

OPERATION MANUAL



***WHITEMAN* SERIES**

MODEL EHTX44Y5

RIDE-ON TROWEL

(YANMAR 3TNV84T-BKSA DIESEL ENGINE)

Revision #0 (01/16/13)

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publication, visit our website at:
www.multiquip.com



THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

PN: 32080

FUEL AND CHEMICAL EXPOSURE WARNINGS



WARNING

Diesel engine exhaust and some of its constituents, and some dust created by power sanding, sawing, grinding, drilling and other construction activities contain chemicals known to cause cancer, birth defects and other reproductive harm.

Some examples of these chemicals are:

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

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

SILICOSIS/RESPIRATORY WARNINGS

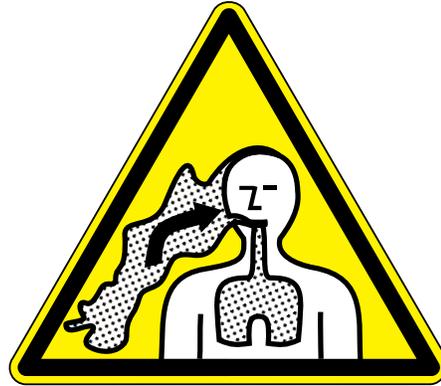
WARNING



SILICOSIS WARNING

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

WARNING



RESPIRATORY HAZARDS

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

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

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EHTX Ride-On Trowel

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NOTICE

Specifications and part numbers are subject to change without notice.

TRAINING CHECKLIST

TRAINING CHECKLIST

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

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

DAILY PRE-OPERATION CHECKLIST

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

SAFETY INFORMATION

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



SAFETY MESSAGES

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

SAFETY SYMBOLS

! DANGER

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

! WARNING

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

! CAUTION

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

NOTICE

Addresses practices not related to personal injury.

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

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

SAFETY INFORMATION

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.



SAFETY INFORMATION

TROWEL SAFETY

DANGER

- Engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause death if inhaled.
- The engine of this equipment requires an adequate free flow of cooling air. **NEVER** operate this equipment in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause injury to people and property and serious damage to the equipment or engine.



- **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.



SAFETY INFORMATION

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

DANGER

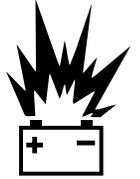
- **DO NOT** start the engine near spilled fuel or combustible fluids. Fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **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.



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.

SAFETY INFORMATION

TRANSPORTING SAFETY

CAUTION

- **NEVER** allow any person or animal to stand underneath the equipment while lifting.



- Ride-on trowels are very heavy and awkward to move around. Use proper heavy lifting procedures and **DO NOT** attempt to lift the trowel by the guard rings.

- **NEVER** lift trowel with the operator on the machine.

NOTICE

- The easiest way to lift the trowel is to utilize the lift loops that are welded to the frame. These lift loops are located to the left and right sides of the operator's seat.

A strap/chain can be attached to these lift loops, allowing a forklift or crane to lift the trowel up onto and off of a slab of concrete. The strap or chain should have a minimum of 2,000 pounds (1,000 kg) lifting capacity and the lifting gear must be capable of lifting at least this amount.

- **NEVER** transport trowel with float pans attached unless safety catches are used and are specifically cleared for such transport by the manufacturer.
- **NEVER** hoist the trowel more than three feet off the ground with float pans attached.
- Before lifting, make sure that the lift loops are not damaged.
- Always make sure crane or lifting device has been properly secured to the lift loops of the equipment.
- **ALWAYS** shutdown engine before transporting.
- **NEVER** lift the equipment while the engine is running.
- Tighten fuel tank cap securely and close fuel cock to prevent fuel from spilling.
- Use adequate lifting cable (wire or rope) of sufficient strength.
- **DO NOT** lift machine to unnecessary heights.
- **ALWAYS** tie down equipment during transport by securing the equipment with straps. Inspect straps to make sure they are not frayed or damaged.

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

NOTICE

The diesel engine used in this equipment has been designed to reduce harmful levels of carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NOx) contained in diesel exhaust emissions.

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

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

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

Emission Control Label

The emission control label is an integral part of the emission system and is strictly controlled by regulations.

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

If a replacement emission label is needed, please contact your authorized Yanmar Engine Distributor.

DIMENSIONS/SPECIFICATIONS

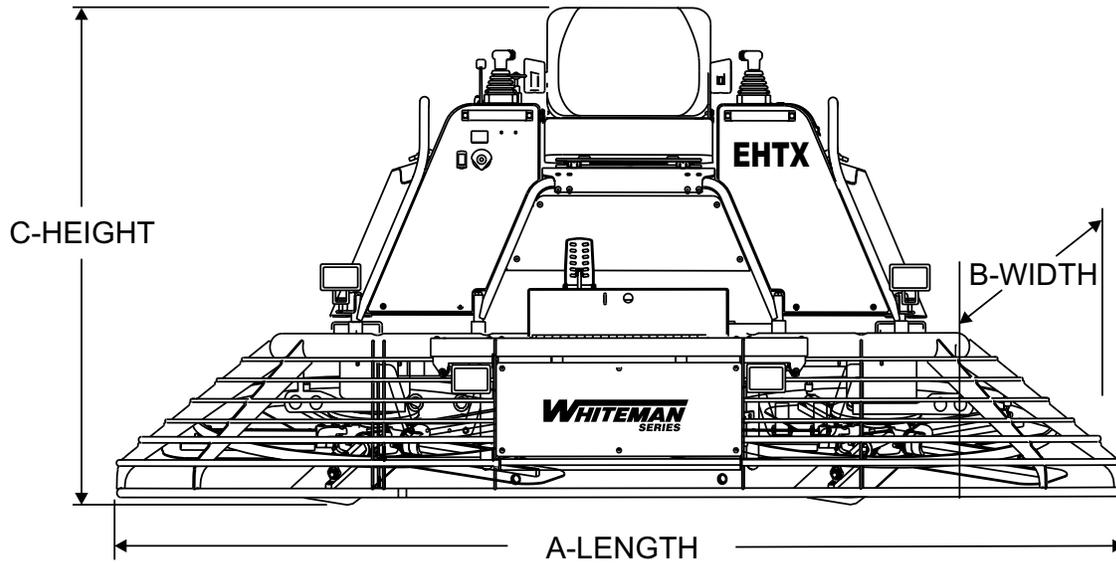


Figure 1. EHTX44Y5 Dimensions

Table 1. EHTX44Y5 Specifications	
A-Length – in. (cm)	96.75 (246)
B-Width – in. (cm)	50.0 (127)
C-Height – in. (cm)	57.0 (145)
Weight – lbs. (kgs.) Operating	1,946 (882.7)
Weight – lbs. (kgs.) Shipping	(Less Pallet Material) 1926 (873.6)
Blade Tip Speed – FPM (m/s)	1,924 (9.9)
Rotor – RPM	0 to 160
Path Width – in. (cm)	91 (231)
Hydraulic Oil Capacity	7.0 gal. (26.5 liters) Less Filter Change ² Add .5 gal. (1.9 liters) With Filter Change ²
Hydraulic Oil ¹	AW MV ISO68 (10W-40 Hot Weather) (10W-30 Cold Weather)
<small>1. "AW" stands for anti-wear and "MV" stands for multi-viscosity. The 68 refers to the general viscosity range and is similar to 10W-30-motor oil. It is recommended that AW MV 68 hydraulic oil be used. If this type of hydraulic oil is not available then use 10W-30 engine oil (cold weather) or 10W-40 engine oil (hot weather).</small>	
<small>2. Hydraulic Oil should be above the sight glass when cold.</small>	

Table 2. Noise and Vibration Emissions	
Guaranteed ISO 11201:2010 Based Sound Pressure Level at Operator Station in dB(A) ^a	89
Guaranteed ISO 3744:2010 Based Sound Power Level in dB(A) ^b	106
Whole Body Vibration Per ISO 2631-1:1997+A1:2010 in m/s ² $\Sigma A(8)$	0.06
<p>a. With an uncertainty factor K of 2.5 dB (A) included per Note 1 in section 7.2.1 of EN 12649::2008+A1:2011</p> <p>b. With an uncertainty factor K of 1.5 dB (A) included per Note 1 in section 7.2.1 of EN 12649::2008+A1:2011</p>	

NOTES:

1. *Sound Pressure and Power Levels are “A” weighted Measures per ISO 3744:2010. 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/s² $\Sigma A(8)$. The daily exposure limit value is 1.15 m/s² $\Sigma A(8)$.*

Table 3. Engine Specifications	
Model	Yanmar 3TNV84T-BKSA
Type	Vertical inline water cooled diesel engine - direct injected - turbocharged
Cylinders	3
Displacement	91.29 cu-in. (1.496 L)
Power (Maximum Output)	44 HP (32.8 kW/min ⁻¹)
Bore and Stroke	3.31 in. x 3.54 in. (84 mm x 90 mm)
Cooling System	Water-Cooled Radiator, Water-antifreeze ratio 50/50
Engine Oil Capacity	7.08 US qt. (6.7 liter) dipstick upper limit
P.T.O Position	Flywheel side
Fuel Tank	Approx. 11 U.S. gallons (41.64 liters)
Fuel	Diesel - No. 2-D (ASTM D975)
Starting System	12V Electric Starter with Glow Plug
Dry Weight	341.7 lbs (155 Kg.)
Dimensions (L x W x H)	22.2 in. x 19.1 in. x 24.5 in (564 mm x 486 mm x 622 mm).

GENERAL INFORMATION

INTENDED USE

Operate the EHTX44Y 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.

RIDE-ON TROWEL FAMILARIZATION

The EHTX44Y is designed for the floating and finishing of concrete slabs.

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

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

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

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

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

ENGINE

This trowel is equipped with a liquid cooled 44 HP Yanmar diesel engine. Refer to the engine owner's manual for specific instructions regarding engine operation. This manual is included with the trowel at the time of shipping. Please contact the Multiquip parts department if a replacement manual is required

BLADES

The blades of the ride-on power trowel finish the concrete as they are swirled around the surface. Blades are classified as combination (10 or 8 inches wide), finish (6 inches wide). The EHTX44Y is equipped with five blades per rotor equally spaced in a radial pattern and attached to a vertical rotating shaft by means of a **spider assembly**.

HYDRAULIC MOTOR

Two 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 trowel. The joysticks are linked to three hydraulic steering cylinders located within the frame of the machine. Detailed explanation of how the joystick controls affect the steering of the trowel can be found in the Operation section of this manual.

See the steering chart (Table 4) for information on the effect the steering joysticks have upon the steering direction of the machine.

HYDRAULIC PUMP

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

TRAINING

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

CONTROLS AND INDICATORS

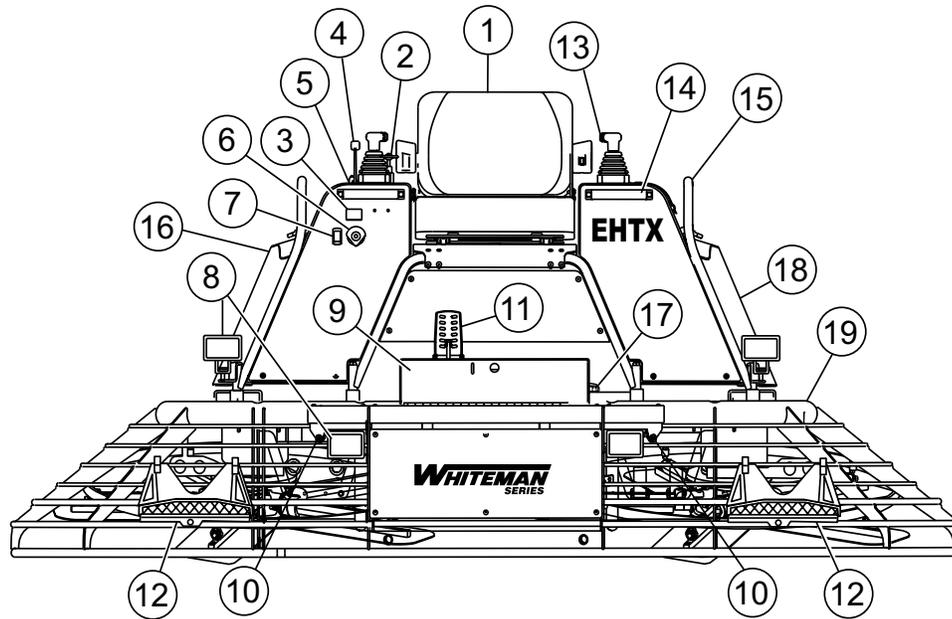


Figure 2. EHTX Controls and Components (Front)

Figure 2 and Figure 3 show the location of the controls, indicators and general maintenance parts. The function of each control, indicator or maintenance part is explained below and on next page.

1. **Seat** – Place for operator to sit. Trowel blades will not rotate unless operator is seated. Seat is adjustable.
2. **Trowel Speed Limiter Control** – Used to adjust the maximum trowel speed that can be obtained when the foot pedal is fully depressed.
3. **Hour Meter** – Indicates number of hours machine has been used.
4. **Throttle Control Lever** – Controls the speed of the engine. Move the hand lever forward to increase engine speed (high), backwards to decrease engine speed (low).
5. **Operator Gauges** – Allows operator to monitor engine, hydraulic and electrical functions.
6. **Ignition Switch** – With key inserted turn clockwise to start engine.
7. **Light Switch** – When activated, turns on six halogen lights. Lights offer better visibility when working indoors.
8. **Lights** – Six low voltage halogen lights are provided with this unit.
9. **Toolbox Compartment** – Storage for tools.
10. **Spray Nozzles** – Spray nozzle for retardant. Two spray nozzles are supplied with this unit.
11. **Foot Pedal** – Controls blade speed. Slow blade speed is accomplished by slightly depressing the foot pedal. Maximum blade speed is accomplished by fully depressing the foot pedal.
12. **Removable Steps (Left and Right)** – Provides for safe footing for mounting and dismounting trowel. When removed, provides access to spider and blade assemblies.
13. **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.
14. **Hand Grip** – Use to assist safe mounting and dismounting of trowel.
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.
16. **Pitch Block** – (Behind grill guard.) Measure and adjust pitch pressure at the pitch block.
17. **Fuel Gauge/Filler Cap** – Indicates the amount of fuel in the fuel tank. Remove this cap to add fuel.
18. **Overflow Bottle** – (Behind grill guard.) Supplies water or coolant to the radiator when radiator water or coolant level is low. Fill to indicated level as shown on bottle.
19. **Hydraulic Reservoir** – Part of frame. Holds hydraulic oil necessary for pump operation.

CONTROLS AND INDICATORS

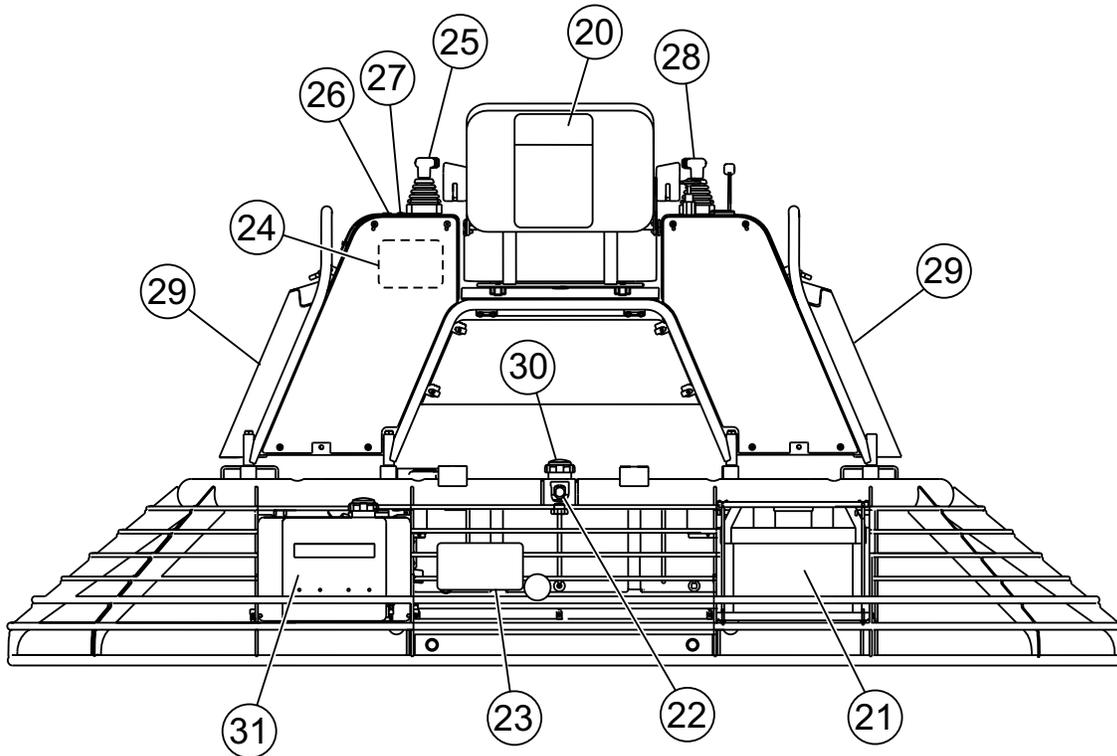


Figure 3. EHTX Controls and Components (Rear)

- 20. **Documentation Box** – Storage for documentation and other information regarding the trowel.
- 21. **Battery** – Provides +12V DC power to the electrical system.
- 22. **Hydraulic Oil Sight Glass** – Indicates the level of the hydraulic oil in the reservoir.
- 23. **Hydraulic Suction Filter** – Filters hydraulic fluid prior to entering the system. (10 Micron absolute synthetic media.)
- 24. **Hydraulic Oil Expansion Tank** – Accommodates expanding hydraulic oil as it gets hot. The oil gravity flows back to the reservoir as it cools down, therefore **NEVER** open the the Hydraulic Oil Filler Cap (Item 30) when the system is warm and the oil has expanded.
- 25. **Steering Control (Left Side)** – Allows the unit to move in a forward or reverse direction only.
- 26. **Blade Pitch Control Switch (Left Side)** – Adjusts the left side blade pitch independently of the right side.
- 27. **Blade Pitch Control (Twin Pitch)[™]** – Adjusts the blade pitches simultaneously.
- 28. **Steering Control (Right Side)** – Allows the unit to move in either a forward, reverse left or right direction.
- 29. **Grill Guards (Left and Right)** – Protects operator from moving components. Remove for maintenance access.
- 30. **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.
- 31. **Retardant Spray Tank** – Holds 5 gallons of retardant, water, or other liquid.

WARNING



Engine components can generate extreme heat. To prevent burns, **DO NOT** touch these areas while the engine is running or immediately after operating. **NEVER** operate the engine with the muffler removed.

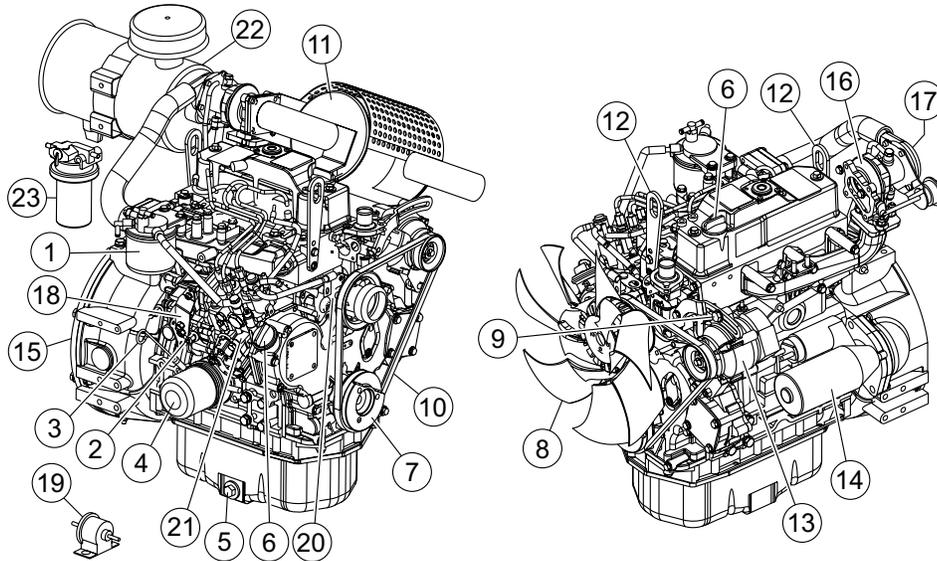


Figure 4. Basic Engine Components

Figure 4 shows the basic engine components and their functions. The manufacturer's engine manual provides further instructions and details of operation and servicing.

1. **Fuel Filter** – Removes dirt and water from the engine fuel.
2. **Engine Stop Lever** – This lever restricts engine speed (high idle and low idle) through a speed control device linked to the accelerator system.
3. **Oil Dip Stick** – Remove to check amount and condition of oil in crankcase.
4. **Oil Filter** – Spin-on type, filters oil for contaminants.
5. **Oil Drain Plug** – Remove plug to drain crankcase oil.
6. **Oil Filler Port** – Remove to add fresh crankcase oil.
7. **Crankshaft V-Pulley** – Check fan V-belt between V-Pulley and alternator to determine proper belt tension.
8. **Cooling Fan** – Driven by the V-belt, the cooling fan cools the engine by cooling water/antifreeze mixture that circulates through the engine block and cylinder head.
9. **V-belt Tension Adjustment** – This bolt provides means to adjust the V-belt tension at the alternator bracket.
10. **V-belt (Fan belt)** – Driven by the engine crank during operation, drives the water pump/fan as well as the alternator.
11. **Muffler** – Exhaust gases routed here through the muffler.
12. **Lifting Eye** – Two lifting eyes are provided if the removal/installation of the engine becomes necessary.
13. **Alternator** – Provides current to the electrical system and charges the battery. Driven by means of a crankshaft/V-belt pulley system.
14. **Starter** – Starts engine when ignition key is rotated to the "START" position.
15. **Flywheel** – Main power is taken off from the flywheel end.
16. **Air Intake Port** – Provides air from the air cleaner to the turbocharger unit.
17. **Turbocharger** – Provides pressurized intake air to the cylinder by means of a turbine energized by exhaust gas that rotates the blower.
18. **Throttle Lever** – Controls engine rpm.
19. **Fuel Pump** – Provides fuel flow to injection pump.
20. **Water Pump** – Circulates coolant flow through engine.
21. **Injection Pump** – Provides equal fuel flow to injectors.
22. **Air Filter** – Helps provide clean source of air flow to turbocharger and engine.
23. **Fuel/Water Separator** – Separates water, dirt and sludge from fuel helping prevent engine component wear.

TROWEL SETUP INSTRUCTIONS

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

NOTICE

The new ride-on trowel cannot be put into service until the setup installation instructions are completed. These setup instructions only need to be performed at the time of unpacking a **NEW** trowel.

Before packaging and shipping this Whiteman Ride-On Power Trowel was run and tested at the factory. If there are problems with the trowel, please let us know.

SEAT ASSEMBLY

NOTICE

EHTX trowels have a seat that is mounted on tracks, similar to an automobile seat. This seat can be adjusted fore and aft via the control lever under the front of the seat.

The seat is not installed on the trowel for shipping purposes. To attach the seat perform the following:

1. Remove the seat from the protective wrapping.
2. Remove the bolts on the bottom of the seat, and place seat on the seat mounting plate, then insert the bolts through the holes or slots on the seat mounting plate and tighten.

BATTERY SETUP

This trowel was shipped with a wet charged battery. This battery may need to be charged for a brief period of time as per the manufacturer instructions.

To install the battery on the trowel, make sure that the battery is well seated in the battery box and the terminals are properly connected. The positive cable, normally RED, is associated with the "+" symbol on the battery. The negative cable, normally BLACK, is associated with the "-" symbol on the battery, (Figure 5). Connect the positive cable to the positive terminal on the battery first, then connect the negative cable to the negative terminal. Close the plastic battery box cover and secure the battery box.

! DANGER

Use all safety precautions specified by the battery manufacturer when working with the battery.



Flammable, explosive gas. (produces hydrogen gas while charging or during operation). Keep area around battery well ventilated and keep from any fire source.



Battery electrolyte contains corrosive, toxic chemical. (dilute sulfuric acid). Avoid contact with eyes and skin.



Shock or Fire due to electric short-circuit. Disconnect battery cables before inspecting electrical system and never "spark" battery terminals to test for charge.

NOTICE

ALWAYS be sure the battery cables are properly connected to the battery terminal. The **RED** cable is connected to the positive terminal of the battery, and the **BLACK** cable is connected to the negative terminal of the battery.

! CAUTION

Use all safety precautions specified by the battery manufacturer when working with the battery. Reference the safety section in this manual for additional battery safety information.

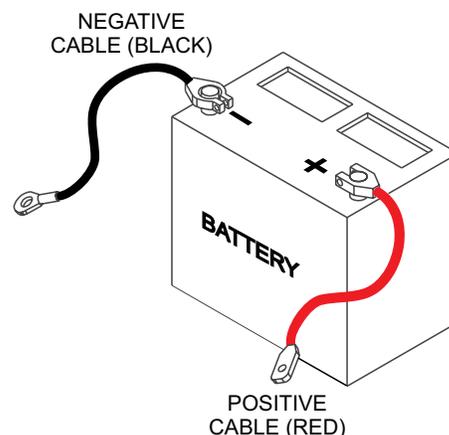


Figure 5. Battery Cable Orientation

This section is intended to assist the operator with the initial start-up of the trowel. It is extremely important that this section be read carefully before attempting to use the trowel in the field.

DO NOT use your ride-on power trowel until this section is thoroughly understood.

WARNING

Failure to understand the operation of this ride-on trowel could result in severe damage to the trowel or personal injury.

ENGINE OIL LEVEL

1. Lift (tilt) seat forward to access engine oil dipstick.
2. Pull the engine oil dipstick (Figure 6) from its holder.
3. Determine if engine oil is low. Oil level should be between the upper and lower limit on the dipstick.
4. If oil level is low add correct amount of engine oil to bring oil level to a normal safe level (See Recommended Viscosity Grades, Table 6).
5. Allow enough time for any added oil to make its way to the oil pan before rechecking.

CAUTION

DO NOT overfill engine oil. Oil level should not be above the top fill line.

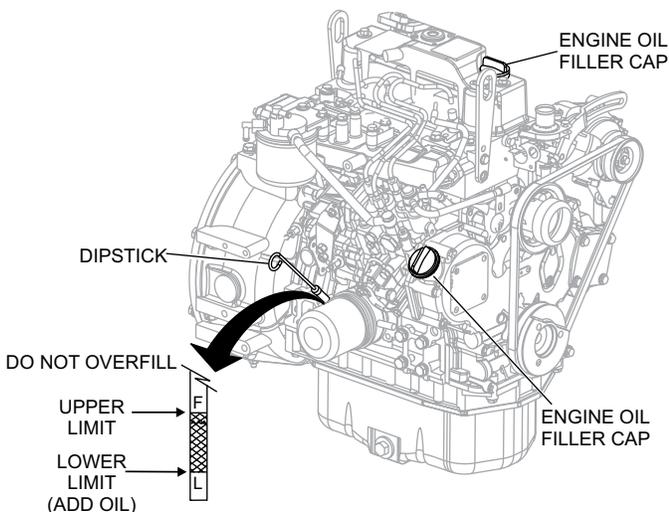


Figure 6. Engine Oil Dipstick

HYDRAULIC OIL LEVEL

Determine if the hydraulic oil is low by observing the level of oil in the hydraulic oil **sight glass**, (Figure 7). The hydraulic tank has an elevated overflow bottle. **DO NOT** remove the fill cap when the oil is hot or spillage will occur.

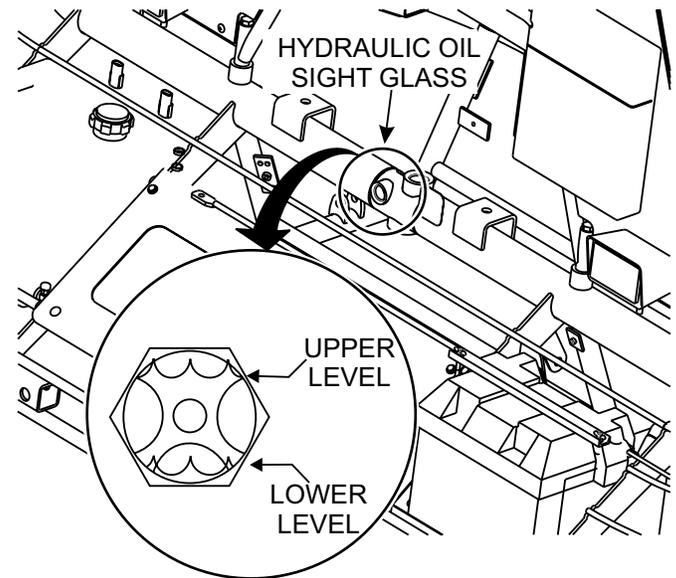


Figure 7. Hydraulic Oil Sight Glass

FUEL

To determine if the engine fuel is low, view the fuel gauge (Figure 8) on the top of the fuel tank. If fuel level is low, fill with clean fresh gasoline fuel.

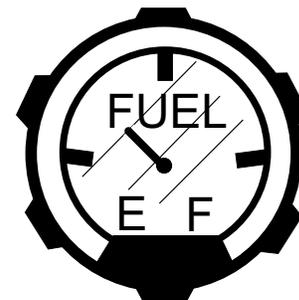


Figure 8. Fuel Gauge

WARNING

Handle fuel safely. Motor fuels are highly flammable and can be dangerous if mishandled. **DO NOT** smoke while refueling. **DO NOT** attempt to refuel the ride-on trowel if the engine is hot or running.

STARTING THE ENGINE

1. Place one foot on the trowel's platform, grab hold of the hand grip located on the front frame, and lift yourself onto the trowel, then sit down in the operator's seat. **DO NOT** use the joysticks to lift yourself onto the trowel.

NOTICE

Pulling on the joysticks repeatedly will weaken the units. **ALWAYS** use the grab handles to lift yourself on the trowel.

NOTICE

This trowel is equipped with a safety stop switch that will not allow the engine to start unless an operator is sitting in the operator's seat. The weight of an operator depresses an electrical switch, which allows the engine to start.

WARNING

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

NOTICE

The safety stop switch should be used to stop the engine after every use. Doing this will verify the switch is working properly thus providing safety for the operator. Remember to turn the key to the "OFF" position after stopping the machine. Not doing so may drain the battery.

2. It is recommended that the operation of the Safety Stop Switch is checked prior to performing any troweling operations. Doing this will verify that the switch is working properly contributing to safe operation of the machine.
3. Place the engine speed control lever, Figure 9 in the LOW position.

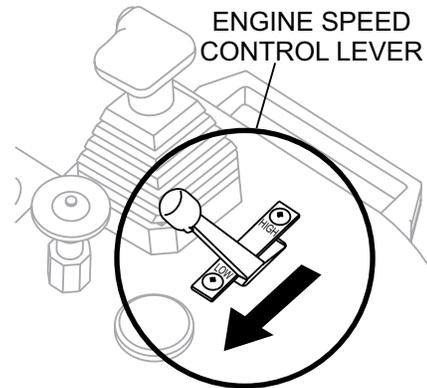


Figure 9. Engine Speed Control Lever (Low)

4. Insert the ignition key into the ignition switch, (Figure 10)

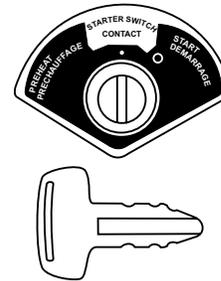


Figure 10. Ignition Switch and Key

5. Turn the ignition key clockwise to the (start) position. The oil and charge indicator lights, (Figure 11) should be on.

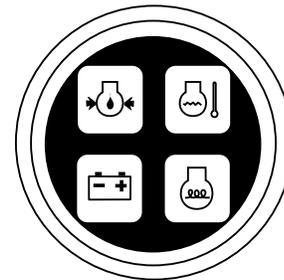


Figure 11. Oil and Charge Indicator Lights

NOTICE

OIL, and **CHARGE**, indicator lights come on when ignition switch is in the **ON** position, and the engine is **NOT** running. In **COLD** weather turn and hold the ignition key counter clockwise to the **PREHEAT** position, wait until the preheat indicator goes off before turning the ignition key clockwise to the start position. Two or three preheat cycles may be necessary in very cold weather.

- Turn ignition key fully clockwise and listen for engine to start. Once engine has started release ignition key. Let the engine warm for a few minutes.
- Place the engine speed control lever, (Figure 12) in the **HIGH** position.

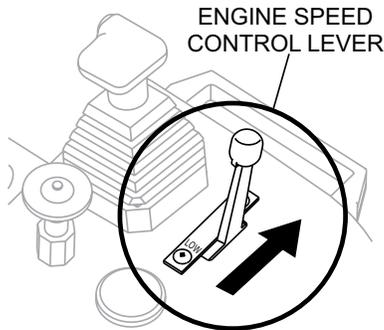


Figure 12. Engine Speed Control Lever (High)

- The engine should be running at full RPM's
- Let the engine idle for 3-5 minutes.
- Repeat this section a few times to get fully acquainted with the engine starting procedure.

STEERING

Two joysticks (Figure 14) located to the left and right of the operator's seat provide directional control for the trowel. Table 4 illustrates the various directional positions of the joysticks and their effect on the ride-on trowel.

NOTICE

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

- The foot pedal, (Figure 13) solely controls blade speed. The position of the foot pedal determines the blade speed. Slow blade speed is obtained by slightly depressing the pedal. Maximum blade speed is obtained by fully depressing the pedal.

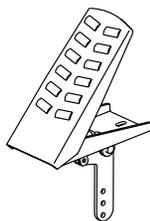


Figure 13. Blade Speed Control Foot Pedal

- Push both the left and right Control Joysticks forward. See Figure 14

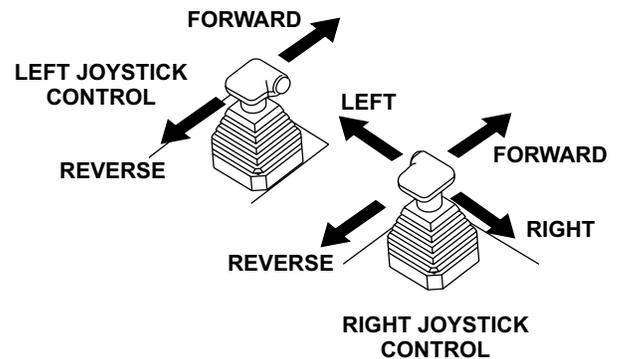


Figure 14. Left and Right Control Joysticks

Table 4. Control 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 BACKWARD ↓	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 backward in a straight line.
Move BOTH Joysticks to the RIGHT → →	Causes the ride-on trowel to move to the right.
Move BOTH Joysticks to the LEFT ← ←	Causes the ride-on trowel to move to the left.

3. With your right foot quickly depress the right foot pedal halfway. Notice that the ride-on power trowel begins to move in a forward direction. Return both joystick controls to their neutral position to stop forward movement, then remove your right foot from the right foot pedal.
4. Practice holding the machine in one place as you increase blade speed. When about 75% of maximum blade speed has been reached, the blade will be moving at proper finishing speed. The machine may be difficult to keep in one place. Trying to keep the ride-on trowel stationary is a good practice for operation.
5. Practice maneuvering the ride-on trowel using the information listed in Table 4. Try to practice controlled motions as if you were finishing a slab of concrete. Practice edging and covering a large area.
6. Try adjusting the pitch of the blades. This can be done with the ride-on trowel stopped or while the trowel is moving, whatever feels comfortable. Test the operation of optional equipment like retardant spray and lights if equipped.
7. Pull both the left and right joysticks backward and repeat steps 3 through 6 while substituting the word reverse for forward.

Trowel Speed Limiter Control

The speed limiter control located on the control panel, (Figure 15) can be used to adjust the maximum trowel speed that can be obtained when the foot pedal is fully depressed. Pull up to reduce the maximum speed and push down to return to full speed. For fine adjustments, rotate the knob clockwise or counter-clockwise.

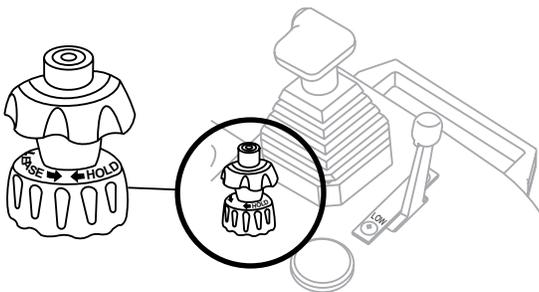


Figure 15. Trowel Speed Limiter Control

Blade Pitch Control

Sometimes it may be necessary to match blade pitch between the two sets of blades. There are some signs that this may be necessary. For example, the differences in pitch could cause a noticeable difference in finish quality between the two sets of blades.

Or, the difference in blade pitch could make the machine difficult to control. This is due to the surface area in contact with the concrete (the blade set with the greater contact area tends to stick to the concrete more).

Adjustment of the blade pitch is accomplished by the setting of the two rocker switches located on the left control panel next to the left joystick control, (Figure 16).

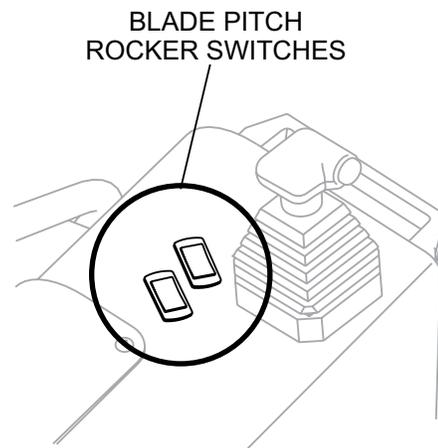


Figure 16. Blade Pitch Control Rocker Switches Location

The right rocker switch (Twin Pitch™) pitches both blades at the same time while the left rocker switch (Figure 17) will pitch only the left blade. Moving the switches forward increases the pitch while moving them backward decreases the blade pitch.

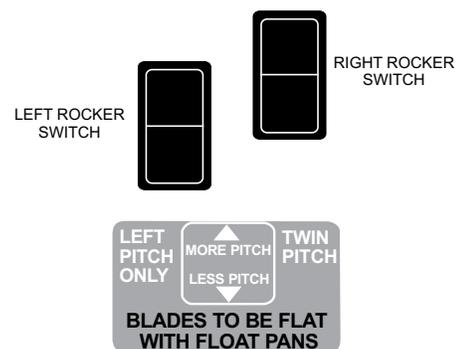


Figure 17. Blade Pitch Rocker Switches

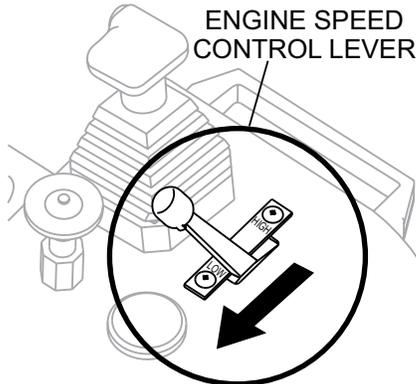
NOTICE

Important! To get the blades absolutely flat for using float pans follow these steps:

1. Press right Twin Pitch™ rocker switch all the way down.
2. Press left pitch rocker switch upward a little.
3. Press right Twin Pitch™ rocker switch all the way down again.
4. Press left pitch rocker switch all the way down.

Engine Shut-Down

1. Return the engine speed control lever, (Figure 18) to low idle, and allow the engine to idle for a minimum 5 minutes.



**Figure 18. Engine Speed Control Lever
Idle (Low Speed)**

NOTICE

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

2. Turn the ignition key counter-clockwise to the "**starter switch contact**" position, then remove the key.
3. Clean and remove any foreign debris from the trowe

MAINTENANCE

Table 5. Maintenance Schedule

System	Check Item	DAILY	Periodic Maintenance Interval						
			Every 50 Hrs	Every 100 Hrs	Every 250 Hrs	Every 500 Hrs	Every 1000 Hrs	Every 1500 Hrs	Every 2000 Hrs
Engine	Check Air Cleaner	X							
	Clean Air Cleaner Element				X				
	Replace Air Cleaner Element					X			
	Check and Refill Engine Coolant	X							
	Check and Clean Radiator Fins		X						
	Check and Adjust Cooling Fan V-Belt		X 1st time		X 2nd time and after				
	Drain, Flush, and Refill Cooling System With New Coolant						X or yearly which- ever comes first		
	Check Engine Oil Level	X							
	Drain and Fill Engine Oil		X 1st time		X 2nd time and after				
	Replace Engine Oil Filter		X 1st time		X 2nd time and after				
	Check and Refill Fuel Tank Level	X							
	Drain Fuel Tank				X				
	Trowel	Change Hydraulic Oil and Filter			X 1st time	X 2nd time and after			
Relube Arms, Thrust Collar, and Clutch		X							
Remove, Clean, Reinstall, and Relube Arms, and Thrust Collar				X					
Check and replace if necessary, arm bushings and thrust collar bushings.						X			
Check blades for excessive wear or damage and replace as necessary.		X							
Adjust Blade Speed						X (if needed)			

NOTICE

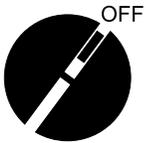
When performing any maintenance on the trowel or engine, follow all safety messages and rules for safe operation stated at the beginning of this manual

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

WARNING



Accidental starts can cause severe injury or death.



ALWAYS place the ON/OFF switch in the OFF position.



Disconnect and ground spark plug leads and disconnect negative battery cable from battery before servicing.

WARNING



Some maintenance operations may require the engine to be run. Ensure that the maintenance area is well ventilated. Exhaust contains poisonous carbon monoxide gas that can cause unconsciousness and may result in **DEATH**

CAUTION



ALWAYS allow the engine to cool before servicing. **NEVER** attempt any maintenance work on a hot engine.

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

CAUTION



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

This Yanmar diesel engine is equipped with a replaceable, high-density paper air cleaner element (Figure 19). This air cleaner may have an *inner* element (option) that is used as a backup filter should the *main* element becomes damaged.

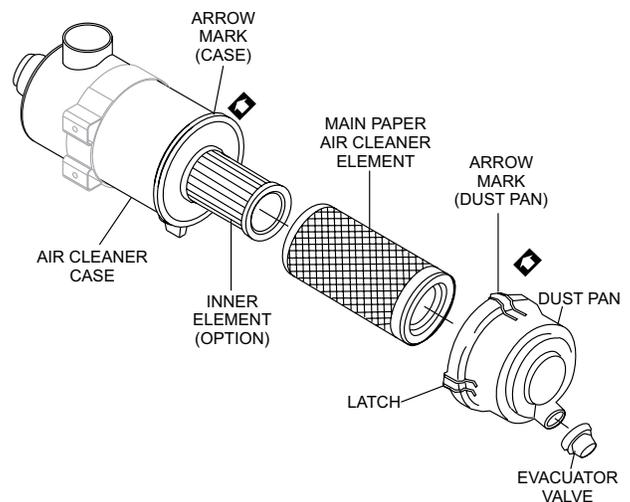


Figure 19. Air Cleaner Components

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 found to be damaged, excessively dirty, or oily.
4. Release the latches located on either side of the air cleaner dust pan, and remove the dust pan.
5. Remove the air cleaner element.

NOTICE

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

3. Remove the drain plug to drain the oil.
4. After oil is sufficiently drained, securely tighten the drain plug.
5. Using a filter wrench, turn the oil filter counter-clockwise to remove.
6. Clean sealing surface on engine where filter mounts.
7. Coat the seal of the new oil filter with clean engine oil. Install new filter first by hand until it contacts the engine sealing surface. Tighten it another 3/4 turn using the filter wrench.
8. Fill engine crankcase with high quality detergent oil classified "For Service CF, or CF-4". Fill to the upper limit of dipstick. **DO NOT** overfill. Crankcase oil capacity with oil filter replacement is 3.5 qts. (3.3 liters).
9. Run the engine briefly for several minutes. Watch for oil leakage. Shut the engine down and allow it to sit for several minutes. Top off the oil to the upper limit on the dipstick.
10. Be sure to coat the seal (Figure 23) of the new oil filter with clean engine oil.

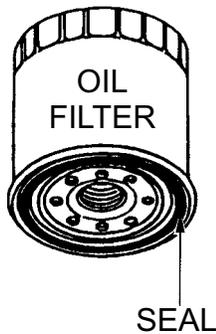


Figure 23. Oil Filter/Seal

Radiator/Cooling System

COOLANT (ANTIFREEZE/SUMMER COOLANT/WATER)

YANMAR recommends antifreeze/summer coolant for use in their engines, which can be purchased in concentrate (and mixed with 50% demineralized water) or pre-diluted. See the **Yanmar Engine Owner's Manual** for further details.

WARNING



If adding coolant/antifreeze mix to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. The possibility of **hot!** coolant exists which can cause severe burns.

Day-to-day addition of coolant is done from the recovery tank. When adding coolant to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. See Table 7 for engine, radiator, and recovery tank coolant capacities. Make sure the coolant level in the recovery tank is always between the "H" and the "L" markings.

Table 7. Coolant Capacity	
Engine and Radiator	2.5 gal (9.5 liters)
Reserve Tank	16 oz. (0.5 liters)

Operation in Freezing Weather

When operating in freezing weather, be certain the proper amount of antifreeze Table 8 has been added.

Table 8. Anti-Freeze Operating Temperatures				
Vol % Anti- Freeze	Freezing Point		Boiling Point	
	°C	°F	°C	°F
50	-37	-34	108	226

NOTICE

When the antifreeze is mixed with water, the antifreeze mixing ratio **must be** less than 50%.

Radiator Maintenance

1. Check radiator for leaks that would indicate corrosion or damage.
2. Check coolant level daily. Top off as necessary. Always use recommended coolant/antifreeze. Use the mixing ratios specified by the coolant/antifreeze manufacturer or Table 8. Replace coolant/antifreeze at least once a year.
3. Check radiator hoses for fatigue or cracking. Replace any defective hoses immediately.
4. Check radiator cap seal and replace as necessary.
5. Blow off dirt and dust from fins and radiator with 28 psi (193 kPa) or less of compressed air (Figure 24). Be careful not to damage the fins with the compressed air.

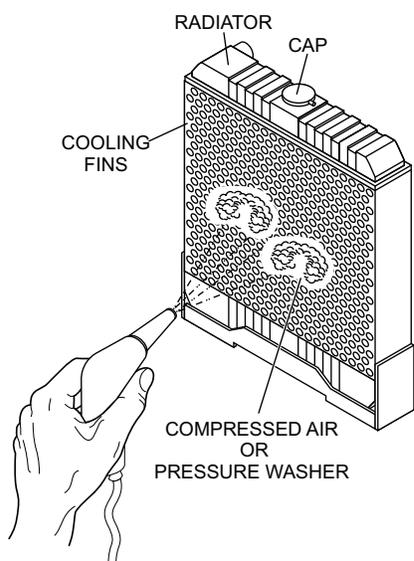


Figure 24. Radiator Cleaning

NOTICE

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.

6. If there is a large amount of contamination on the fins, use detergent to clean and rinse thoroughly with tap water. T

Fuel Filter

Replace the engine fuel filter (Figure 25) every 800 hours. Refer to your engine manual for specific details to perform this operation.

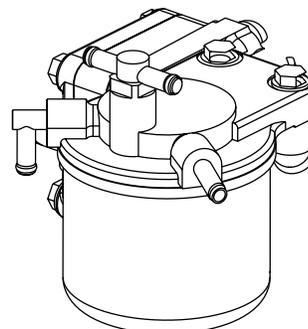


Figure 25. Fuel Filter

Fuel/Water Separator

1. Inspect the fuel filter water separator daily. If the fuel filter/water separator (Figure 26) has collected a significant amount of water and sediment at the bottom of the cup, it should be drained off.
2. To remove water and sediment from the cup, place the fuel cock valve in the OFF position and unscrew the cup from the retaining ring.
3. Pour the contents of the cup into a safety container. Rinse cup with a mild detergent and reattach cup to retaining ring.
4. Place fuel cock valve in the ON position.

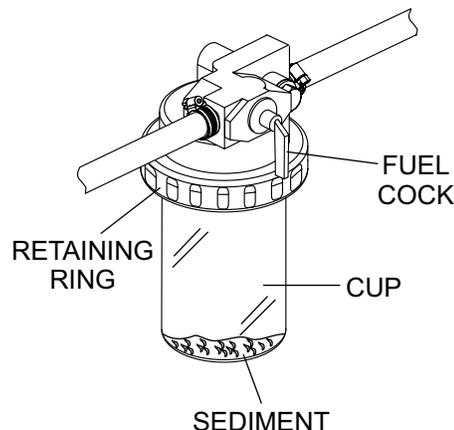


Figure 26. Fuel Water Separator

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.

CHECKING THE V-BELT

The V-belt (Figure 27) needs to be replaced as soon as it starts to show signs of wear. **NEVER** use a defective V-belt under any circumstances. Indications of excessive belt wear are fraying, squealing when in use, a belt that emits smoke or a burning rubber smell when in use.

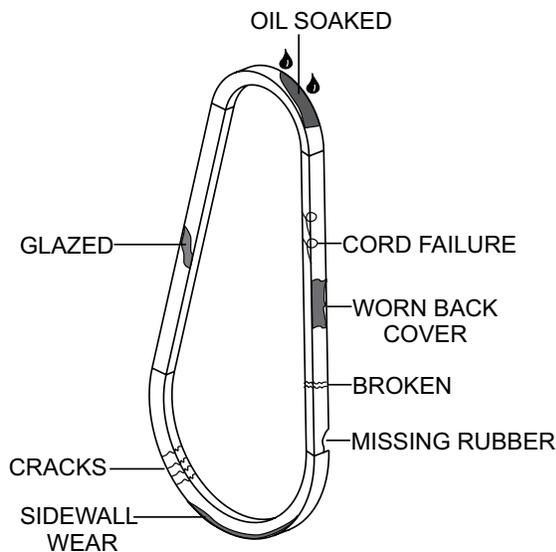


Figure 27. V-Belt Inspection

1. Visually inspect V-belt (Figure 27) for signs of damage or excessive wear. If V-belt is worn or damaged, replace V-belt.
2. Check to ensure that the V-belt is tensioned and aligned correctly.

Battery/Charging System

DANGER

Use all safety precautions specified by the battery manufacturer when working with the battery.



Flammable, explosive gas. (produces hydrogen gas while charging or during operation). Keep area around battery well ventilated and keep from any fire source.



Battery electrolyte contains corrosive, toxic chemical. (dilute sulfuric acid). Avoid contact with eyes and skin.



Shock or Fire due to electric short-circuit. Disconnect battery cables before inspecting electrical system and never "spark" battery terminals to test for charge.

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

Long Term Storage

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

CAUTION

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

Engine Tune-Up

See your engine manual for specific information on tuning up your engine.

NOTICE

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

CAUTION

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

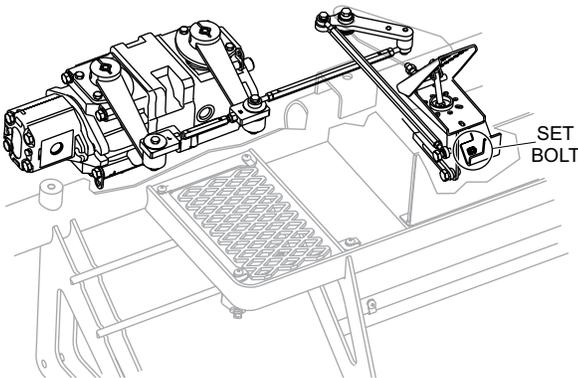
Checking/Adjusting Trowel Speed

Because the two hydraulic drive motors operate independent of each other, the trowel speed between them may vary. If the unit's steering is difficult to control, or if one spider is spinning noticeably faster or slower than the other, the trowel speed may need to be checked. It is also recommended that the trowel speed be checked at least once a year.

Trowel speed adjustment is a two-step process. First, the left side should be checked and/or adjusted. Second, the right side should be adjusted to match the left.

Left Side Trowel Speed Adjustment

The left side trowel speed is adjusted by the **set bolt** (Figure 28) located under the operator's platform, and is accessed by opening the storage panel door. Backing the set screw out decreases the left side trowel speed; screwing it inward increases the speed.



**Figure 28. Trowel Speed Control
(Set Bolt Location)**

Right Side Trowel Speed Adjustment

The right side trowel speed is adjusted by changing the length of the connecting rod (Figure 29) on the pump actuation levers. This is accomplished by adjusting the right side adjustment nut.

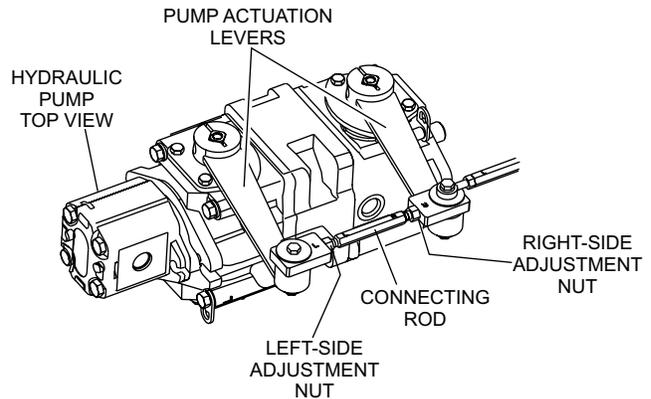


Figure 29. Pump Adjustment Components

This rod is basically a turnbuckle, (Figure 29). Rotating it in one direction increases the length and corresponding trowel speed. Rotating it the opposite direction decreases the length and trowel speed. The right side trowel speed should be within 3 rpm of the left.

A good starting point in the adjustment process is to adjust the rod such that both trowels begin to rotate at the same time when the foot pedal is slowly depressed. This will, generally, get the speeds fairly close; close enough for use if instrumentation is unavailable (i.e. on the job site). From this point on, some form of instrumentation is required to verify that the trowel speeds are within tolerance. A strobe or magnetic pickup type speed indicator is recommended to verify the speeds.

The trowel speeds should be adjusted on a dry concrete floor with the blades pitched flat. Units with the Yanmar turbocharged engine should be set at 140-160 RPM with the engine at full speed. Blade Pitch

Matching Blade Pitch for Both Sets of Blades

Sometimes it may be necessary to match blade pitch between the two sets of blades. There are some signs that this may be necessary. For example, the differences in pitch could cause a noticeable difference in finish quality between the two sets of blades, or, the difference in blade

pitch could make the machine difficult to control.

This is due to the surface area in contact with the concrete (the blade set with the greater contact area tends to stick to the concrete more).

The right rocker switch (Twin Pitch™) pitches both blades at the same time while the left rocker switch (Single Pitch) will pitch only the left blade. Moving the switches forward increases the pitch while moving them backward decreases the pitch, (Figure 30).

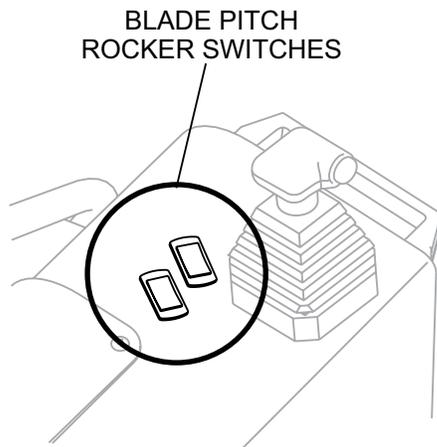


Figure 30. Blade Pitch Rocker Switches

Blade Pitch Adjustment Procedure

Maintenance adjustment of blade pitch is made by adjusting a bolt (Figure 31) on the arm of the trowel blade finger. This bolt is the contact point of the trowel arm to the lower wear plate on the thrust collar. The goal of adjustment is to promote consistent blade pitch and finishing quality.

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

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

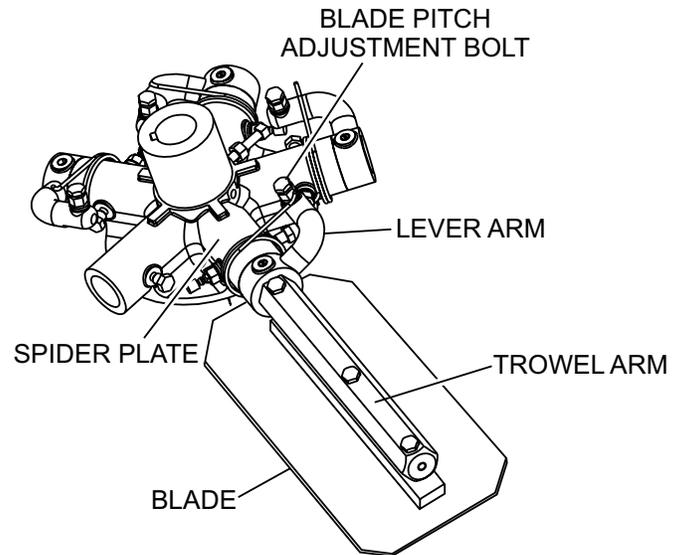


Figure 31. Blade Pitch Adjustment Bolt

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

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

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

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

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

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

Stabilizer Ring Removal

5. To remove the outer stabilizer ring, (Figure 32), remove the six bolts at the end of each spider arm.

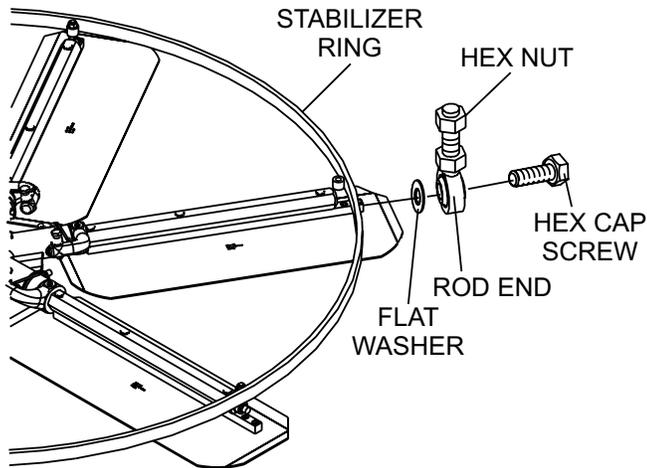


Figure 32. Stabilizer Ring Removal

6. Examine stabilizer ring for out of round or bends. If ring is damaged, replace ring. If ring is found to be correct with no damage, set aside.

Changing Blades

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

1. Place the machine on a flat, level surface. Adjust the blade pitch control to make the blades as flat as possible.
2. 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.
3. Remove the bolts and lock washers (Figure 33) that secure the blade to the trowel arm, then remove the blade.

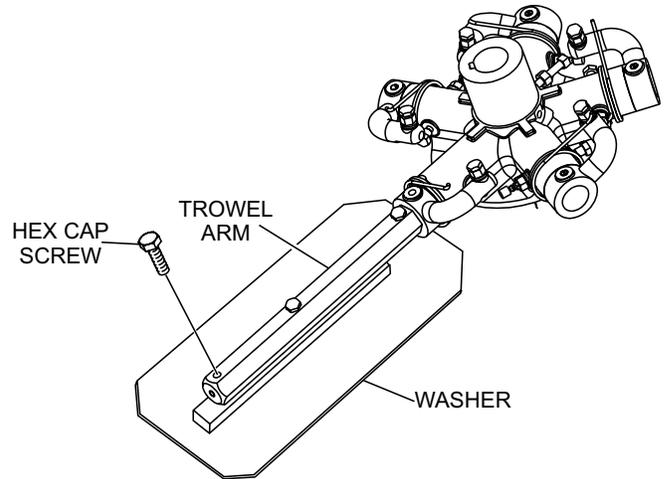


Figure 33. Blade Removal

4. Wire brush any build-up of concrete from all six sides of the trowel arm. This is important to properly seat the new blade. Repeat for the remaining arms.
5. Install the new blade, maintaining the proper orientation for direction of rotation.
6. Reinstall the bolts and lock washers.
7. Torque to 9 ft. lbs. (12.2 N·m)
8. Repeat steps 2-7 for all remaining blades.

TROWEL ARM ADJUSTMENT

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

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

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

1. Place the trowel on a FLAT, LEVEL surface.
2. A level, clean surface area to test the trowel prior to and after is essential. Any unlevel spots in the floor or debris under the trowel blades will give an incorrect perception of adjustment. Ideally, a 5 x 5 ft. (1.5 x 1.5 m) three-quarter inch (19 mm) thick FLAT steel plate should be used for testing.
3. 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.
4. Figure 34 illustrates, "incorrect alignment", worn spider bushings or bent trowel arms. Check that the adjustment bolt is barely touching (0.10" max. clearance) lower wear plate. All alignment bolts should be spaced the same distance from the lower wear plate.

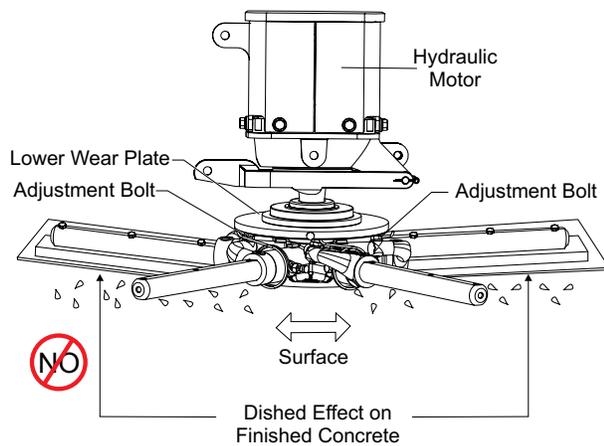


Figure 34. Incorrect Spider Plate Alignment

5. Figure 35 illustrates the "correct alignment" for a spider plate (as shipped from the factory).

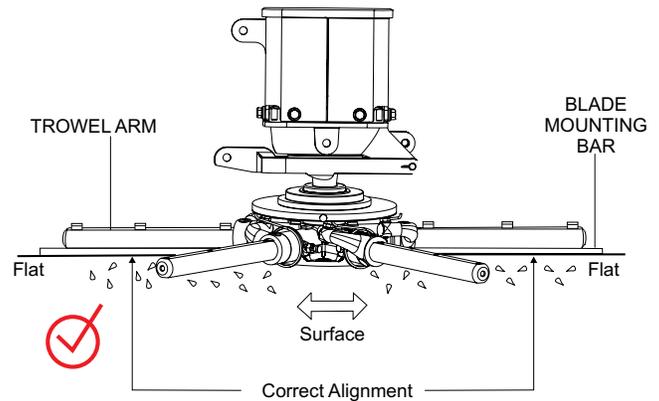


Figure 35. Correct Spider Plate Alignment

Spider Removal

Remove the spider assembly (Figure 36) from the hydraulic motor shaft as follows:

1. Remove the protective plug located on the underside of the spider to gain access to the screw securing the spider plate to the hydraulic motor shaft.

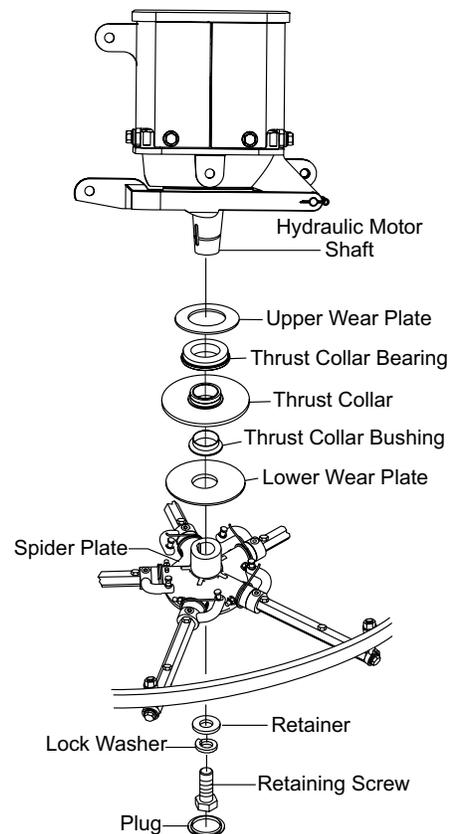


Figure 36. Spider/Gearbox Removal

2. Remove spider to hydraulic motor retainingscrew.
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 hydraulic motor.
4. For reassembly apply Blue Loctite #242 to the spider retaining screw and torque to 130 ft.-lbs. (176 N·m)

Trowel Arm Removal

1. Remove the hardware securing the stabilizer ring to the trowel arm (Figure 37).

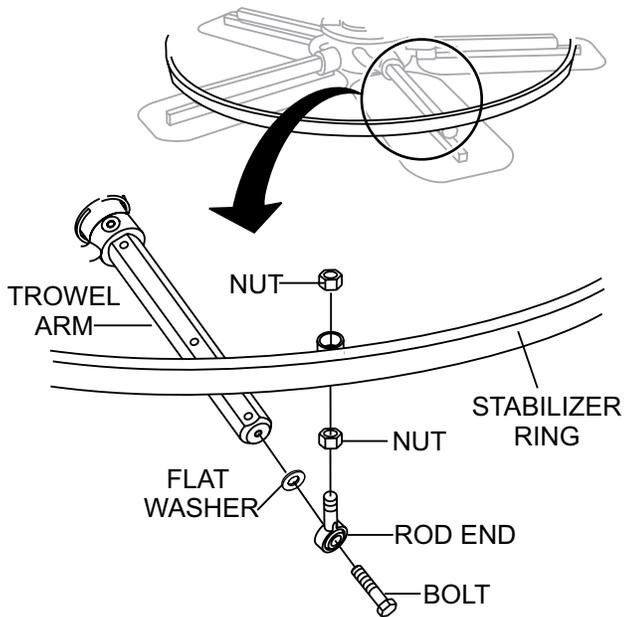


Figure 37. Trowel Arm Removal (Stabilizer Ring)

2. Each trowel arm (Figure 38) is held in place at the spider plate by a hex head bolt (zerk grease fitting) and a roll pin. Remove both the hex head bolt and the roll pin from the spider plate.
3. Remove the trowel arm from the spider plate.

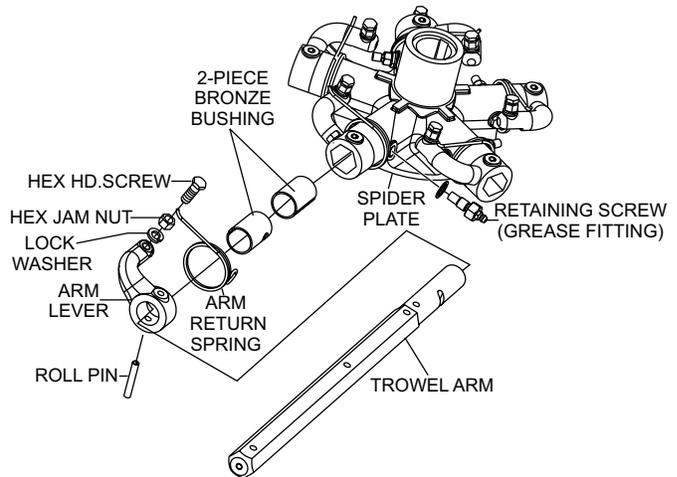


Figure 38. Trowel Arm Removal (Spider Plate)

4. Should the trowel arm inserts (bronze bushing) come out with the trowel arm, remove the bushing from the trowel arm and set aside in a safe place. If the bushing is retained inside the spider plate, carefully remove the bushing.
5. Examine the bronze trowel arm bushings (Figure 39), and clean if necessary. Replace bushing if out-of-round or worn.



Figure 39. Bronze Bushings

6. Wire brush any build-up 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 follows, refer to Figure 40 and Figure 41:

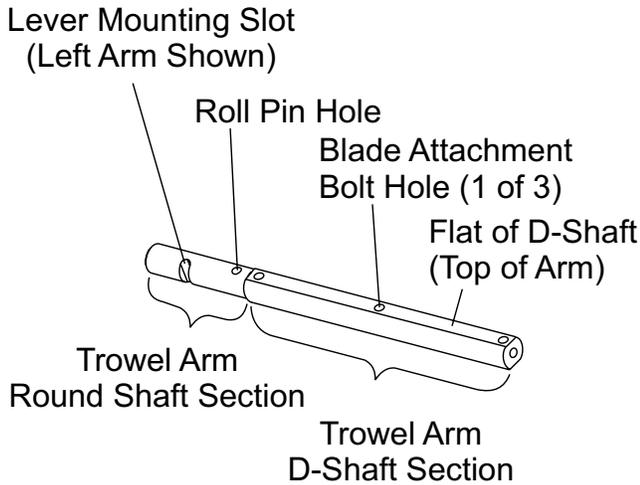


Figure 40. Trowel Arm

1. Use a thick steel plate, granite slab or any surface which is true and flat, to check all six sides of each trowel arm for flatness.
2. Check each of the six sides of the trowel arm (hex section). A feeler gauge of .004" (0.10 mm) should not pass between the flat of the trowel arm and the test surface along its length on the test surface. (Figure 41) .

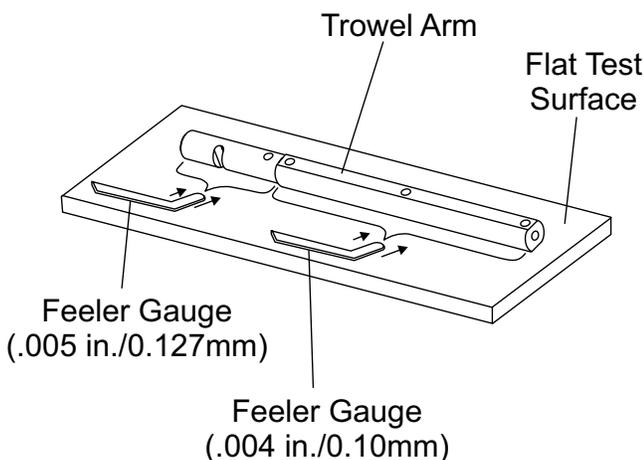


Figure 41. Checking Trowel Arm Flatness

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

Trowel Arm Adjustment

Shown in Figure 42 is the adjustment fixture with a trowel arm inserted. As each trowel arm is locked into the fixture, the arm bolt is adjusted to where it contacts a stop on the fixture. This will consistently adjust all of the trowel arms, keeping the finisher as flat and evenly pitched as possible.

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

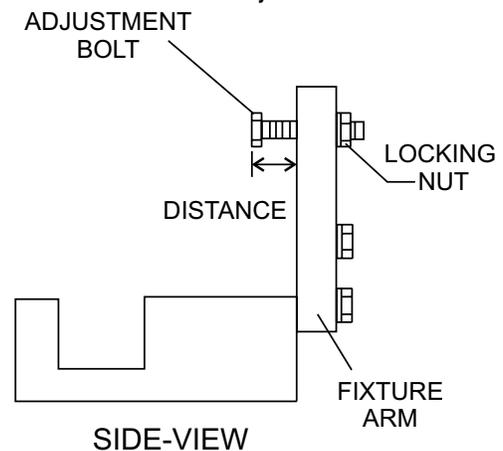


Figure 42. Trowel Arm Adjustment Tool Side View

2. Ensure the fixture arm is in the proper setting (up or down) for your trowel arm rotation as shown in Figure 43.

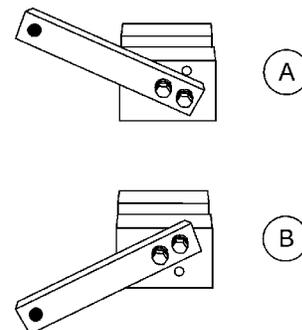


Figure 43. Trowel Arm Adjustment Setup

NOTICE

Arms with CLOCK-WISE blade rotation use the fixture arm in the UP position (A in Figure 43). Arms with COUNTER CLOCK-WISE blade rotation use the fixture with the fixture arm in the DOWN position. (B in Figure 43).

3. Unscrew the locking bolts on the adjustment tool and place the trowel arm into the fixture channel as shown in Figure 44. 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.

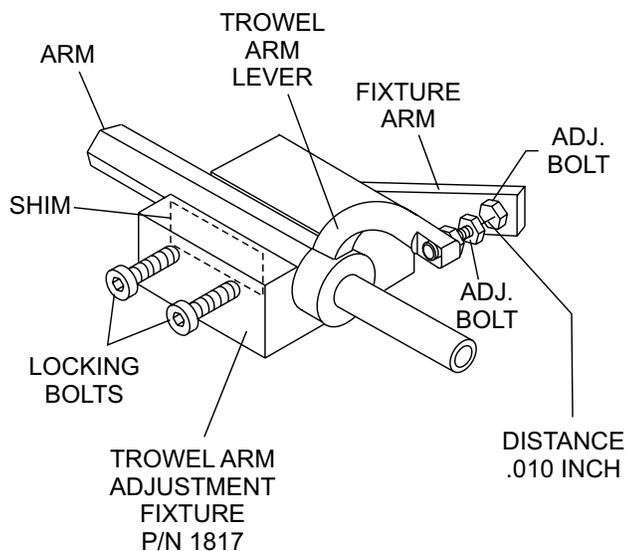


Figure 44. Trowel Arm Adjustment Fixture Components

4. Use an allen wrench to tighten the locking bolts securing the trowel arm in place.
5. Adjust the bolt "distance" shown in Figure 42 to match one of the arms. The other arms will be adjusted to match this distance.
6. Loosen the locking nut on the trowel arm lever, then turn the trowel arm adjusting bolt until it barely touches (.010") the fixture adjusting bolt.
7. Once the correct adjustment is made, tighten the lock nut on the trowel arm to lock in place.
8. Loosen locking nuts on the adjustment fixture, and remove trowel arm.
9. Repeat steps for the remaining trowel arms.

Re-Assembly

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

Installing Pans Onto Finisher Blades

These round discs sometimes referred to as "pans" attach to the spiders arms and allow early floating on wet concrete and easy movement from wet to dry areas. They are also very effective in embedding large aggregates and surface hardeners.

WARNING



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

WARNING

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

1. Lift trowel just enough to slide pan under blades. Lower finisher onto pan with blades assembly adjacent to Z-Clips.
2. Rotate blades into position under Z-Clips (Figure 45). Ensure that the blades are rotated in the direction of travel when the machine is in operation or use the engine to rotate the blades into position.

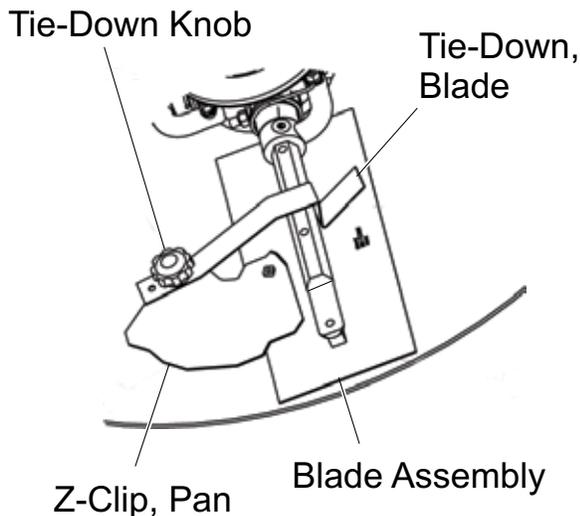


Figure 45. Z-Clip Finisher Pan Installation

3. Attach the blade tie-downs to the far side of the Z-Clip brackets with tie-down knobs as shown in Figure 45.
4. Check to make certain that the blade edges are secured under the Z-Clips and the tie-downs are secured completely over the edges of the blade bar before the machine is put back into operation.

Checking Hydraulic Steering Pressure

WARNING



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

Many hydraulic problems are a result of low fluid levels. Before checking any other possibilities, make sure the hydraulic fluid level is up to the top of the sight glass which is located at the back/center of the frame.

Hydrostatic pressure can be checked using a pressure gauge with a range of at least 5,000 psi. Two male diagnostic quick couplers/test ports (one for each pump) are located beneath the right grill guard (Figure 46).

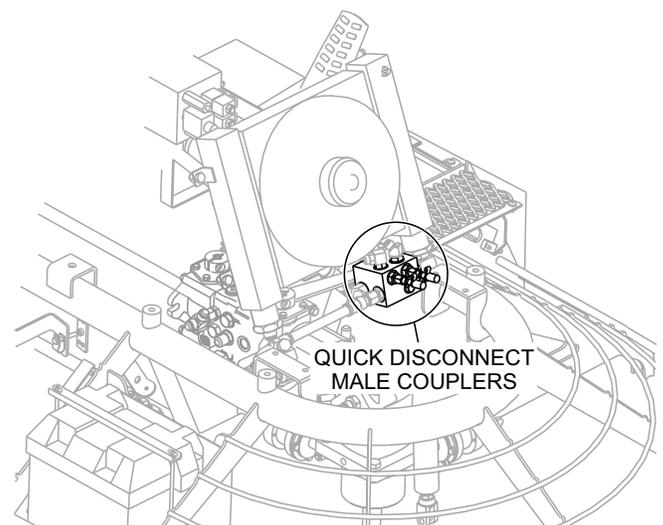


Figure 46. QD Male Couplers Location

MAINTENANCE

To access the right and left hydrostatic pump test ports, remove the grill guard. It is best to use two gauges simultaneously, but it is possible to use only one gauge and repeat the procedure for each side.

Connect the pressure gauges to right and left test ports as shown in Figure 47.

To fully test the hydrostatic system, the spiders will need to be **locked** so that they cannot rotate. This can be done by wrapping a chain around an arm on each spider, thus chaining them together in the back of the trowel.

Once the pressure gauges are installed and the spiders chained together, the system can be checked.

With the foot pedal in the idle position and the engine at full speed, the pressure should be 150 to 250 psi. If the pressure is less than 150 psi, the charge system may need to be inspected and/ or serviced. In particular, the suction filter and charge pump relief valve should be checked. The suction filter may be plugged, or the relief valve may be stuck. Either condition may cause low charge pressure.

With the engine at 50% to 70% of full speed, and spiders chained together, slowly depress the foot pedal and read the gauges. The pressure should get to at least 3,625 psi (250 bar). If the pressure will not attain 3,625 psi (250 bar), the pump should be inspected and/or serviced by an authorized service representative.

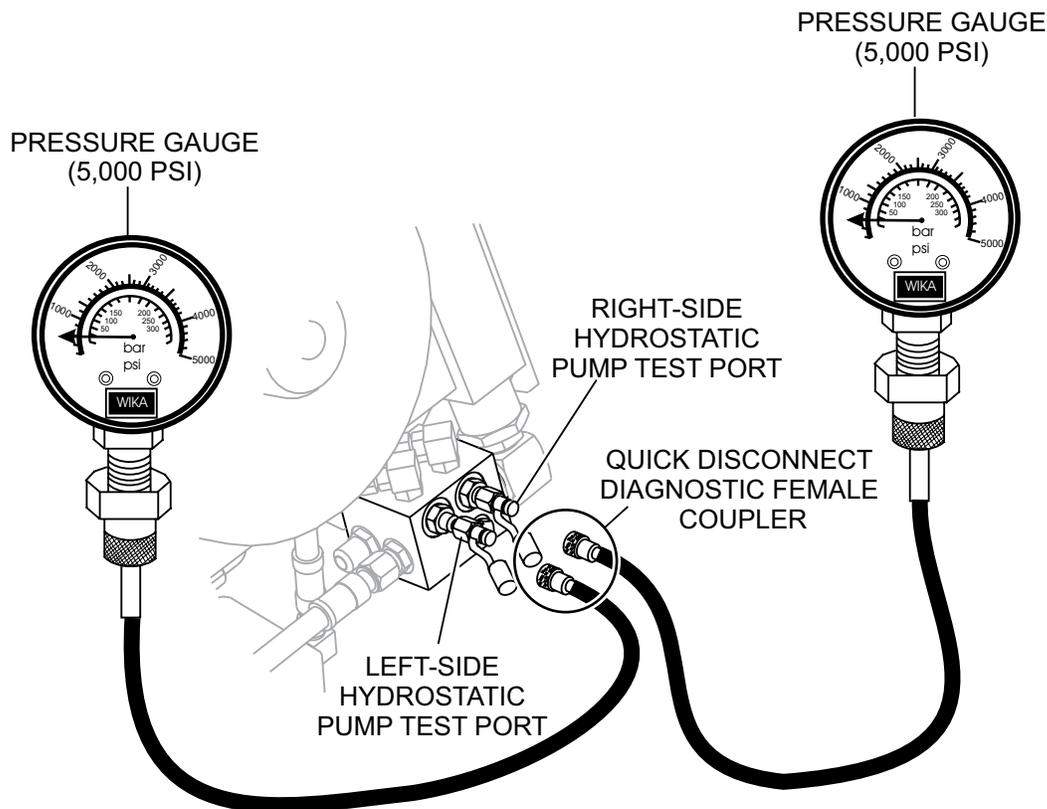


Figure 47. Hydraulic Pump Pressure Test Ports

Checking Steering Pressure

Steering pressure is also checked at either one of the pressure diagnostic couplers (Figure 48) under the right grill guard. Check steering pressure at either coupler with a 300-600 PSI gauge.

⚠ WARNING

DO NOT depress the FOOT PEDAL with the 300-600 PSI gauge installed or the gauge will be ruined.

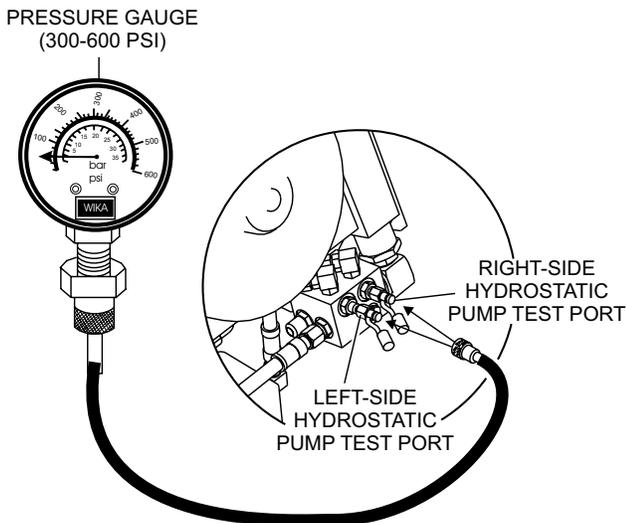


Figure 48. Steering Pressure Gauge

Run the engine at full RPM. The steering system's factory settings are shown in Table 9, however some operators may prefer a more responsive steering (higher pressure required) and some operators may prefer a "softer feel" (lower pressure required).

Table 9. Steering Pressure	
Cool Oil ¹	155-175 PSI
Hot Oil ¹	145-165 PSI

1. Engine must be a full speed.

Steering Pressure Adjustment

Remember, **DO NOT** depress the foot pedal with the 300-600 PSI gauge installed. Immediate damage to the gauge will occur.

1. Remove right grill guard.
2. Install 300 or 600 PSI gauge (Figure 49).
3. Loosen 1-1/16" jam nut on charge relief valve.

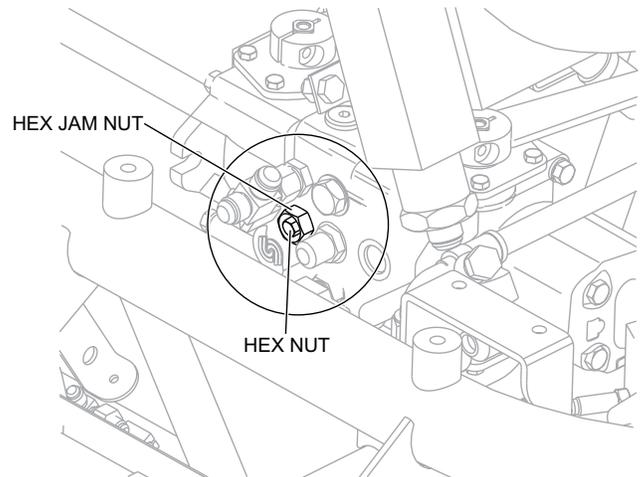


Figure 49. Steering Pressure Adjustmen

4. Use a 1/2" socket to adjust the small hex nut within the larger hex jam nut.
5. Adjust to proper steering pressure specifications shown in Table 9.
6. Retighten jam nut, remove gauge, and reinstall grill guard.

Pitch Pressure Check

To gain access to the pitch block (Figure 50), removal of the right-rear seat frame panel may be necessary.

Pitch pressure must be measured with at least one of the pitch switches **activated**. When pitch switches are unactivated, the pitch pressure will be the same as the charge/steering pressure. Proper pitch pressure is 2300 PSI (2250 - 2350 PSI).

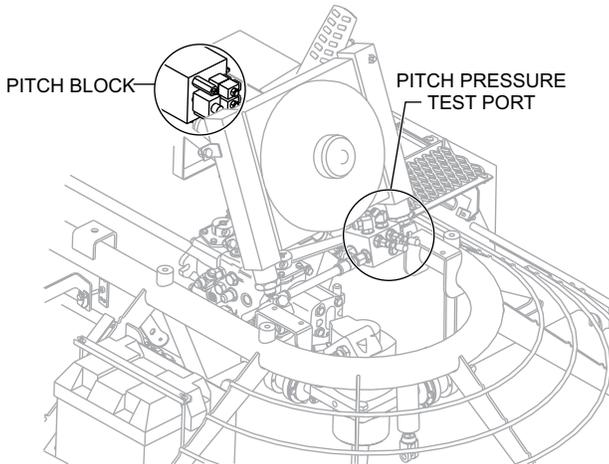


Figure 50. Pitch Block Location

1. Install 3000 PSI range pressure gauge to pitch pressure test port on pitch block, (Figure 51).

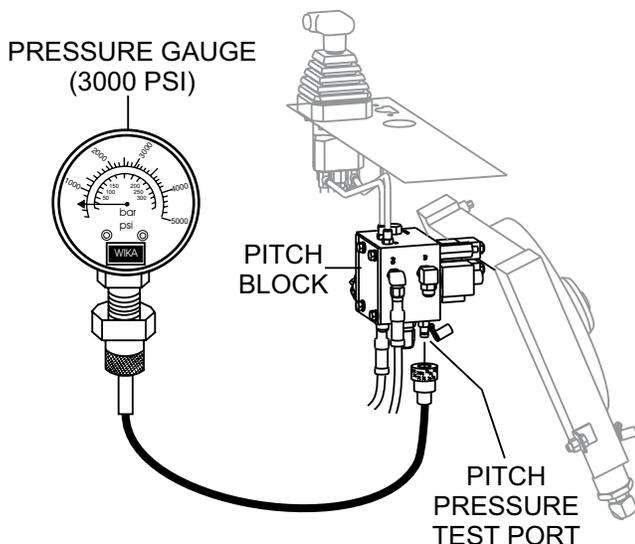


Figure 51. Pitch Pressure Test Port

2. Press the left pitch rocker switch downward.

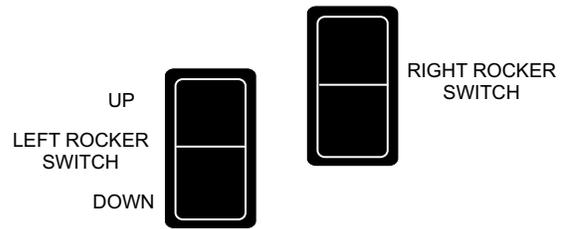


Figure 52. Pitch Pressure (Left Pitch Rocker Switch)

3. The blades should fatten out (bottom out the pitch cylinders).
4. Continue to hold down the left pitch rocker switch and record pressure.

Pitch Pressure Out of Specification

NOTICE

The Pitch Pressure Relief Valve is SET AT THE FACTORY, and normally should not require adjustment. If all other systems are found not to be defective, then the pitch relief valve is suspect, the following steps can be used to adjust the valve.

If the pitch pressure check is not within specification, check for the following:

- Correct hydraulic fluid level.
- Plugged hydraulic oil filter
- Loose or leaking fittings.
- Ruptured/damaged hydraulic lines.
- Faulty hydraulic pump.
- Pitch Pressure Relief Valve no longer at factory setting.

Pitch Pressure Adjustment

NOTICE

NEVER allow the pitch pressure to exceed 2700 PSI or equipment damage may result.

NOTICE

DO NOT attempt to adjust the Pitch Pressure Relief Valve while the engine is running.

1. Remove right grill guard and right rear seat frame panel.
2. With the engine OFF, remove the end cover (Figure 53) on relief valve.

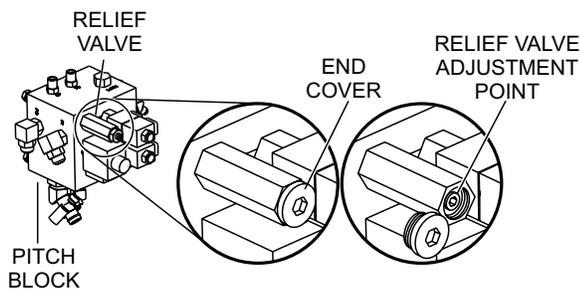
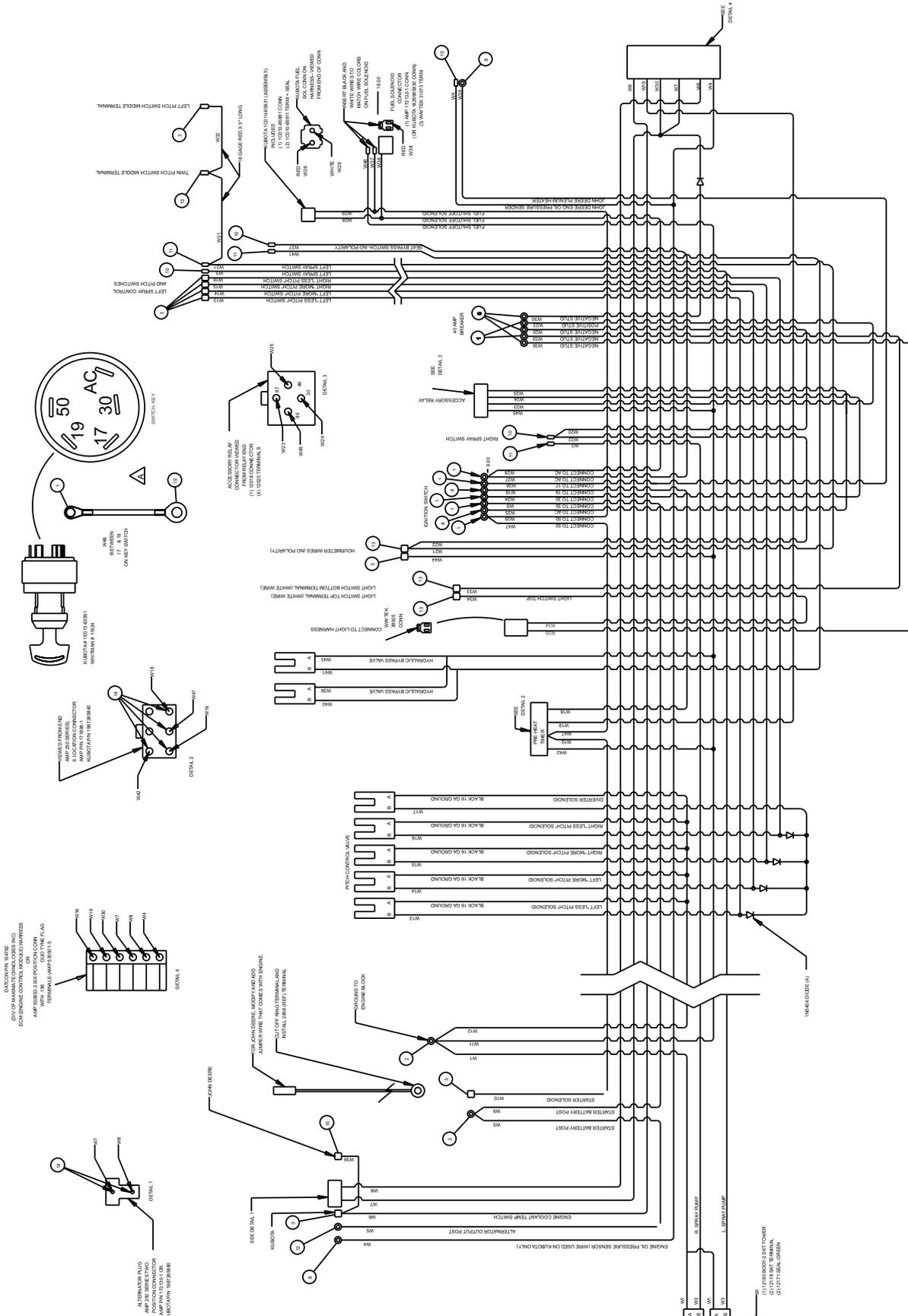


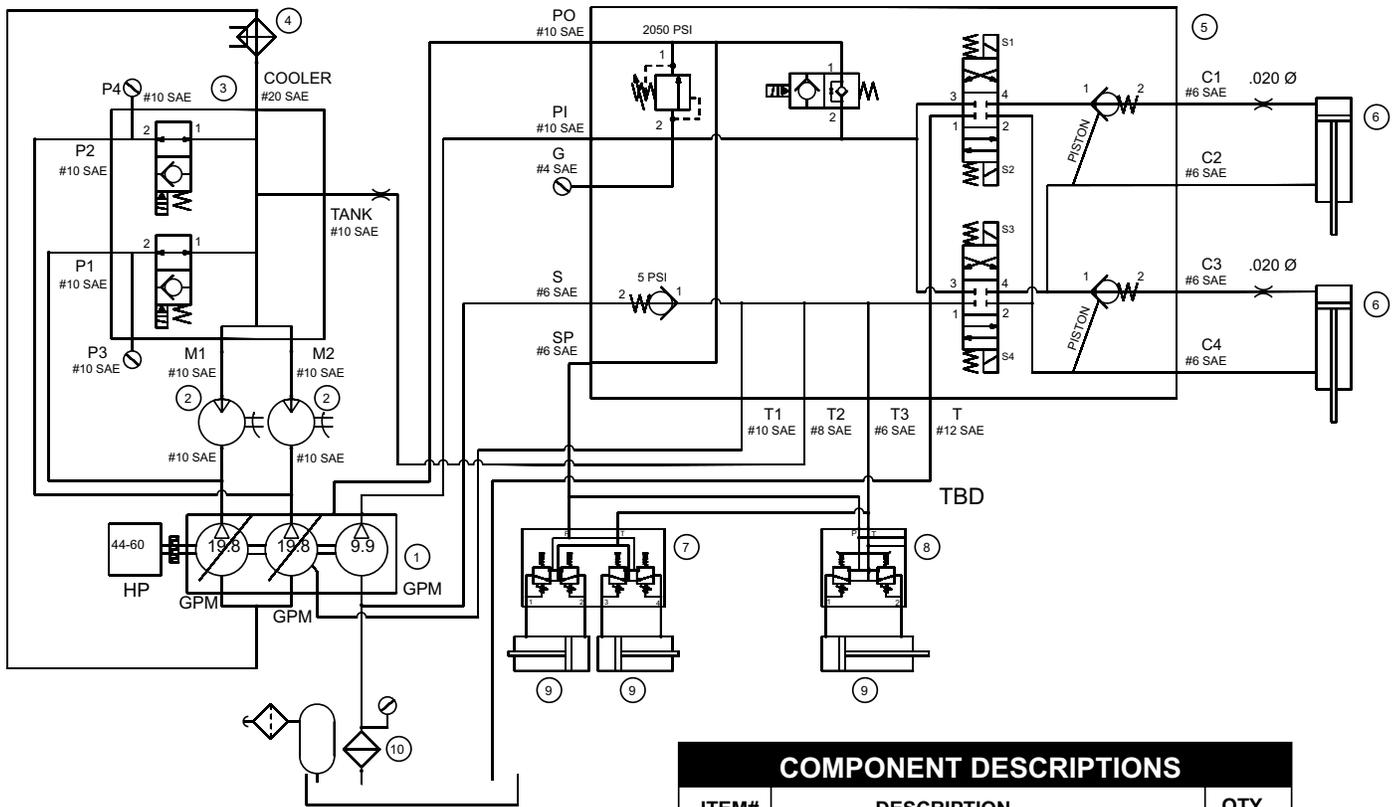
Figure 53. Pitch Pressure Adjustment

3. Adjust the relief valve with an allen wrench and reinstall the end cover.
4. Start the engine and check the pressure as described earlier. (See Pitch Pressure Check)
5. If pressure requires further adjustment, shut the engine down and repeat steps 2 through 4 until pressure check reads 2300 PSI.

WIRING DIAGRAM



HYDRAULIC DIAGRAM



COMPONENT DESCRIPTIONS

ITEM#	DESCRIPTION	QTY
1	PUMP/A, SAUER-DANFOSS M-25	1
2	MOTOR, HYD SAUER OMTW315	2
3	VALVE/A, PUMP SAFETY BYPASS	1
4	COOLER, THERM TRANSFER MF-15	1
5	VALVE/A, PITCH BLOCK	1
6	CYLINDER, PITCH	2
7	VALVE/A, HYDRO-CONTROL DUAL AXIS	1
8	VALVE/A, HYDRO-CONTROL SNG AXIS	1
9	CYLINDER, STEERING	3
10	SUCTION FILTER, 10 MICRON ABS	1

TROUBLESHOOTING

Troubleshooting (Ride-On Hydraulic Trowel)		
Symptom	Possible Problem	Solution
Safety stop switch not functioning.	Other problems?	Consult engine manufacturer's manual.
	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 than 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

Troubleshooting (Ride-On Hydraulic Trowel) - continued		
Symptom	Possible Problem	Solution
Lights (optional) 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.
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.
	Spool stuck in solenoid valve?	Replace solenoid valve.

TROUBLESHOOTING

Troubleshooting (Engine)		
Symptom	Possible Problem	Solution
Engine will not start or start is delayed, although engine can be turned over.	No Fuel reaching injection pump?	Add fuel. Check entire fuel system.
	Defective fuel pump?	Replace fuel pump.
	Fuel filter clogged?	Replace fuel filter and clean tank.
	Faulty fuel supply line?	Replace or repair fuel line.
	Compression too low?	Check piston, cylinder and valves. Adjust or repair per engine repair manual.
	Fuel pump not working correctly?	Repair or replace fuel pump.
	Oil pressure too low?	Check engine oil pressure.
	Low starting temperature limit exceeded?	Comply with cold starting instructions and proper oil viscosity.
	Defective battery?	Charge or replace battery.
	Air or water mixed in fuel system?	Check carefully for loosened fuel line coupling, loose cap nut, etc.
At low temperatures engine will not start.	Engine oil too thick?	Refill engine crankcase with correct type of oil for winter environment.
	Defective battery?	Replace battery.
Engine fires but stops soon as starter is switched off.	Fuel filter blocked?	Replace fuel filter.
	Fuel supply blocked?	Check the entire fuel system.
	Defective fuel pump?	Replace fuel pump.
Engine stops by itself during normal operation.	Fuel tank empty?	Add fuel.
	Fuel filter blocked?	Replace fuel filter.
	Defective fuel pump?	Replace fuel pump.
	Mechanical oil pressure shutdown sensor stops the engine due to low oil?	Add oil. Replace low oil shutdown sensor if necessary.
Low engine power, output and speed.	Fuel tank empty?	Replace fuel filter.
	Fuel filter clogged?	Replace fuel filter.
	Fuel tank venting is inadequate?	Ensure that tank is adequately vented.
	Leaks at pipe unions?	Check threaded pipe unions tape and tighten unions as required.
	Speed control lever does not remain in selected position?	See engine manual for corrective action.
	Engine oil level too full?	Correct engine oil level.
	Injection pump wear?	Use No. 2-D diesel fuel only. Check the fuel injection pump element and delivery valve assembly and replace as necessary.

TROUBLESHOOTING

Troubleshooting (Engine) - continued		
Symptom	Possible Problem	Solution
Low engine power output and low speed, black exhaust smoke.	Air filter blocked?	Clean or replace air filter.
	Incorrect valve clearances?	Adjust valves per engine specification.
	Malfunction at injector?	See engine manual.
Engine overheats.	Too much oil in engine crankcase?	Drain off engine oil down to uppermark on dipstick.
	Entire cooling air system contaminated/ blocked?	Clean cooling air system and cooling fin areas.
	Fan belt broken or elongated?	Change belt or adjust belt tension.
	Coolant insufficient?	Replenish coolant.
	Radiator net or radiator fin clogged with dust?	Clean net or fin carefully.
	Fan, radiator, or radiator cap defective?	Replace defective part.
	Thermostat defective?	Check thermostat and replace if necessary.
Head gasket defective or water leakage?	Replace parts.	

OPERATION MANUAL

HERE'S HOW TO GET HELP

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

UNITED STATES

Multiquip Corporate Office

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

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

Service Department

800-421-1244
310-537-3700

Fax: 310-537-4259

Technical Assistance

800-478-1244

Fax: 310-943-2238

MQ Parts Department

800-427-1244
310-537-3700

Fax: 800-672-7877
Fax: 310-637-3284

Warranty Department

800-421-1244
310-537-3700

Fax: 310-943-2249

MEXICO

MQ Cipsa

Carr. Fed. Mexico-Puebla KM 126.5
Momoxpan, Cholula, Puebla 72760 Mexico
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Fax: (52) 222-285-0420

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