm of the trowel blade finger. This bolt is the contact point of the trowel arm with 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 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?
- Do the pitch control towers rock back and forth?

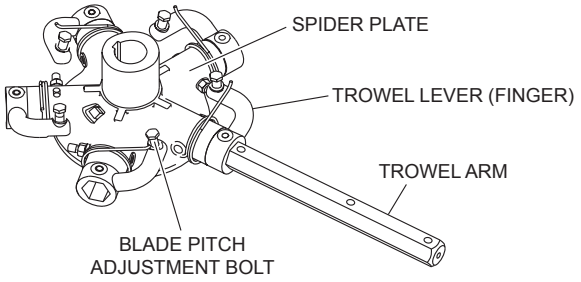


Figure 44. Blade Pitch Adjutsment Bolt

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 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 that the blades pitch correctly after adjustment.

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 should be checked for adjustment, wear, or damage. See the following sections.

Changing Blades

It is recommended that **ALL** of the blades on the 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.

Clean-Up

Never allow concrete to harden on the power trowel. Wash any concrete off the trowel with water immediately after use. 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.

Trowel Arm Adjustment

NOTICE

The following procedure should be followed to adjust trowel arms when it becomes apparent that the trowel is finishing poorly or in need of routine maintenance.

A clean, level 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', 3/4 inch-thick, flat, steel plate should be used for testing.

Some indications of poor concrete finishing are incorrect trowel arm alignment, worn spider bushings, or bent trowel arms:

Does your trowel exhibit the following?

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

1. To determine which blades need adjustment, place the trowel in the test area (3/4 inch-thick plate).
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 45).

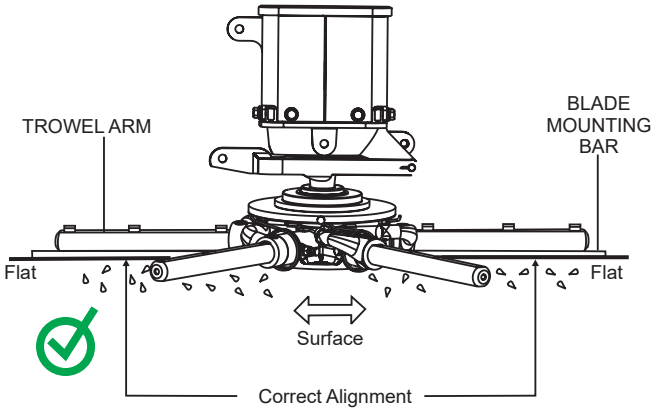


Figure 45. Correct Spider Plate Alignment

Figure 45 illustrates the correct alignment for a spider plate (as shipped from the factory).

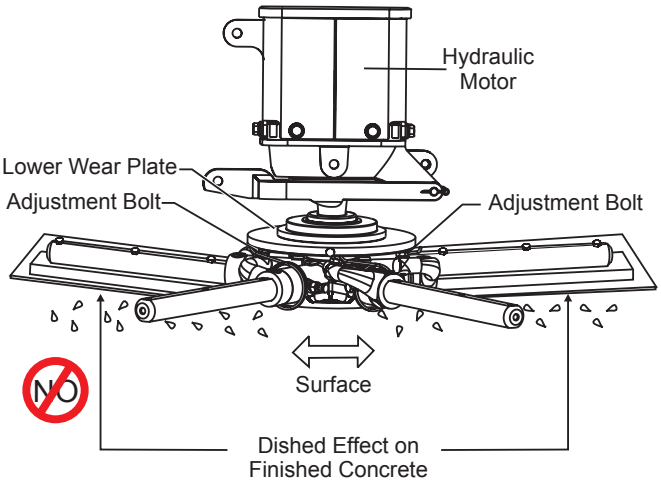


Figure 46. Incorrect Spider Plate Adjustment

Remove the spider assembly from the gearbox shaft as follows:

1. Locate the cone point square head set screw (Figure 47) and attached jam nut found on the side of the spider assembly.

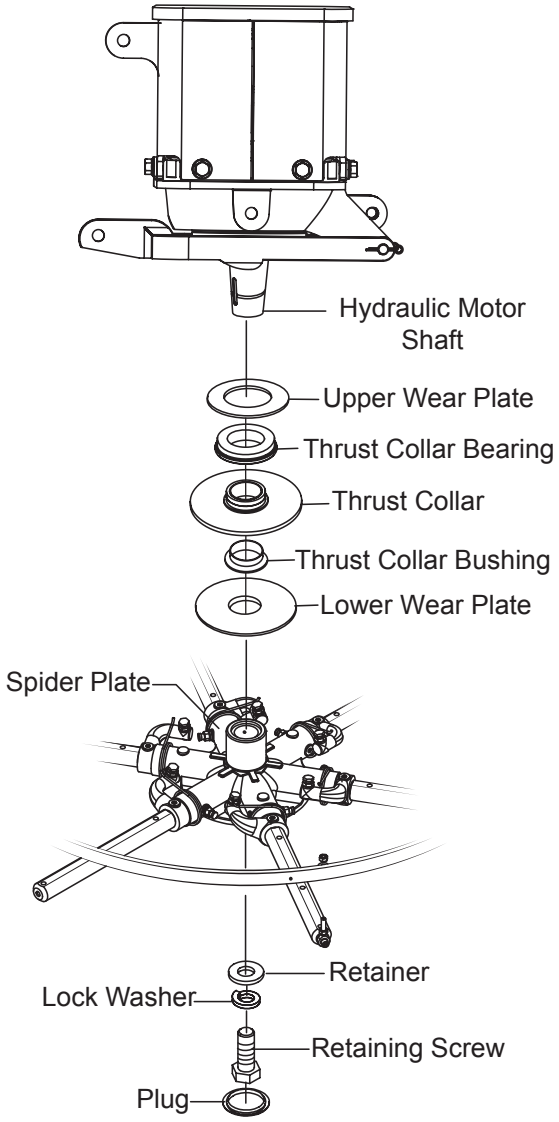


Figure 47. Spider Removal

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.
4. For reassembly apply Red Loctite #262 to the spider retaining screw and torque to 130 ft.-lb. (176 N·m).

TROWEL BLADE REMOVAL

Remove the trowel blades by removing the three hex head bolts (Figure 48) from the trowel arm. Set blades aside.

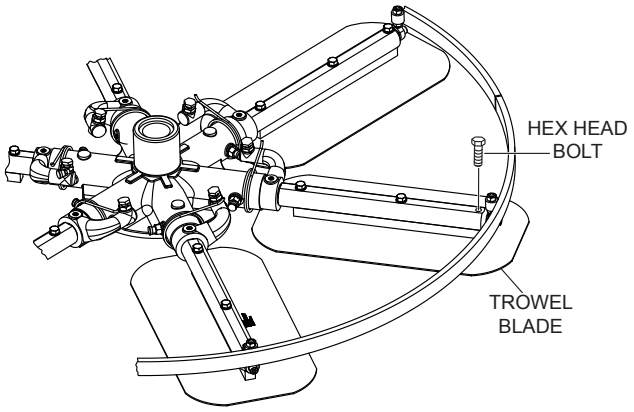


Figure 48. Trowel Blade Removal

TROWEL ARM REMOVAL

1. Remove the hardware securing the stabilizer ring to the trowel arm (Figure 49).

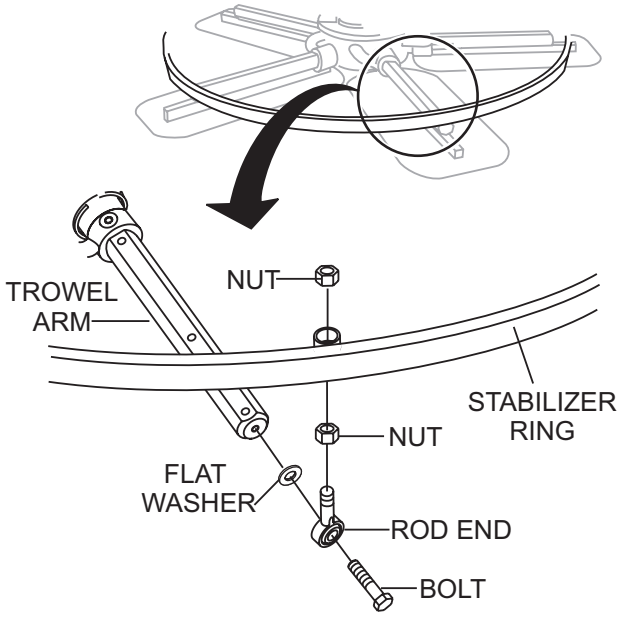


Figure 49. Stabilizer Ring

2. Each trowel arm is held in place at the spider plate (Figure 50) by a hex head bolt (zerk grease fitting) and a roll pin. Remove both the hex head bolt and the roll pin from the spider plate.

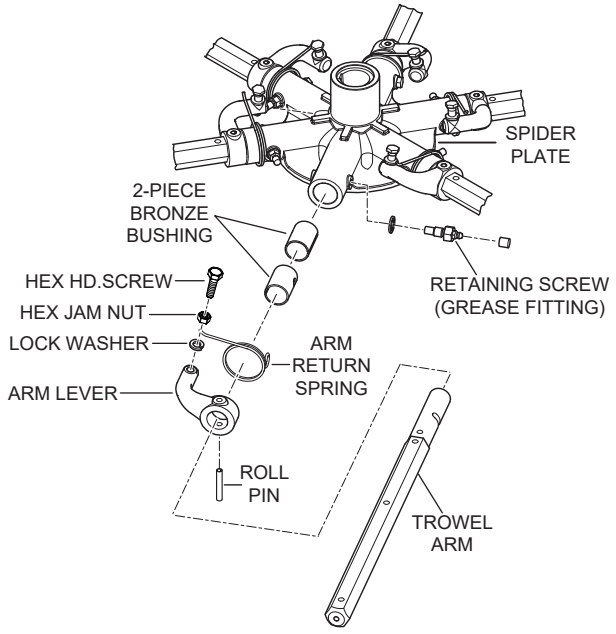


Figure 50. Remove Roll Pin and Zerk Fitting

3. Remove the trowel arm from the spider plate.

4. Should the trowel arm insert (bronze bushing) come out with the trowel arm, remove the bushing from the trowel arm and set it aside in a safe place. If the bushing is retained inside the spider plate, carefully remove the bushing.

5. Examine the bronze trowel arm bushings (Figure 51), and clean if necessary. Replace bushings if out-of-round or worn.

Figure 51. Bronze Bushings

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

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 shown below. Refer to Figure 52.

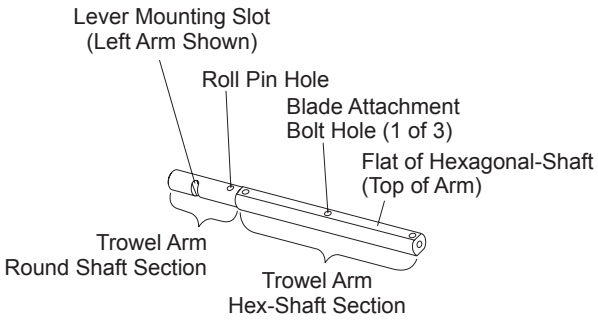


Figure 52. Trowel Arm

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 in. (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 53).

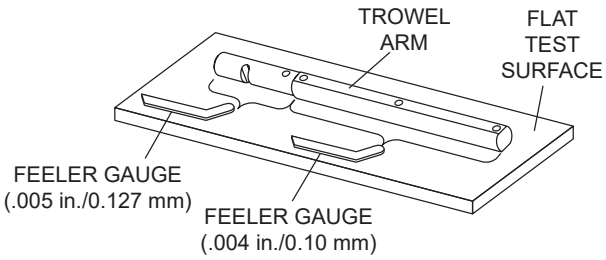


Figure 53. Checking Trowel Arm Flatness

3. 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 in. (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

Figure 54 illustrates 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.

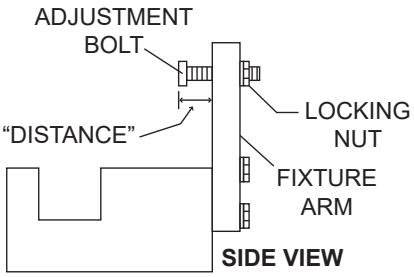


Figure 54. Trowel Arm Adjustment Tool Side View

1. Locate the trowel arm adjustment tool P/N 9177.
2. Ensure the fixture arm is in the proper setting (up or down) for your trowel arm rotation as shown in Figure 55.

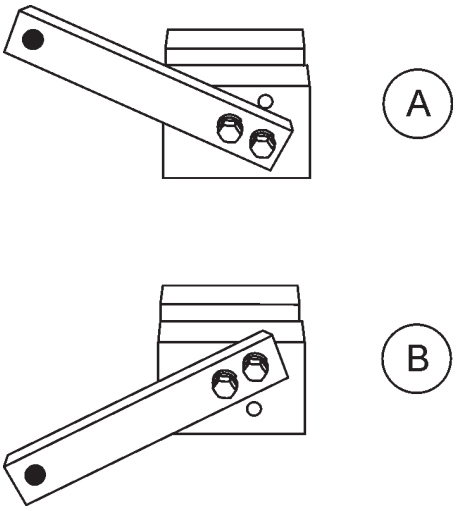


Figure 55. Trowel Arm Adjustments

NOTICE

Arms with **CLOCKWISE** blade rotation use the fixture arm in the **UP** position (Figure 55**A**). Arms with **COUNTERCLOCKWISE** blade rotation use the fixture with the fixture arm in the **DOWN** position (Figure 55**B**).

3. Unscrew the locking bolts on the adjustment tool and place the trowel arm into the fixture channel as shown in Figure 56. 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.

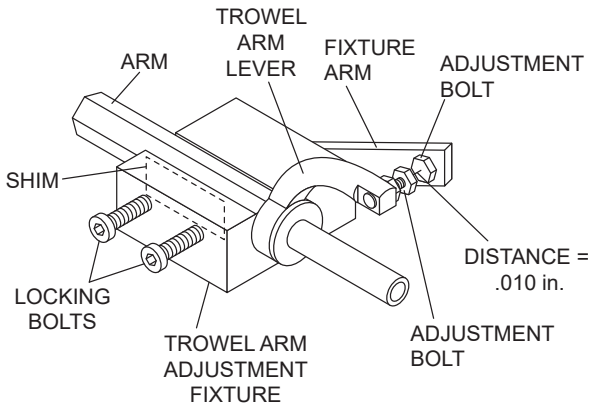


Figure 56. Trowel Arm Adjustment Fixture Components

4. Use an allen wrench to tighten the locking bolts securing the trowel arm in place.
5. Adjust the bolt "distance" shown in Figure 56 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 the locking nuts on the adjustment fixture, and remove the trowel arm.
9. Repeat steps for the remaining trowel arms.

REASSEMBLY

1. Clean and examine the upper/lower wear plates and thrust collar. Examine the entire spider assembly. Wire brush any concrete or rust buildup. 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 the bronze bushing onto the 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 (with bronze bushings already installed) into the spider plate, using care to align the grease hole on the bronze bushing with the grease hole fitting on the spider plate.
7. Lock the trowel arms in place by tightening the hex head bolt with zerk grease fitting and jam nut.
8. Reinstall the blades onto the trowel arms.
9. Install the stabilizer ring onto the spider assembly.
10. Lubricate all grease points (zerk fittings) with premium Lithum 12-based grease, conforming to NLG1 Grade #2 consistency.

FLOAT PAN INSTALLATION

Float pans attach to the trowel arms and allow early floating on wet concrete and easy movement from wet to dry areas. They are also very effective at embedding large aggregates and surface hardeners.

NOTICE

IMPORTANT! To get blades absolutely flat for using float pans, pitch them as follows:

Press and hold down both pitch switches until the **MODE** light blinks before installing float pans.

NOTICE

The rotors must be turned in order to install and secure float pans to the trowel blades. Rotors are only turned via drive bypass rocker switch and foot pedal engagement. **DO NOT** engage the seat switch by sitting in the operator's seat.

⚠ WARNING

ALWAYS install float pans either in the work area or in an area that is next to and level with the work area. **NEVER** lift the trowel while float pans are attached.

1. Lift the trowel just enough to slide a float pan under the blades. Lower the finisher onto the pan with the blades between the blade stops (Figure 57).

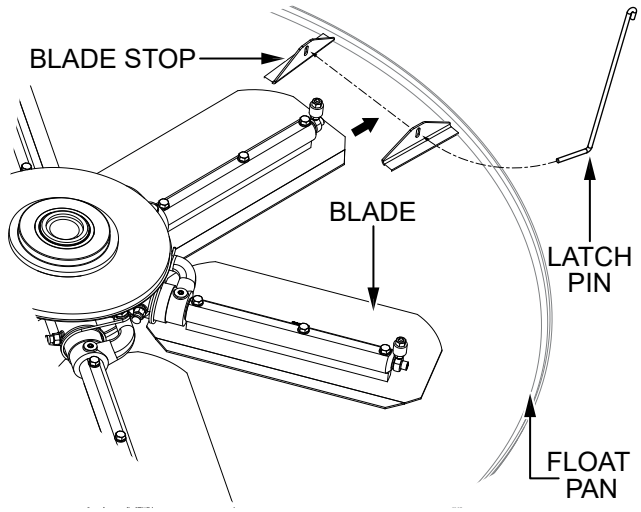


Figure 57. Float Disc Installation (Latch Pins)

2. Route a latch pin through the holes in the blade stops as shown in Figure 57.
3. After it has been routed through the blade stop holes, rotate the latch pin so the end that is bent approximately 90 degrees lays flat on the surface of the float pan. See Figure 58.

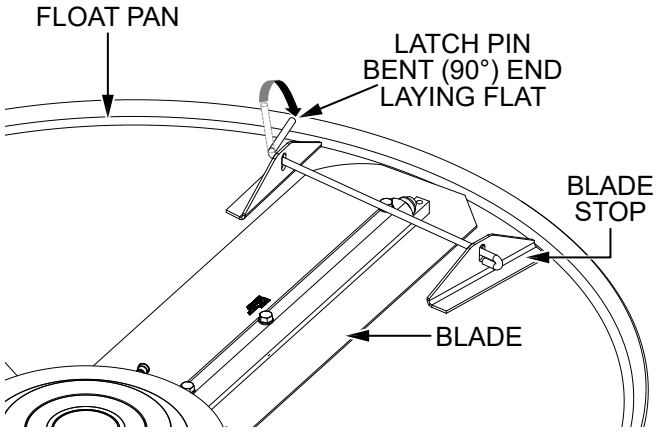


Figure 58. Latch Pin Placement

4. Make sure the blade edges are secured between the blade stops, and the latch pin is secured completely over the blade, locking it in place.

5. To finish installing the float pan onto the remaining finisher blades, turn the rotors by pressing and holding the left or right drive bypass switch (Figure 59) and the foot pedal.

NOTICE

A second person may be needed to help turn the rotors by hand and secure the float pan latch pins in the blade stops.

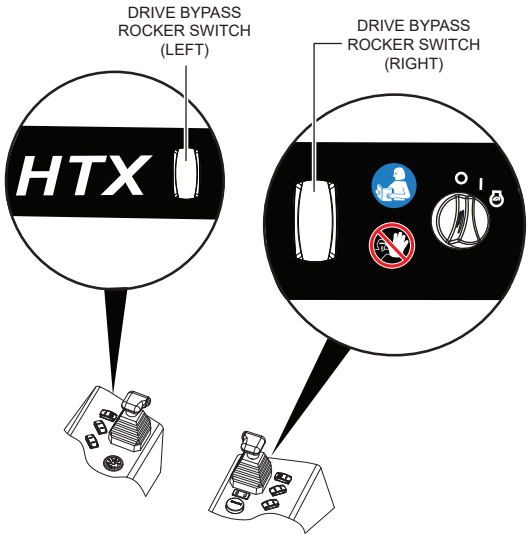


Figure 59. Drive Bypass Rocker Switches

6. Repeat steps 2–4 for the remaining finisher blades.
7. Make sure the float pans are well secured to the blades before the trowel is put back into operation.
8. Periodically check the latch pins during normal operation to ensure they are still in the correct position.

REMOVING FLOAT PANS

1. Position the trowel on the side of the troweling surface.
2. Using a forklift, lift the trowel enough for easy access to the pans.

NOTICE

Pans may stick to the finisher blades unless the rotors are turned via drive bypass rocker switch and foot pedal engagement. **DO NOT** engage the safety bypass switch by sitting in the operator seat.

3. Do the opposite of the **Float Pan Installation** instructions to remove the pans.

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 all fluids properly in accordance with local and governmental regulations. **NEVER** pour on the ground or dump down drains or sewers.
2. Remove the battery and bring it to an appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
3. The remainder can be brought to a salvage yard or metal reclamation facility for further dismantling.

DIAGNOSTIC SYSTEM DISPLAY

The diagnostic display panel (Figure 60) located on the right control console is designed to meet the needs for instrumentation and control of electronically controlled engine communication using the SAE J1939 Controller Area Network (CAN). This diagnostic display is a multifunction tool that enables equipment operators to view many different engine parameters and service codes.

The keypad on the diagnostic display panel is a capacitive touch sensing system. There are no mechanical switches to wear or stick. This display unit will operate in extreme hot or cold weather conditions.

The Engine Control Unit (ECU) used with this trowel will diagnose engine faults. The Machine Control Unit (MCU) used with this trowel will diagnose machine faults. Both sets of faults can be reviewed in the Active and Stored Fault screens of the display. See Table 12 and Table 13 for a complete listing of available actions on the diagnostic systems display. See Table 14–Table 31 for a complete listing of active fault codes and countermeasures.

The following definitions describe the controls and functions of the ***diagnostic system display*** (Figure 60).

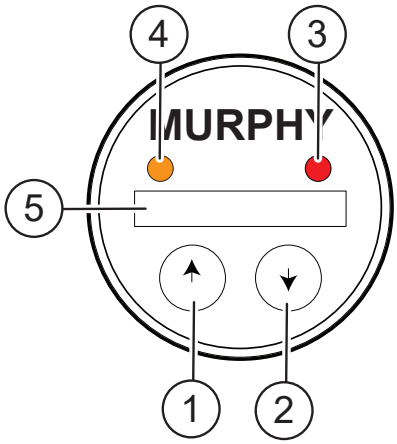


Figure 60. Diagnostic Display Panel

1. **Up Arrow —** Press this button to scroll upward through the display and menu options.
2. **Down Arrow —** Press this button to scroll downward through the display and menu options.
3. **Stop Lamp (RED)** — When lit (**RED**), a major fault has occurred. The operator should immediatley shut down the machine and correct the fault.
4. **Warning Lamp (AMBER)** — When lit (**AMBER**), a minor fault has occurred. The operator should shut down the machine and correct the fault as soon as possible.
5. **Display Screen** — Graphical backlight LCD screen. Backlighting is controlled via simultaneously pressing the **UP** and **DOWN** arrows.

Display Parameters

The following are some of the engine and transmission parameters displayed on the diagnostic display panel.

- Machine Hours
- Engine Speed/RPM
- Engine Oil Pressure (Oil Pres)
- Engine Coolant Temperature (Cool Tmp)
- System Voltage (Sys Volt)
- Battery Potential (Switched) (Bat Volt)
- Engine Hours (Eng Hrs)
- % Engine Load at Current RPM (Load @ RPM)

Table 12. Diagnostic Display Menu		
Menu Item	**Options**	**Action**
Show 1-Up	Switch to the parameter display.	Momentarily hold the **Up & Down** arrows, when released, broadcast parameters begin to display.
Active Faults	The Active Fault (Active FLTS) menu shows the **SPN** (Suspect Parameter Number), **FMI** (Failure Mode Identifier), and **OC** (Occurrence Count) for faults currently broadcasting on the CANBus. When a new fault message is received, the PV25 automatically switches to **Active Faults.**	The **Amber** (left) or **Red** (right) LED lights to indicate the status of the fault — Warning or Shutdown. If there is more than one fault, the PV25 automatically scrolls through each fault. To return to the **Main Menu** press the **Up & Down** arrows simultaneously and release.
Stored Faults	The **Stored Faults** (Stored FLTS) menu shows the SPN, FMI, and OC for any stored faults. A message is sent to the ECU, and the ECU responds with what is in history. No information will be displayed if there are no stored faults.	Use the **Up & Down** arrows to scroll through the list if there is more than one stored fault. To return to the **Main menu** press the **Up & Down** arrows simultaneously and release.
Set Units	The **Set Units** Config menu will allow the user to select between the following unit settings: English Metric kPa Metric BAR Exit An asterisk (*) to the right of a setting indicates it is the current setting.	To enter the **Set Units** menu, momentarily press both arrows and release. Scroll through the options using the Down arrow. Choose a unit by momentarily pressing the Up/Down arrows. An asterisk displays at the right. To leave this menu, scroll down to EXIT, press both arrows and release.
Set 1-Up	Use this menu to set the parameters you want to monitor. For a full list of the parameters available, see page 8. An asterisk (*) to the right of the parameter indicates it is selected.	Pressing the **Up/Down** arrows at the same time selects the currently displayed parameter. Pressing the **Up/Down arrows** at the same time while **Exit** is displayed returns you to the main menu. **Exit** is the last item in the parameter list.

Table 13. Diagnostic Display Menu (Cont.)		
Menu Item	**Options**	**Action**
Scroll ON/OFF	When **Scroll** is **ON**, the parameters you select to display automatically scroll with about 5 seconds on each parameter reading. If **Scroll** is **OFF**, view parameters manually by pressing the **Up or Down** arrow.	To toggle **ON** or **OFF**, press the **Up/ Down** arrows at the same time.
Machine Hours ON/OFF	When set to **ON**, machine hours are calculated by the PV25 once the RPM is above 100.	Scroll to Machine Hours. To toggle **ON** or **OFF**, press the **Up/Down** arrows at the same time.
Tier 4 ON/OFF	When **Tier 4** is set to **OFF,** other Tier 4 menu items are not available.	To toggle **ON** or **OFF**, press the **Up & Down** Arrows at the same time. Tier 4 is not available on this trowel.
Backlight	The **Backlight** menu allows you to select the desired backlight level. The range is 0–100% in 5% increments. This value also broadcasts a CAN message that can set the backlights on optional PVCAN gauges in the panel to the same intensity.	Pressing the Up/Down buttons at the same will toggle into and out of the adjustment screen.

Table 14. Engine Fault Codes

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
MAP High Pressure	X	X					106	16	MAP High Pressure >	17.00	psia	2	1	seconds
									And TPS <	8.0	%			
									And RPM >	800	rpm			
									To unlatch, MAP pressure must be <	10.00	psia			
MAP Low Voltage	X	X					106	4	MAP Voltage <	0.050	volts	1	2	seconds
									And TPS >	2.0	% rpm volts			
									And RPM <	3000	rpm			
									To unlatch, MAP pressure must be >	0.500	volts			
Primary FP High Voltage	X	X				X	94	3	Primary FP Voltage >	4.800	volts	1	2	seconds
Primary FP Low Voltage	X	X				X	94	3	Primary FP Voltage <	0.200	volts	1	2	seconds
									Primary FP fault mode		Gasoline Only			
									Run time wait for fuel pressure high/ low faults	10	seconds			
Primary Fuel Pressure High	X	X					94	0	Non-Common-Rail Primary Fuel Pressure >	90	psia	2	2	seconds
									Or Common-Rail (actual-target) Fuel Pressure >	10	bar			

Table 15. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
Primary Fuel Pressure Low	X	X					94	1	Non-Common-Rail Primary Fuel Pressure >	40	psia	2	2	seconds
									Or Common-Rail (target-actual) Fuel Pressure >	10	bar			
									FT Fault Mode		Voltage or Temp			
FT Gasoline High	X	X					174	3	FT Voltage >	4.95	volts	120	2	seconds
									Or Fuel Temp >	138	°F			
FT Gasoline Low	X	X					174	4	FT Voltage <	0.05	volts	1	2	seconds
									Or Fuel Temp <	-35	°F			
FT Gaseous Fuel Extremely Low	X						3468	1	Fuel Temp <	-40	°F	1	10	seconds
ECT/CHT High Voltage	X	X				X	110	3	ECT Voltage >	4.95	volts	1	2	seconds
ECT/CHT Low Voltage	X	X				X	110	4	ECT Voltage <	0.05	volts	1	2	seconds
ECT Higher Than Expected 1	X	X					110	15	ECT >	220	°F	10	10	seconds
									And RPM >	600	rpm			
									And Run-Time >	15	seconds			

Table 16. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
ECT Higher Than Expected 2	X						110	0	ECT <	230	°F	3	3	seconds
									And RPM >	600	rpm			
									And Run-Time >	15	seconds			
Failed To Reach Operating Temperature	X						110	31	ECT <	95	°F	30	5	seconds
									And RPM >	500	rpm			
									And MAP >	3	psia			
									And Map >	3	psia			
									And Run-Time >	900	seconds			
IAT High Voltage	X	X				X	105	3	IAT Voltage >	4.76	volts	1	2	seconds
IAT Low Voltage	X	X				X	105	4	IAT Voltage <	0.05	volts	1	2	seconds
									Run-Time Wait For All IAT HiExp Faults	15	seconds			
IAT Higher Than Expected 1	X	X					105	15	IAT >	200	°F	60	15	seconds
									And RPM >	600	rpm			
IAT Higher Than Expected 2	X						105	0	IAT >	210	°F	3	3	seconds
									And RPM >	600	rpm			

Table 17. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
BP High Pressure	X	X				X	108	0	BP Pressure >	16	psia	3	2	seconds
BP Low Pressure	X	X				X	108	1	BP Pressure <	8.3	psia	3	2	seconds
Voltage High	X	X				X	168	15	Voltage >	18	volts	3	5	seconds
Voltage Low	X	X					168	17	Voltage <	9	volts	5	10	seconds
									And RPM >	1000	rpm			
5VE1 High Voltage	X	X				X	1079	3	5VE1 >	5.4	volts	1	2	seconds
5VE1 Low Voltage	X	X				X	1079	4	5VE1 <	4.6	volts	1	2	seconds
5VE2 High Voltage	X	X				X	1080	3	5VE2 >	5.4	volts	1	2	seconds
5VE2 Low Voltage	X	X				X	1080	4	5VE2 <	3	volts	1	2	seconds
5VE1/2 Both Out-of-Range	X	X				X	1079	31	Uses same parameters as above			1	2	seconds
TPS1 High Voltage	X					X	51	3	TPS1 Voltage >	4.8	volts	1	3	seconds
TPS1 Low Voltage	X					X	51	3	TPS1 Voltage <	0.2	volts	1	3	seconds
TPS2 High Voltage	X					X	3673	3	TPS2 Voltage >	4.8	volts	1	3	seconds
TPS2 Low Voltage	X					X	3673	4	TPS2 Voltage <	0.2	volts	1	3	seconds
TPS1 Higher Than TPS2	X						51	0	(TPS1% - TPS2%) >	20	%	1	2	seconds

Table 18. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
TPS1 Lower Than TPS2	X						51	1	(TPS1% - TPS2%) <	-20	%	1	2	seconds
Unable To Reach Higher TPS	X						51	7	(target TPS - actual TPS) >	20	%	1	1	seconds
Unable To Reach Lower TPS	X						3673	7	(target TPS - actual TPS) <	-20	%	1	1	seconds
									Persistently Longer Than	200	ms			
									While Battery Voltage >	9	volts			
									And Battery Voltage <	16	volts			
TPS1/2 Both Voltages Out-of-Range	X					X	51	31	Uses same parameters as individual TPS1/2 voltage fault detection above.			1	3	seconds
Higher RPM Than Expected	X		X				515	15	rpm >	3400	rpm	2	1	seconds
									Run Time wait for all oil pressure low faults	10	seconds			
									RPM lower limit for all oil pressure low faults	600	rpm			
Oil Pressure Low Stage 1 (Sender)	X	X					100	18	Stage 1: oil pressure <	6	psig	5	3	seconds
Oil Pressure Low Stage 2 (Sender)	X						100	1	Stage 2: oil pressure <	3	psig	3	3	seconds
									For rpm ≥ Stage 1: oil pressure <	1450 8	rpm psig			
									Stage 2: Oil Pressure <	3	psig			

Table 19. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
Oil Pressure Sender High Voltage	X	X				X	100	3	Oil Pressure Sender Voltage >	4.8	volts	1	2	seconds
Oil Pressure Sender Low Voltage	X	X				X	100	4	Oil Pressure Sender Voltage <	0.2	volts	1	2	seconds
AL High Gasoline Bank 1/ Bank	X	X					4237	0	AL_BM >	30	%	3	3	updates
							4239	0	And RPM ≥	0	rpm			
									And RPM ≤	9999	rpm			
									And MAP ≥	0	psia			
									And MAP ≤	99	psia			
AL Low Gasoline Bank 1/ Bank 2	X	X					4237	1	AL_BM >	-30	%	3	3	seconds
							4237	1	And RPM/MAP Conditions Above					
AL High LPG	X	X					4237	0	AL_BM >	30	%	3	3	updates
									And RPM ≥	0	rpm			
									And RPM ≤	9999	rpm			
									And MAP ≥	0	psia			
									And MAP ≤	99	psia			
									Stage 2: Oil Pressure <	3	psig			

Table 20. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
AL Low LPG	X	X					4237	1	AL_BM >	-30	%	3	3	updates
									And RPM/MAP Conditions Above					
CL High Gasoline Bank 1/ Bank 2	X	X					4236	0	CL_BM >	35	%	5	1	updates
							4238	0	And RPM ≥	0	rpm			
									And RPM ≤	9999	rpm			
									And MAP ≥	0	psia			
									And MAP ≤	99	psia			
CL Low Gasoline Bank 1/ Bank 2	X	X					4236	1	CL_BM <	-35	%	5	1	updates
							4238	1	And RPM/MAP Conditions Above					
CL High LPG	X	X					4236	0	CL_BM >	35	%	5	1	updates
									And RPM ≥	0	rpm			
									And RPM ≤	9999	rpm			
									And MAP ≥	0	psia			
									And MAP ≤	99	psia			
CL Low LPG	X	X					4236	1	CL_BM <	-35	%	5	1	updates
									And RPM/MAP Conditions Above					

Table 21. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
Gasoline CAT Monitor	X	X					3050	11	EGO3/4 RMS >	0.005	phi	100	5	updates
							3051	11	And EGO3/4 RMS > CL EGO1/2 RMS*	40	%			
									And EGO3/4 RMS > CL WaveformRMS*	50	%			
									Air Mass Flow At Ports ≥	20	g/sec			
									Air Mass Flow At Ports ≤	1000	g/sec			
									And CBT - CBT_ss ±	300	°F			
									Persistently For	5	seconds			
LPG CAT Monitor	X	X					3050	11	EGO3 RMS >	0.005	phi	100	5	updates
									And EGO3 RMS > CL Waveform RMS*	50	%			
									And Same Mass Flow/CBT Conditions As Above					
EGO Open/ Lazy Pre-Cat 1	X						3217	5	EGO Cold Persistently >	120	seconds	5	1	seconds
EGO Open/ Lazy Pre-Cat 2/ Post-Cat 1							3227	5	Same as above			20	2	seconds
EGOH4 Open/ Ground Short	X	X				X	3271	4	EGOH4 Low-Side Feedback <	5	% Vbat	2	2	seconds
									And PWM Duty-Cycle <	5	%			

Table 22. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
EGOH4 Short To Power	X	X				X	3271	3	EGOH4 Low-Side Feedback >	90	% Vbat	2	2	seconds
									And PWM Duty-Cycle >	90	%			
Injecter Loop Open Or Low-Side Short To Ground 1-10	X	X					651	5	Non-CR Injector Off-State Low-Side <	4	volts	10	5	samples
							652	5	And Battery Voltage >	9	volts			
							653	5						
							654	5	CR Injector Current Rise-Time To Peak >	500	us			
							655	5	And Minimum Boost Voltage (target - actual) <	10	volts			
							656	5						
							657	5						
							658	5						
							659	5						
							660	5						

Table 23. Engine Fault Codes (Continued)														
Fault Description	**Amber Lamp ON**	**Amber Lamp OFF w/ Key**	**Shut down**	**Power Derate To 50% Throttle**	**Engine Forced Idle**	**Detect With Engine Stopped**	**SPN**	**FMI**	**Fault Conditions**	**Fault Value**	**Units**	**Latch**	**Unlatch**	**Latch/Unlatch Units**
Injector Coil Shorted 1-10	X	X					651	6	Non-CR Injector On-State Low-Side >	4.0	volts	10	5	samples
							652	6	And Battery Voltage <	16.0	volts			
							653	6						
							654	6	CR Injector Current Rise-Time To Peak <	70	us			
							655	6	And Maximum Boost Voltage (actual - target) <	volts				
							656	6						
							657	6						
							658	6						
							659	6						
							660	6						
Fuel Run-Out Longer Than Expected	X	X					632	31	Fuel Run-Out Engine Run Time >	10000	ms	N/A	N/A	
									Historic Fault Forced Indication = DISABLED	9	volts			

Table 24. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
FPump Relay Control Ground Short	X	X				X	1348	4	Low-Side Diagnostics Non-Adjustable			10	5	samples
									Or High-Side Feedback <	10	% Vbat			
FPump Relay Coil Open	X	X				X	1348	5	Low-Side Diagnostics Non-Adjustable			10	5	samples
									Or High-Side Feedback >	4	volts			
									And Short-to-Power Fault Inactive					
FPump Relay Coil Short To Power	X	X					1348	3	Low-Side Diagnostics Non-Adjustable			10	5	samples
									Or High-Side Feedback >	90	% Vbat			
Relay Control Ground Short	X	X				X	1485	4	Relay Key-Off Fault Checking = DISABLED			10	5	samples
									For All Relay Faults In This Section					
Relay Coil Open	X	X				X	1485	3	Low-Side Feedback <	10	% Vbat	10	5	samples
Relay Coil Short To Power	X	X					1485	3	Low-Side Feedback >	90	% Vbat	10	5	samples

Table 25. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
EPR/CFV Regulation Pressure Higher Than Expected	X	X					520 260	0	EPR (actual - commanded) Pressure >	1.5	in H_2O	10	1	seconds
									Or CFV (actual-commanded) Pressure >	10	psi			
EPR/CFV Regulation Pressure Lower Than Expected	X	X					520 260	1	EPR (actual - commanded) Pressure <	-1.5	in H_2O	5	1	seconds
									Or CFV (actual-commanded) Pressure <	-10	psi			
EPR/CFV Comm. Lost	X	X		X			520 260	31	No EPR/CFV Packets Received Within	500	ms	1	5	seconds
EPR/CFV Internal Actuator Fault Detection	X	X					520 260	12				0	0	seconds
EPR/CFV Internal Circuitry Fault Detection	X	X					520 260	12				0	0	seconds
Cam Loss	X	X					723	4	No Cam Pulse In	2.5	cycles	1	10	seconds
									And RPM >	100	rpm			
Crank Loss	X	X					636	4	Cam Pulses Without Crank Activity >	6	Cam Pulses	1	N/A	seconds

Table 26. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
Cam Sync Noise	X	X					723	2	Number of Invalid Cam Re-Syncs	1	re-syncs	1	10	seconds
									Within a Time Window of ≤	700	ms			
Crank Sync Noise	X	X					636	2	Number of Invalid Crank Re-Syncs	1	re-syncs	1	10	seconds
									Within a Time Window of ≤	800	ms			
Never Crank Synced at Start	X	X					636	8	Cranking Revs Without Sync >	4	revs	2	N/A	seconds
Never Crank Synced at Start	X	X					636	8	Cranking Revs Without Sync >	4	revs	2	N/A	seconds
									And RPM >	90	rpm			
Intake Cam/ Distributor Position	X	X					520 800	7	Intake Cam Position Error >	30	CAD	10	5	seconds
									And RPM >	500				
COP Failure	X						629	31						
RTI 1 Loss	X						629	31						
RTI 2 Loss	X						629	31						
RTI 3 Loss	X						629	31						

Table 27. Engine Fault Codes (Continued)

Fault Description	Amber Lamp ON	Amber Lamp OFF w/ Key	Shut down	Power Derate To 50% Throttle	Engine Forced Idle	Detect With Engine Stopped	SPN	FMI	Fault Conditions	Fault Value	Units	Latch	Unlatch	Latch/Unlatch Units
A/D Loss	X						629	31						
Invalid Interrupt	X						629	31						
Flash Checksum Invalid	X						628	13						
RAM Failure	X						630	12						
Hardware ID Failure	X						1634	2						
Calibration Configure Error	X	X					1634	13						
Shutdown Request	X	X					1110	31				N/A	N/A	
CAN1 Tx Failure	X	X					639	12	Tx Error Counter >	100	failures	1	1	seconds
CAN1 Rx Failure	X	X					639	12	Rx Error Counter >	100	failures	1	1	seconds
J1939 TSC1 Message Receipt Lost	X	X			X		695	9	Loss of TSC1 After Engine Running ≥	1	sec	1	0	seconds
CAN1 Address Conflict Failure	X	X				X	639	13	Address Conflict Counter >	5	failures	N/A	2	seconds

Table 28. Machine Fault Codes (Continued)				
Parameter Name	**SPN**	**FMI**	**Fault Conditions**	**Fault Reations**
Left Hand Hydraulic Loop Temperature	521100	0	Resistance above 10,000 Ohms.	Amber Warning Lamp and Fans are on.
		1	Resistance below 60 Ohms or temperatures above 180°F.	Red Stop Lamp and Fan are on.
		17	Temperature above 170°F.	Amber Warning Lamp and Fans are on.
Right Hand Hydraulic Loop Temperature	521101	0	Resistance above 10,000 Ohms	Amber Warning Lamp and Fans are on.
		1	Resistance below 60 Ohms or temperatures above 190°F.	Red Stop Lamp and Fan are on.
		17	Temperature above 170°F.	Amber Warning Lamp and Fans are on.
Primary Hydraulic Oil Filter Restriction Switch	521106	31	Filter is restricted and hydraulic cold start is not on.	Amber Warning Lamp is on.
Secondary Hydraulic Oil Filter Restriction Switch	521107	31	Filter is restricted and hydraulic cold start is not on.	Amber Warning Lamp is on.
Pump Stroke Position	521118	0	Sensor output is significantly more than upper calibration point.	Red Stop Lamp is on. Pump Stroke is directly controlled by Pedal Position. Cruise Control, Power Management, and Stroke Follower are disabled.
		1	Sensor output is significantly less than lower calibration point.	Red Stop Lamp is on. Pump Stroke is directly controlled by Pedal Position. Cruise Control, Power Management, and Stroke Follower are disabled.

Table 29. Machine Fault Codes (Continued)				
Parameter Name	**SPN**	**FMI**	**Fault Conditions**	**Fault Reations**
Pump Stroke Position		3	Sensor Output is > 4.96 V	Red Stop Lamp is on. Pump Stroke is directly controlled by Pedal Position. Cruise Control, Power Management, and Stroke Follower are disabled.
		5	Sensor Output is < 0.05 V	Red Stop Lamp is on. Pump Stroke is directly controlled by Pedal Position. Cruise Control, Power Management, and Stroke Follower are disabled.
		13	The sensor needs calibration	Red Stop Lamp is on. Pump Stroke is directly controlled by Pedal Position. Cruise Control, Power Management, and Stroke Follower are disabled.
Left Hand Pitch Position	521122	0	Sensor output is > 5% above max calibration point.	Amber Warning Lamp on. Smart Pitch is disabled.
		1	Sensor output is < 20% below minimum calibration point.	Amber Warning Lamp on. Smart Pitch is disabled.
		3	Sensor output is > 4.90 V	Amber Warning Lamp on. Smart Pitch is disabled.
		5	Sensor output is < .10 V	Amber Warning Lamp on. Smart Pitch is disabled.
		13	The sensor needs calibration.	Amber Warning Lamp on. Smart Pitch is disabled.

Table 30. Machine Fault Codes (Continued)				
Parameter Name	**SPN**	**FMI**	**Fault Conditions**	**Fault Reations**
Right Hand Pitch Position	521123	0	Sensor output is > 5% above max calibration point.	Amber Warning Lamp on. Smart Pitch is disabled.
		1	Sensor output is < 20% below minimum calibration point.	Amber Warning Lamp on. Smart Pitch is disabled.
		3	Sensor output is > 4.90 V	Amber Warning Lamp on. Smart Pitch is disabled.
		5	Sensor output is < .10 V	Amber Warning Lamp on. Smart Pitch is disabled.
		13	The sensor needs calibration.	Amber Warning Lamp on. Smart Pitch is disabled.
Pedal Position	521131	0	Sensor output is significantly more than upper calibration point.	Red Stop Lamp is on. Pump Stroke is disabled.
		1	Sensor output is significantly less than lower calibration point.	Red Stop Lamp is on. Pump Stroke is disabled.
		3	Sensor output is > 4.96 V	Red Stop Lamp is on. Pump Stroke is disabled.
		5	Sensor output is < 0.05 V	Red Stop Lamp is on. Pump Stroke is disabled.
		13	The sensor needs calibration.	Red Stop Lamp is on. Pump Stroke is disabled.

Table 31. Machine Fault Codes (Continued)				
Parameter Name	**SPN**	**FMI**	**Fault Conditions**	**Fault Reations**
Left Hand Pitch Up Coil	521147	31	Short Circuit or Software Error	Amber Warning Lamp is on. Valve is off.
Left Hand Pitch DN Coil	521148	31	Short Circuit or Software Error	Amber Warning Lamp is on. Valve is off.
Right Hand Pitch Up Coil	521149	31	Open Circuit or Over Temperature	Amber Warning Lamp is on. Valve is off.
Right Hand Pitch DN Coil	521150	31	Open Circuit or Over Temperature	Amber Warning Lamp is on. Valve is off.
Pitch Dump Valve	521151	31	Open Circuit or Over Temperature	Amber Warning Lamp is on. Valve is off.
Stroke Valve Command	521152	0	Above Normal, Most Severe	Amber Warning Lamp is on. Pump Stroke is disabled.
		1	Below Normal, Most Severe	Amber Warning Lamp is on. Pump Stroke is disabled.
		3	Short Circuit	Amber Warning Lamp is on. Pump Stroke is disabled.
		5	Open Circuit	Amber Warning Lamp is on. Pump Stroke is disabled.
		31	Input Out-of-Range	Amber Warning Lamp is on. Pump Stroke is disabled.
Engine Fan Command	521154	3	Short Circuit	Amber Warning Lamp is on. Fan is off.
Fuse Health	521198	5	Fuse Blown	
Relay Health	521199	31	Relay Problem	

Troubleshooting (Ride-On Hydraulic Trowel)		
Symptom	**Possible Problem**	**Solution**
Seat Switch not functioning.	Other problems?	Check seat function with the electronic service tool.
	Loose wire connections?	Check wiring. Replace as necessary.
	Bad contacts?	Replace seat cushion (contains the switch).
If trowel “bounces, rolls concrete, or makes uneven swirls in concrete”..	Blades?	Make certain blades are in good condition, not excessively worn. Finish blades should measure no less than 2"" (50mm) from the blade bar to the trailing edge, combo blades should measure no less that 3.5"" (89mm). Trailing edge of blade should be straight and parallel to the blade bar.
	Spider?	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 (see Optional Equipment)..
	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"" (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"" (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"" (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.
	Blade pitch?	Check blades for consistent pitch. Adjust per Maintenance Section instructions if necessary.
Machine has a perceptible rolling motion while running.	Spider Finger Screws?	Adjust per procedure in Maintenance Section.
	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 (Ride-On Hydraulic Trowel) - continued		
Symptom	**Possible Problem**	**Solution**
Work lights not working.	Wiring?	Check all electrical connections, including the master on/off switch and check to see if wiring is in good condition with no shorts. Replace as necessary.
	Lights?	Check to see if light bulbs are still good. Replace if broken.
	CAN Communication?	Test the light circuit input and output function with the electronic service tool.
Retardant spray (optional) not working.	Retardant?	Check retardant level in tank. Fill tank as required.
	Wiring?	Check all electrical connections, including master on/off switch connections. Replace components and wiring as necessary.
	Bad switch?	Check the continuity of master on/off switch. Replace if broken.
	Bad spray pump?	If pump has a voltage present when the switch is turned on, but does not operate and electrical connections to the pump are good, replace the pump..
	Bad fuse?	Check fuse. Replace fuse if defective.
Steering is unresponsive.	Blade speed out of adjustment?	See section on blade speed adjustment.
	Worn components?	Check for wear of steering bearings and linkage components replace if necessary.
	Pivots?	Check to ensure free movement of hydraulic drive motors.
	Hydraulic pressure?	Check to ensure that hydraulic steering pressure is adequate. See section on checking hydraulic steering pressure.
Operating position is uncomfortable.	Seat adjusted for operator?	Adjust seat with lever located on the front of the seat.
Pitch system not working.	Wiring?	Check and repair wiring and connectors as necessary. Check the function inputs and outputs with the electronic service tool.
	Spool stuck in solenoid valve?	Replace solenoid valve.

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.

OPERATION MANUAL

HERE'S HOW TO GET HELP

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

UNITED STATES

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Dukinfield, Cheshire SK16 4UJ
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