

OPERATION MANUAL



***WHITEMAN* SERIES**
MODEL HTN27KTCSL
MODEL HTN28KTCSL
RIDE-ON TROWEL
(KOHLER GASOLINE ENGINE)

Revision #2 (04/21/14)



THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

PN: 21565



CALIFORNIA — Proposition 65 Warning

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


Some examples of these chemicals are:

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

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

SILICOSIS/RESPIRATORY WARNINGS

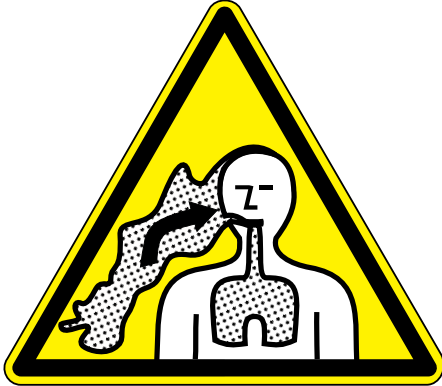
⚠ WARNING



SILICOSIS WARNING

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

⚠ WARNING



RESPIRATORY HAZARDS

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

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

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NOTICE

Specifications are subject to change without notice.

TRAINING CHECKLIST

Training Checklist			
No.	Description	OK?	Date
1	Read operation manual completely.		
2	Machine layout, location of components, checking of engine oil level.		
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	Radiator coolant level						
3	Condition of blades						
4	Blade pitch operation						
5	Safety stop switch operation						
6	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.



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 or 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 rope.

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. **Trailer tires should 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

NOTICE

- Dispose of hazardous waste properly. Examples of potentially hazardous waste are used motor oil, fuel and fuel filters. 
- **DO NOT** use food or plastic containers to dispose of hazardous waste.
- **DO NOT** pour waste, oil or fuel directly onto the ground, down a drain or into any water source.

SPECIFICATIONS/DIMENSIONS

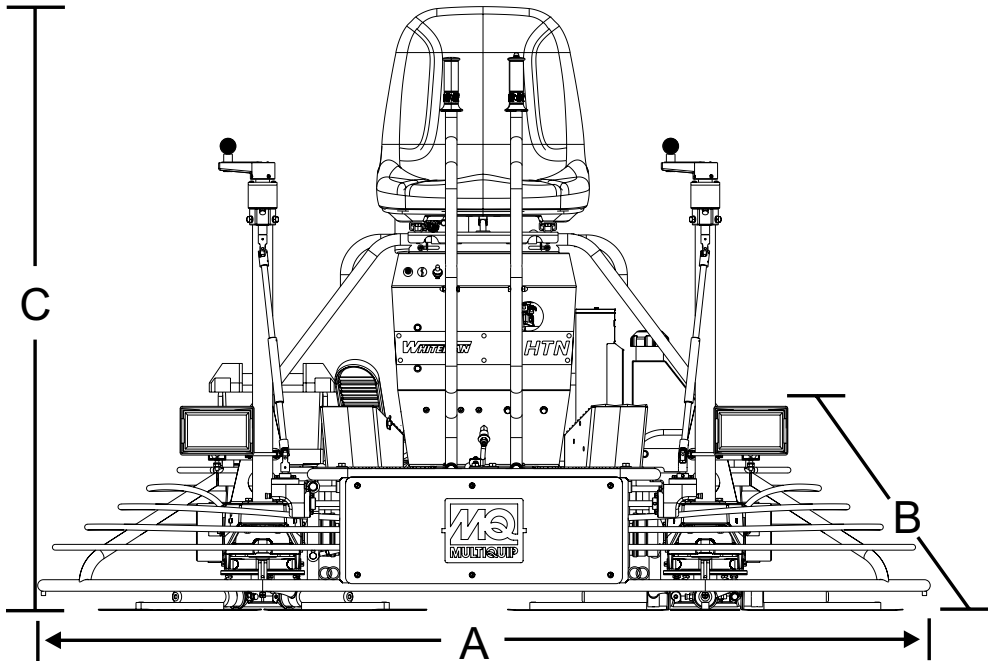


Figure 1. HTN27-28 Dimensions

Table 1. HTN27-28 Specifications		
Model	HTN27KTCSL	HTN28KTCSL
A–Length – in. (cm)	95.0 (241.3)	95.0 (241.3)
B–Width – in. (cm)	48.0 (122)	48.0 (122)
C–Height – in. (cm)	46.0 (116.8)	46.0 (116.8)
Weight – lbs. (kgs.) Operating	705 (320.5)	705 (320.5)
Weight – lbs. (kgs.) Shipping	1130 (513.6)	1130 (513.6)
Rotor – RPM (Dry Concrete)	150	150
Path Width – in. (cm)	91 (231)	91 (231)

SPECIFICATIONS (ENGINE)

Table 2. Noise and Vibration Emissions for Model HTN27KTCSL

Guaranteed ISO 11201:2010 Based Sound Pressure Level at Operator Station in dB(A)	92
Guaranteed ISO 3744:2010 Based Sound Power Level in dB(A)	116
Whole Body Vibration Per ISO 2631-1:1997 +A1:2010 in $m/s^2 \Sigma A(8)$	0.17

NOTES:

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

Table 3. HTN27-28 Engine Specifications

Model	HTN27KTCSL Kohler 25 HP Engine	HTN28KTCSL Kohler 25 HP EFI Engine
Type	4 Stroke, Overhead Valve V-Twin, gasoline engine.	4 Stroke, Overhead Valve V-Twin, EFI, gasoline engine.
Piston Displacement	44.0 cu.in. (725 cc)	44.0 cu.in. (725 cc)
Max. Output	25 bhp/3600 rpm (18.6 KW)	25 bhp/3600 rpm (18.3 KW)
Max. Torque	42.7 lbf-ft at 2200 rpm	42.7 lbf-ft at 2200 rpm
Cooling System	Forced Air	Forced Air
Engine Oil Capacity	1.75 qt. (1.6 liters) 2.1 qt. (1.9 liters w/oil filter replacement)	1.75 qt. (1.6 liters) 2.1 qt. (1.9 liters w/oil filter replacement)
Fuel Tank	5 gal.(19.23 liters)	5 gal.(19.23 liters)
Gear Box Oil Capacity	69 oz. (2.041 L) Multiquip p/n 20111 (Mobil SCH 634 ISO VG640)	69 oz. (2.041 L) Multiquip p/n 20111 (Mobil SCH 634 ISO VG640)
Fuel	Unleaded gasoline Octane rating of 86 or higher	Unleaded gasoline Octane rating of 86 or higher
Starting System	Electric Start/Transistorized Magneto	Electric Start/Transistorized Magneto
Spark Plug Type	See engine owner's manual	See engine owner's manual
Spark Plug Gap	See engine owner's manual	See engine owner's manual

GENERAL INFORMATION

POWER TROWEL FAMILIARIZATION

The HTN27/28 Series Ride-On Power Trowel is designed for the floating and finishing of concrete slabs.

Take a walk around your trowel. Take notice of all the major components (see Figure 2 and Figure 3) like the engine, blades, air cleaner, fuel system, fuel shut-off valve, ignition switch etc. Ensure engine and gearbox oil levels are within proper operating range.

Read all the safety information carefully. 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 levers. Grasp the control levers and move them around a bit. Observe how moving the control levers 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 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 an air-cooled 25HP carbureted or EFI Kohler gasoline engine. Refer to the engine owner's manual for specific instructions regarding engine operation. This manual is included with the trowel at the time of shipping. Please contact your nearest Multiquip Dealer if a replacement manual is required.

BLADES

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

COMPONENTS

NOTICE

Read, understand, and comply with all safety messages and operating instructions in this manual before attempting to operate the trowel.

1. **Seat** — Engine will neither start nor run unless operator is seated.
2. **Steering Control Levers** — Directs the unit forward, reverse, left, or right.
3. **Retardant Spray Control Button** — Sprays retardant through the nozzle at the front of the machine.
4. **Twin Pitch Control** — Both pitch towers are linked together. One crank may be turned to adjust the blade pitch simultaneously, or individually controlled for each set of blades. Turn the crank as marked on its top surface to increase or decrease blade pitch.
5. **Light Switch** — Turns on three halogen lights, two in front and one in rear.
6. **Ignition Switch** — With key inserted, turn clockwise to start engine.
7. **Hour Meter** — Indicates number of hours the engine has run.
8. **Choke Control Lever (HTN27 Only)** — In cold weather pull this lever to start engine. After engine warms, push knob all the way in.
9. **Fuel Gauge/Filler Cap** — Indicates the amount of fuel in the fuel tank. Remove this cap to add fuel.
10. **Fuel Tank** — Holds 5 gallons of unleaded gasoline.
11. **Left Foot Riser** — Operator foot rest pedal.
12. **Spray Nozzle** — Spray nozzle for retardant.
13. **Right 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.

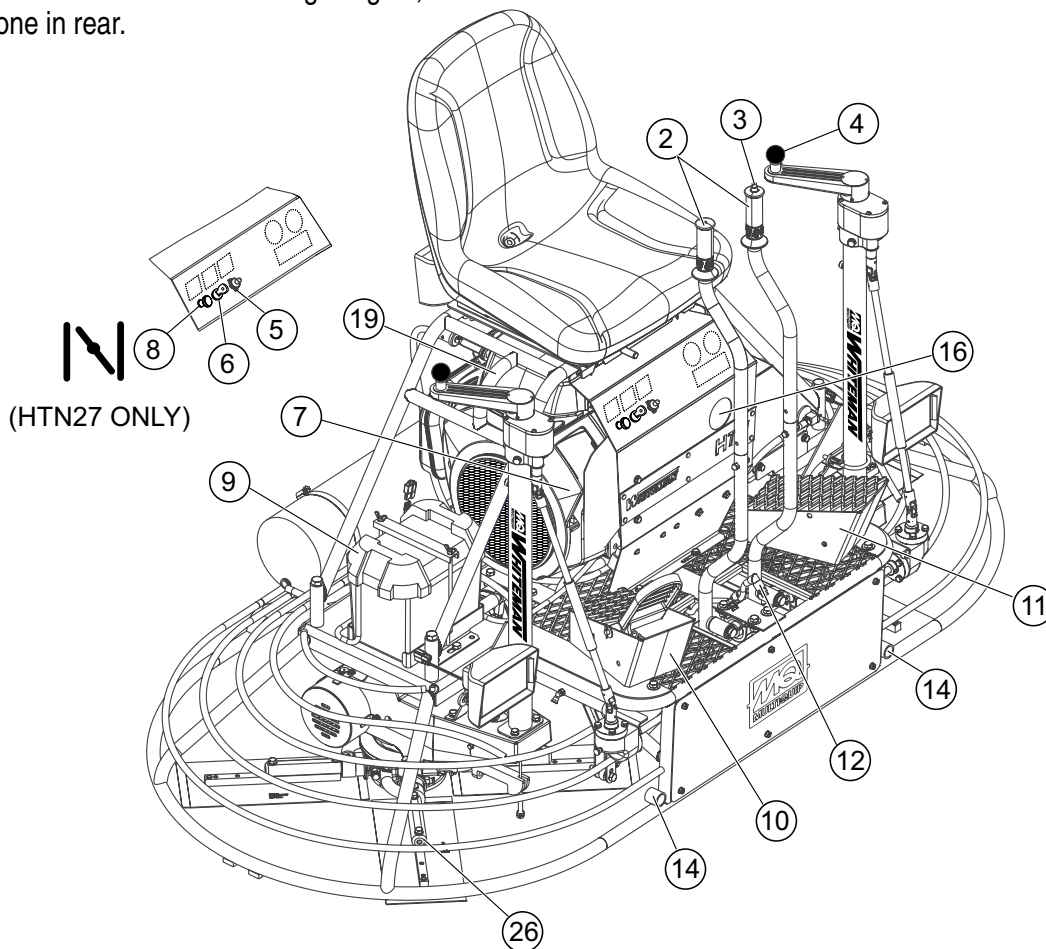


Figure 2. HTN27-28 Components (Front)

COMPONENTS

14. **EZ-Mover Boss** — Front attachment point for EZ Mover. Used to move the trowel.
15. **Dip Stick** — Access hole provided to check engine oil.
16. **Spark Plug** — Access the spark plug through this cutout.
17. **Safety Stop Switch** — Shuts down engine when seat is empty.
18. **Rear Light** — The HTN-SERIES Ride-On Power Trowel has three 12-volt halogen lights.
19. **Lift Loops** — Located on both sides of the main frame. Used to lift the trowel.
20. **Engine Air Filter** — Protects the engine from dirt.
21. **Oil Filter** — Filters the engine oil.
22. **Oil Drain** — Remove the plug from end of hose to drain the engine oil.
23. **Retardant Spray Tank** — Holds 5 gallons of retardant.
24. **Retardant Spray Pump** — Delivers retardant to the spray nozzle.
25. **EZ-Mover Boss** — Rear attachment point for EZ Mover. Used to transport the trowel.
26. **Spiders (Left/Right)** — Consist of trowel arms, blades, wear plate, and thrust collar.
27. **Document Box** — Contains all product documentation.
28. **Battery** — Provides +12V DC power to the electrical system.
29. **Belt Guard** — Encloses drive belt used in conjunction with clutch.
30. **Engine Oil Fill** — Remove this cap to add engine oil.

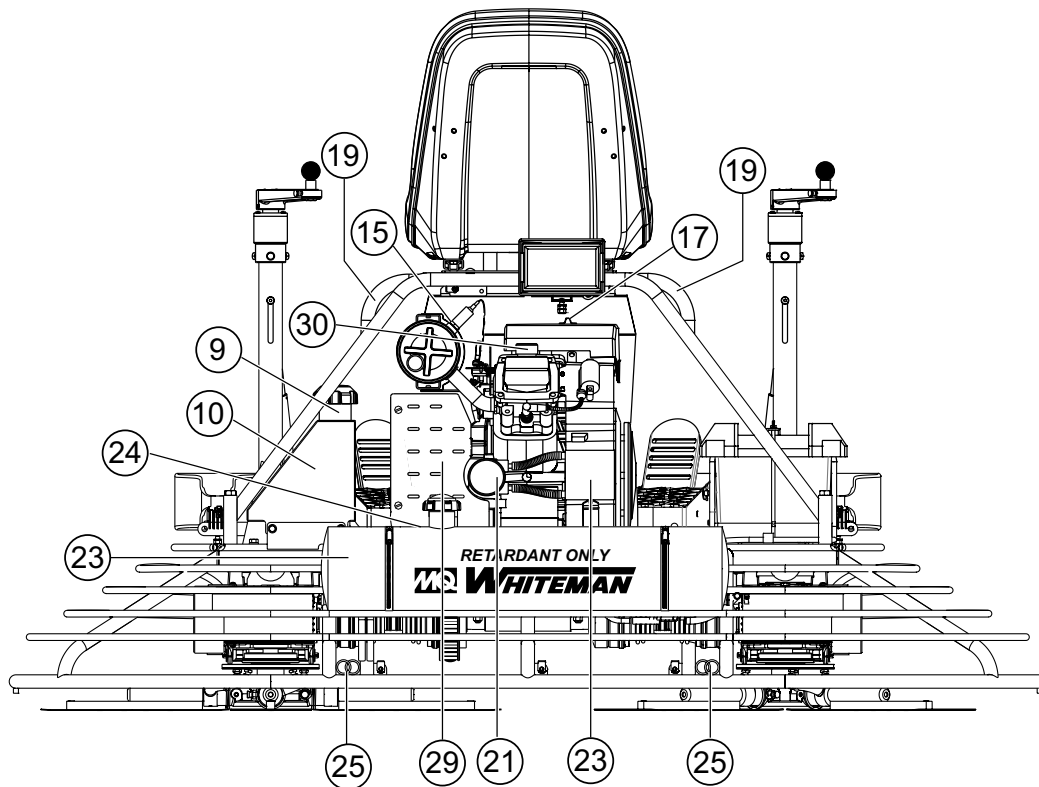


Figure 3. HTN27-28 Components (Rear)

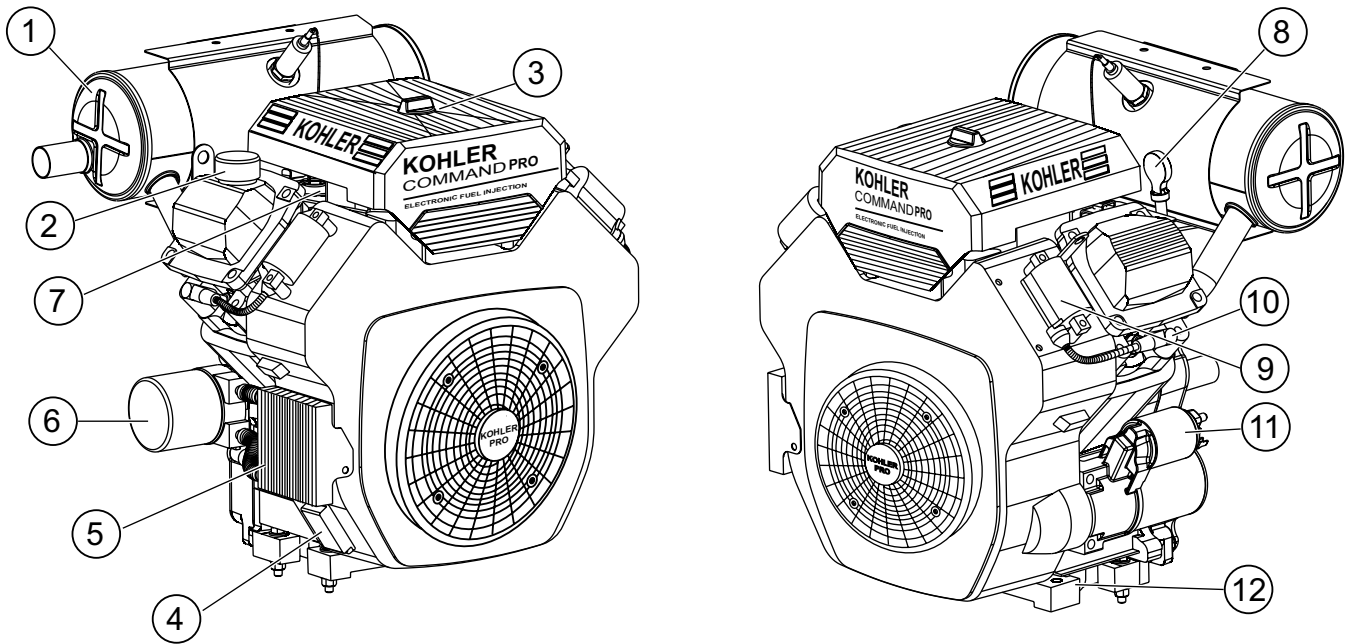


Figure 4. Engine Components

INITIAL SERVICING

The engine must be checked for proper lubrication and the fuel tank filled with fuel prior to operation. Refer to the manufacturer's engine manual for instructions and details of operation and servicing. The engines shown above are Kohler engines.

1. **Muffler** — Used to reduce noise and emissions.

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.

2. **Oil Filler Cap** — Remove to add engine oil.
3. **Air Filter** — Prevents dirt and other debris from entering the fuel system. Unsnap air filter cover to gain access to filter element.

4. **Oil Drain Hose** — Remove plug from end of hose to drain crankcase oil.
5. **Oil Cooler** — Helps keep engine oil cooler for longer engine life.
6. **Oil Filter** — Spin-on type, filters oil for contaminants.
7. **Throttle Lever** — Controlled by accelerator pedal, increases or decreases engine RPM.
8. **Oil Dip Stick** — Remove to check amount and condition of oil in crankcase.
9. **Ignition Coil** — Provides spark to the ignition system.
10. **Spark Plug** — Provides spark to the combustion chamber. See engine owner's manual for plug type and gap settings. Clean spark plug once a week.
11. **Starter** — Starts engine when ignition key is rotated to the **START** position.
12. **Side Oil Drain Plug (one of two)** — Remove to drain crankcase oil.

NEW MACHINE SETUP

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

NOTICE

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

Before packaging and shipping, this ride-on power trowel was run and tested at the factory. If there are problems, please let us know.

CONTROL HANDLE ASSEMBLY

The steering control handles are not attached to the trowel's two lower handles at the time of shipment. To attach the steering control handles to the lower handle assemblies, perform the following:

1. Remove the bolts from the plastic bag tied to the control towers.
2. Remove all protective wrapping and straps from the control handles.
3. Slip the top (loose) control handle piece into the base of the corresponding handle, making sure to line up the holes.
4. Install the bolt through the lined up holes and tighten the acorn nut onto the threaded end.

NOTICE

Models equipped with adjustable height handles are adjusted by placing the bolt through the set of holes that bring the handles to a height most comfortable for the operator.

5. Pay close attention to any wires that may be inside the control handles. **DO NOT** pinch or cut any wires during installation.
6. Remove the two knobs from the plastic bag for the pitch control tower cranks and install the knobs onto the tower crank levers.

SEAT ASSEMBLY

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

NOTICE

HTN-Series 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.

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. 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 manufacturer's instructions.

CAUTION

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

To install the battery on the trowel, make sure that the battery is well seated in the battery box. 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. See 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.

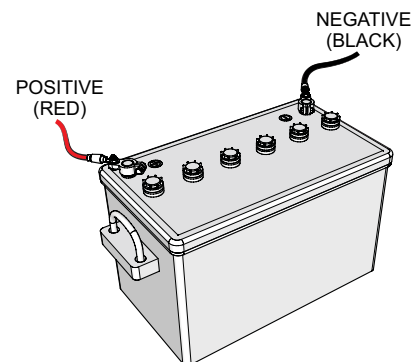


Figure 5. Battery Cable Orientation

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

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

CAUTION

Failure to understand the operation of the HTN27-28 trowel could result in severe damage to the machine or personal injury.

See Figure 2 and Figure 3 for the location of any control or indicator referenced in this manual.

ENGINE OIL LEVEL

ALWAYS check engine oil before each use.

1. Pull the engine oil dipstick (Figure 4) from its holder.
2. Determine if engine oil is low (Figure 6).

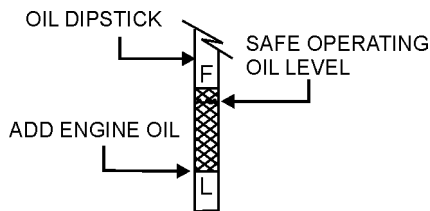


Figure 6. Engine Oil Dipstick

NOTICE

To prevent extensive engine wear or damage, always maintain the proper oil level in the crankcase. Never operate the engine with the oil level below the "L" mark or over the "F" mark on the dipstick.

Table 4. Recommended Viscosity Grades

5W-20, 5W-30		10W-30, 10W-40							
°F	-20	0	20	32	40	60	80	100	
°C	-30	-20	-10	0	10	20	30	40	

TEMPERATURE RANGE EXPECTED BEFORE NEXT OIL CHANGE

GEARBOX OIL LEVEL

1. Check the gearbox oil level in both gearboxes by removing the level plug and ensuring that the oil is at the correct level. See Figure 7
2. Fill the gear box just to the level of the fill plug (Figure 7) with 69 oz. (2.041 L) of Multiquip gearbox lubricant, P/N 20111, ISO or equivalent.

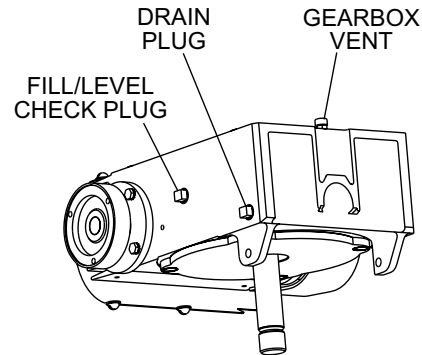


Figure 7. Gearbox Oil Plugs/Sight Glass

FUEL

Determine if the engine fuel is low (Figure 8). If fuel level is low, remove the fuel filler cap and fill with unleaded gasoline.

DANGER

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. **DO NOT** attempt to start the engine until the fuel residue has been completely wiped up and the area surrounding the engine is dry.

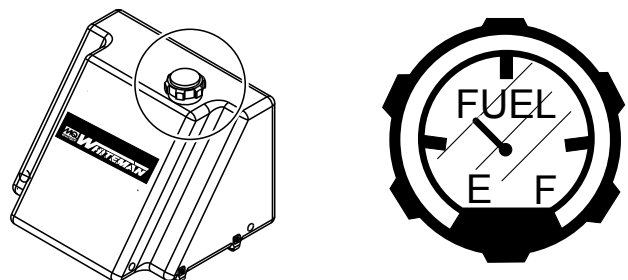


Figure 8. Fuel Gauge

STARTING THE ENGINE

1. Place one foot on the trowel's platform, grab a hold of any part of the frame, lift yourself onto the trowel, then sit down in the operator's seat.

NOTICE

The HTN27-28 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

Using the safety stop switch to stop the engine after every use will verify that the switch is working properly. Remember to turn the key to the "OFF" position after stopping the machine. Not doing so may drain the battery.

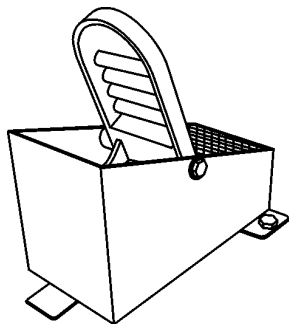
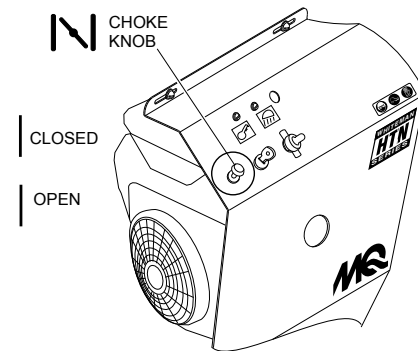


Figure 9. Blade Speed Control Foot Pedal

2. The right foot pedal (Figure 9) controls blade and engine 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.
3. When starting a cold engine, pull the choke knob, if so equipped, (Figure 10) out to the closed position. In warm weather or when the engine is warm, the unit can be started with choke halfway or completely open (27 HP engine).



**Figure 10. Choke Knob
(Kohler 25 HP Carbureted Only)**

4. Keep your foot OFF the right foot pedal. Start the engine at idle (without touching the foot pedal).
5. Insert the ignition key into the ignition switch.
6. Turn the ignition key (Figure 11) clockwise and listen for the engine to start. Once the engine starts, release ignition key.
7. If the engine fails to start in this manner, consult the engine owner's manual supplied with the trowel.
8. Test the safety stop switch by standing up briefly. The switch under the seat should cause the engine to stop. If the switch fails to shut down the engine, turn off the engine with the key switch and repair the safety stop switch. See Troubleshooting for possible causes.

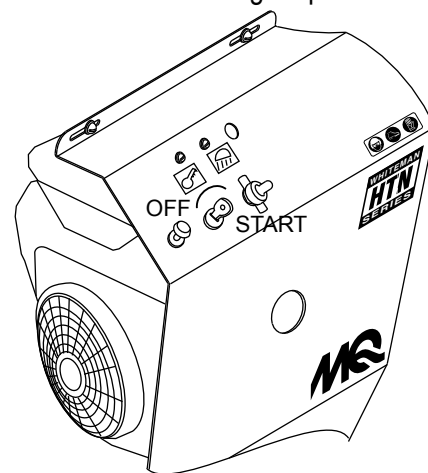


Figure 11. Ignition Key

9. Let the engine idle for 3-5 minutes. If choke is applied, push the choke to the open position as soon as the

engine will run smoothly.

STEERING

Two control levers located in front of the operator's seat provide directional control for the trowel. Table 5 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 levers are from the operator's seat position.

1. Push both the left and right control levers forward. See Figure 12.

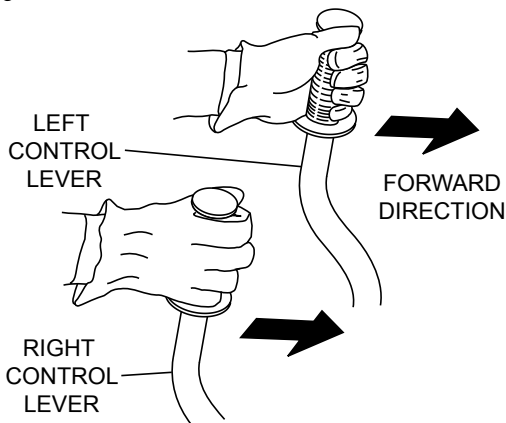


Figure 12. Left and Right Control Levers

2. 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.
3. Practice holding the machine in one place as you increase blade speed. When about 75% of maximum blade speed has been reached, the blade will be moving at proper finishing speed. The machine may be

difficult to keep in one place. Trying to keep the ride-on trowel stationary is a good practice for operation.

4. Practice maneuvering the ride-on trowel using the information listed in Table 5. Try to practice controlled motions as if you were finishing a slab of concrete. Practice edging and covering a large area.
5. Try adjusting the pitch of the blades. This can be done with the 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.
6. Push both the left and right joysticks backward and repeat steps 2 through 5 while substituting the word reverse for forward.

Table 5. Control Lever Directional Positioning


Control Lever	Direction	Results
Left	Move Control Lever Forward	Causes the ride-on trowel to move forward and to the right.
Left	Move Control Lever Backward	Causes the ride-on trowel to move backward and to the left.
Right	Move Control Lever Forward	Causes the ride-on trowel to move forward and to the left.
Right	Move Control Lever Backward	Causes the ride-on trowel to move backward and to the right.
Left and Right	Move Both Control Levers Forward	Causes the ride-on trowel to move forward in a straight line.
Left and Right	Move Both Control Levers Backward	Causes the ride-on trowel to move backward in a straight line.
Left and Right	Move Both Control Levers to the Right	Causes the ride-on trowel to move to the right.
Left and Right	Move Both Control Levers to the Left	Causes the ride-on trowel to move to the left


CAUTION


Trowel arms can be damaged by rough handling or by striking exposed plumbing or forms while in operation. **ALWAYS** look out for objects which might cause damage to the trowel arms.

When performing any maintenance on the trowel or engine, follow all safety messages at the beginning of this manual.

WARNING

 Accidental starts can cause severe injury or death. **ALWAYS** place the **ON/OFF** switch in the **OFF** position before performing maintenance.

 Disconnect negative battery cable from battery before servicing.

 **ALWAYS** allow the engine to cool before servicing. **NEVER** attempt any maintenance work on a hot (muffler, radiator, etc.) trowel.

MAINTENANCE SCHEDULE

Check and retighten all fasteners as necessary.

Daily (8-10 Hours)

1. Check the fluid levels in the engine and gearboxes, fill as necessary.

Weekly (30-40 Hours)

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

Monthly (100-125 Hours)

1. Remove, clean, reinstall and relube the arms and thrust collar. Adjust the blade arms.
2. Replace gearbox lubricant after the first 100 hours of operation. Replace every 500-600 hours thereafter.
3. Check drive belt for excessive wear. Refer to following section on Drive Belt maintenance.

Yearly (500-600 Hours)

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

AIR CLEANER (DAILY)

The Kohler 25 HP carbureted and EFI engines are equipped with a replaceable, high-density paper air cleaner element. Most are also equipped with an oiled-foam precleaner which surrounds the paper element.

Check the air cleaner daily or before starting the engine. Check for and correct heavy buildup of dirt and debris along with loose or damaged components.

NOTICE

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

PRECLEANER SERVICE

If so equipped, wash and re-oil the precleaner every 25 hours of operation (more often under extremely dusty or dirty conditions).

To service the precleaner perform the following steps and refer to Figure 13:

1. Release the latches located on either side of the air cleaner cover (Figure 13), and remove the cover.
2. Remove the foam precleaner from the paper air cleaner element.
3. Wash the precleaner in warm water with detergent. Rinse the precleaner thoroughly until all traces of detergent are eliminated. Squeeze out excess water (do not wring). Allow the precleaner to air dry.
4. Saturate the precleaner with new engine oil. Squeeze out all excess oil.
5. Reinstall the precleaner over the paper air cleaner element.
6. Reinstall the air cleaner cover and secure the latches.

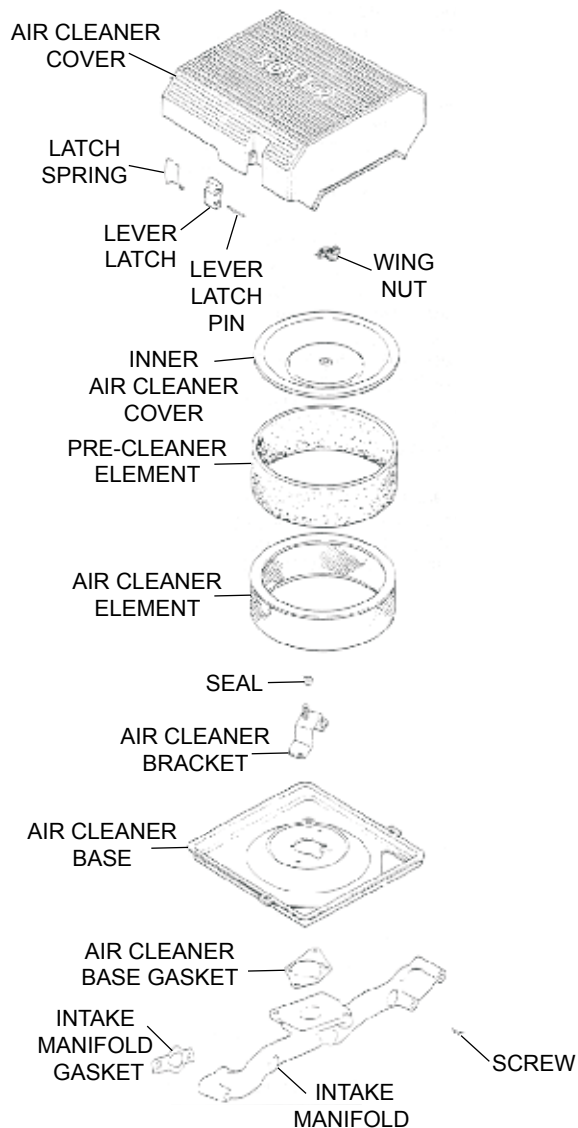


Figure 13. Air Cleaner Components

PAPER ELEMENT SERVICE (STANDARD TYPE)

Check the paper element every 100 hours of operation (more often under extremely dusty or dirty conditions). Replace the element as necessary.

Refer to the following steps and to Figure 13:

1. Release the latches located on either side of the air cleaner cover (Figure 13), and remove the cover.
2. Remove the wing nut, element cover, seal and air cleaner element.
3. Remove the precleaner (if so equipped) from the paper element.
4. Do not wash the paper element or use pressurized air, as this will damage the element. Replace a dirty, bent, or damaged element with a new element as prescribed by the engine manufacturer. Handle new elements carefully; do not use if the sealing surfaces are bent or damaged.
5. Reinstall the seal, paper element, precleaner, element cover, flat washer and wing nut.
6. Reinstall the air cleaner cover and secure the latches.

NOTICE

Make sure the correct depth air cleaner element and rubber seal are used for the engine specification involved.

Air Cleaner - Components to Check

Whenever the air cleaner cover is removed, or the paper element or precleaner is serviced, check the following:

- **Air Cleaner Element Cover and Seal** — Make sure the element cover is not bent or damaged. Make sure the wing nut, washer and seal are in place to ensure the element is sealed against leakage.
- **Air Cleaner Base** — Make sure the base is secured tightly to carburetor and not cracked or damaged.
- **Breather Tube** — Make sure the tube is installed to both the air cleaner base and the breather cover.

Disassembly and Reassembly (Standard Type)

If the base plate on the standard type must be removed, proceed as follows:

1. Remove the air cleaner components as described previously.
2. Remove the hex flange screws securing the bracket and base.
3. Remove the base and gasket. Carefully pull the rubber breather tube through the base.
4. Remove the tube from under side of base if necessary.
5. Reverse the foregoing steps to reinstall new or service components. Tighten screw to 9.9 N-m (88 in. lb.) torque.

Air Intake/Cooling System

To ensure proper cooling, make sure the grass screen and fan cooling fins and other external surfaces of the engine are kept clean at all times.

Every 100 hours of operation (more often under extremely dusty or dirty conditions):

1. Remove the blower housing and other cooling shrouds.
2. Clean the cooling fins and external surfaces as necessary.
3. Make sure the cooling shrouds are reinstalled.

CAUTION

Operating the engine with a blocked grass screen, dirty or plugged cooling fins, and/or cooling shrouds removed, will cause engine damage due to overheating.

CHANGING ENGINE OIL AND FILTER

1. Change the engine oil after the first 5 hours of use, then change every 6 months or 100 hours.
2. Remove the oil filler cap and fill engine crankcase with recommended type oil as listed in Table 4. Fill to the upper limit of dipstick.
3. Crankcase oil capacity with oil filter replacement is 2.02 quarts (1.90 liters).

Oil Filter (100 Hours)

1. Replace the engine oil filter (Figure 14) every oil change or 100 hours.

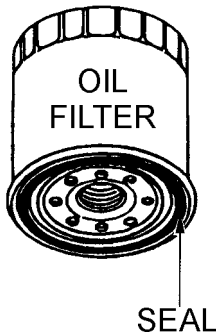


Figure 14. Oil Filter

2. Be sure to coat the seal of the new oil filter with clean engine oil.

Fuel Filter (200 Hours)

- Replace the engine fuel filter (Figure 15) every 200 hours.

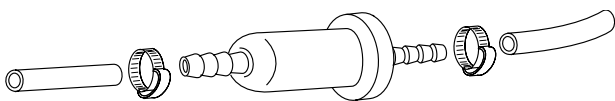


Figure 15. Fuel Filter (Typical)

Oil and Fuel Lines

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

LONG TERM STORAGE

- Remove the battery.
- Drain fuel from fuel tank, fuel line and carburetor.
- Remove spark plug and pour a few drops of motor oil into cylinder. Crank engine 3 to 4 times so that oil reaches all internal parts.
- Clean exterior with a cloth soaked in clean oil.
- Store unit covered with plastic sheet in moisture-free 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, checking and gapping the spark plugs, etc.

NOTICE

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

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

Disconnect spark plug wires and battery cables before attempting any service or maintenance on the ride-on trowel.

MAINTENANCE (OLD STYLE CLUTCH)

NOTICE

This section is intended to aid users in the maintenance of drive assemblies with an old style Comet clutch.

CHECKING THE DRIVE BELT

The drive belt needs to be replaced as soon as it starts to show signs of wear. Indications of excessive belt wear are fraying, squealing when in use, belts that emit smoke or a burning rubber smell when in use.

Under normal operating conditions, a drive belt may last approximately 150 hours. If your trowel is not reaching this kind of life span for drive belt wear, check the drive belt for proper pulley alignment and spacing.

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

WARNING



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

WARNING



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

REMOVING THE DRIVE BELT

- Leave the existing drive belt intact until instructed to cut it.
- Leave the engine in place for this procedure. It is not necessary to slide the engine to replace the drive belt.
- Have a 3/4 x 1 x 3-1/4 inch wooden block available.

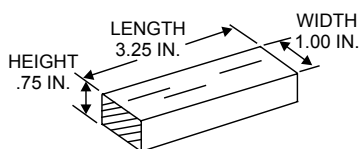


Figure 16. Wooden Block for Spacer

1. Remove Drive Belt Cover (see Figure 17).

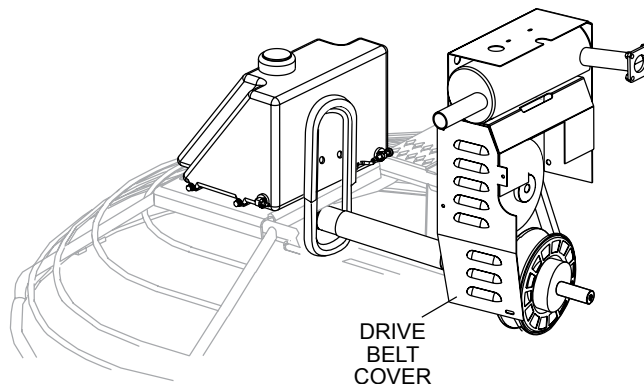


Figure 17. Drive Belt Cover

2. Squeeze the drive belt as shown in Figure 18, and pull the belt upwards. This will spread open the faces of the lower drive pulley.

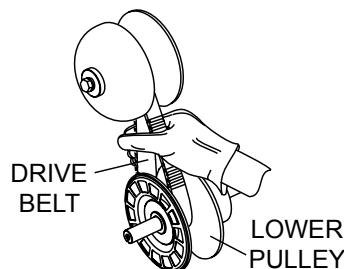


Figure 18. Expanding Lower Drive Pulley

3. Insert the wooden block (Figure 16) between the moveable face and the fixed face of the lower drive pulley. See Figure 19. This block will help keep the lower drive pulley faces open while installing the new drive belt.

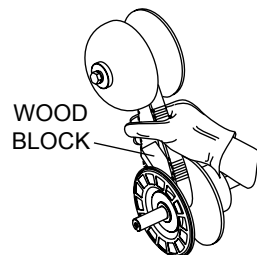


Figure 19. Wood Block

4. If the belt is not being reused (recommended), cut the drive belt. Ensure all belt remnants are removed from the pulleys.

MAINTENANCE (OLD STYLE CLUTCH)

INSTALLING REPLACEMENT DRIVE BELT

The trowel is equipped with a replacement drive belt (spare) carrier, which is mounted on the inboard side of the fuel tank near the clutch. Make sure that there is **ALWAYS** a spare drive belt in the drive belt carrier before the trowel is placed on a slab to finish concrete.

In the event of a drive belt failure, the spare (replacement) drive belt can be used for quick replacement at the job site to continue trowel operation.

1. Ensure all remnants of old belt have been removed from pulleys.
2. To replace the drive belt with the spare drive belt, remove the 2 bolts that secure the spare belt holder (Figure 20). This will allow free movement of the belt for installation. Take care with to not contaminate the replacement belt with grease or dirt.

3. With the wood block holding the lower pulley open, place the replacement belt into the lower pulley first. Work the belt over the upper drive pulley into the pulley groove.
4. Squeeze the belt enough to remove the wood block. With the block removed, release the tension on the belt.
5. Reinstall the spare belt holder and the drive belt guard.
6. Replace the spare belt before the next trowel use.

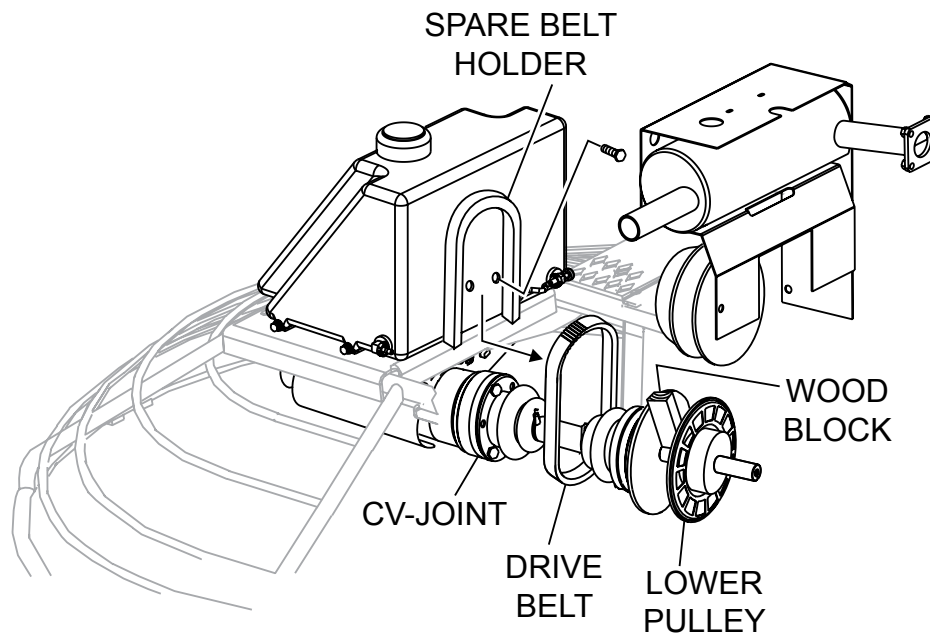


Figure 20. Installing Drive Belt

MAINTENANCE (OLD STYLE CLUTCH)

SPARE DRIVE BELT REPLACEMENT

To replace a spare drive belt, be prepared to disconnect the CV-joint from the left-side gearbox. See Figure 21.

1. Place the trowel on suitable supports and observe all safety precautions.
2. Remove the three screws that secure the CV-joint to the left-side gearbox coupler.
3. Once the CV-joint has been separated from the left-side gearbox, push the CV-joint inward so that a gap exists between the gearbox and the CV-joint. Slide
4. Place the spare drive belt inside the spare belt holder, and secure the spare belt holder to the inboard side of the left gearbox.
5. Install the three screws that secure the CV-joint to the left-side gearbox coupler.

the spare V-belt between the gearbox coupler and the CV-joint. Avoid contaminating the replacement belt with grease or oil when sliding it between the CV-Joint and gearbox coupler.

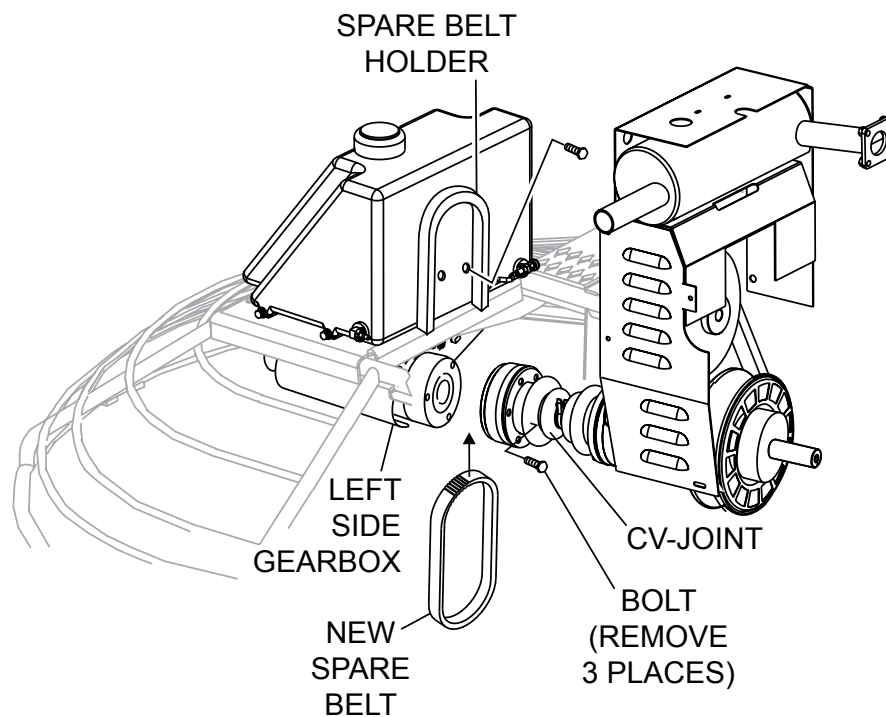


Figure 21. Spare Belt Replacement

MAINTENANCE (OLD STYLE CLUTCH)

TORQUE CONVERTER

The HTN27-28 trowel is equipped with a Torque Converter which supplies torque to both the left and right gear boxes.

The function of the a torque converter is to automatically deliver the correct amount of torque required by the trowel under all load conditions. This enables the trowel to deliver the necessary torque for float pan applications and the high rotor speeds required for burnishing concrete.

The torque converter is of the variable pitch pulley type, (Figure 22) connected by a drive belt.

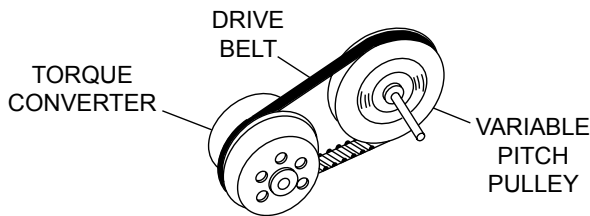


Figure 22. Torque Converter/Variable Pitch Pulley

DRIVE PULLEY

The drive pulley uses centrifugal force (Figure 23 and Figure 24) to create a belt squeeze force transmitted at the pulley faces. This condition functions as an automatic clutch.

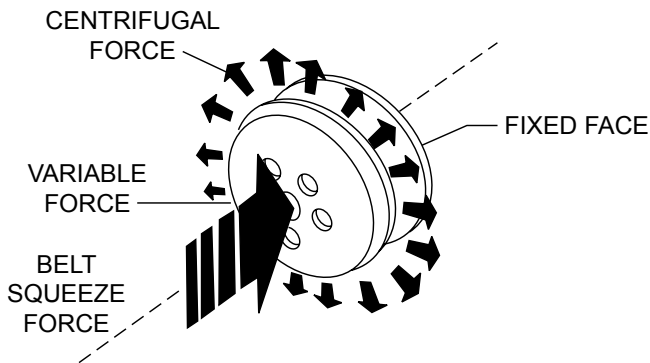


Figure 23. Torque Converter (Centrifugal Force)

As shown in Figure 23, centrifugal force pushes the roller arms (Figure 24) against the ramp plate, forcing the moveable face toward the fixed face and squeezing the belt

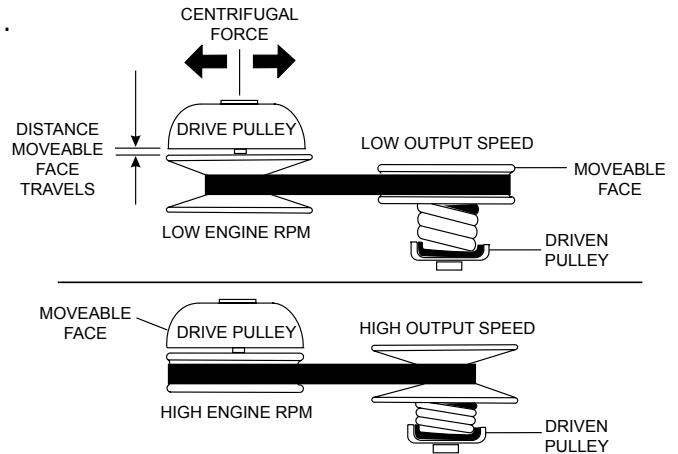


Figure 24. Pulley Interaction

The "Variable Pitch Pulleys" have one fixed face, and one moveable face. The drive pulley (Figure 25) moveable face is controlled by roller weight arms and springs, which change position according to engine speed. The driven pulley moveable face is controlled by a spring and belt tension.

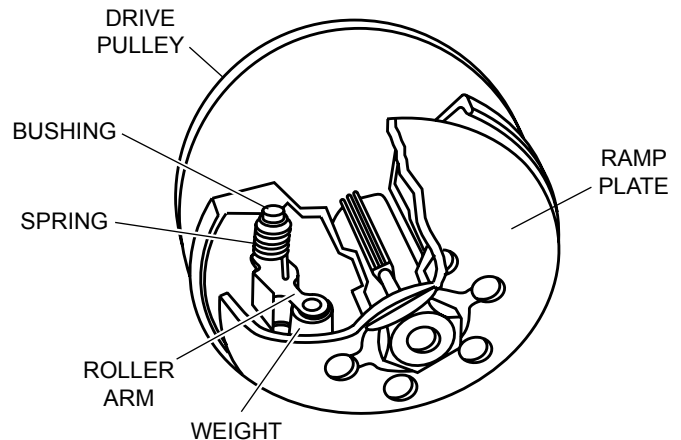


Figure 25. Variable Pitch Pulley

MAINTENANCE (OLD STYLE CLUTCH)

HOW IT WORKS

Refer to Figure 26.

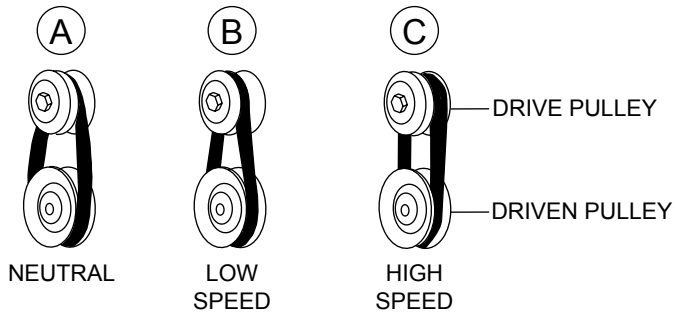


Figure 26. Pulley Conditions

Condition A:

- Engine: Idling
- Drive Pulley: Small
- Belt: Loose and Stationary

Condition B:

- Engine: Accelerating
- Drive Pulley: Small But Increasing
- Driven Pulley: Large But Decreasing
- Belt: Approaching Tightness

Condition C:

- Engine: At High Speed
- Drive Pulley: Large
- Driven Pulley: Small
- Belt: Tight

CLUTCH

This clutch system provides a high pulley ratio (a low gear- so to speak) to start out and a low pulley ratio (a high gear- so to speak) for a high speed operation, with infinite variation between the two.

This means that it will not be necessary to give full throttle in order to “break the blades/pans loose”. The machine can slowly be brought up to speed.

The torque-sensitive pulley (Figure 27) utilizes a spring and cam bracket. Peak performance results from proper interaction between the driven pulley spring and the ramp angle of the cam bracket.

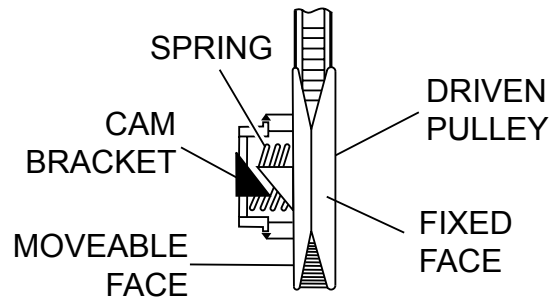


Figure 27. Pulley Spring and Cam Bracket

MAINTENANCE (NEW STYLE CLUTCH)

NOTICE

This section is intended to aid users in the maintenance of drive assemblies with a new CVT Multi-clutch.

CHECKING THE DRIVE BELT

The drive belt needs to be replaced as soon as it starts to show signs of wear. **NEVER** use a defective drive 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.

Under normal operating conditions, a drive belt may last approximately 150 hours. If your trowel is not reaching this kind of life span for drive belt wear, check the drive belt for proper pulley alignment and spacing.

To gain access to the drive belt, remove the drive belt guard cover (Figure 28), then visually inspect the drive belt for signs of damage or excessive wear. If the drive belt is worn or damaged, replace the drive belt.

BELT GUARD REMOVAL

1. To gain access to the drive belt, remove Drive Belt Guard (Figure 28).

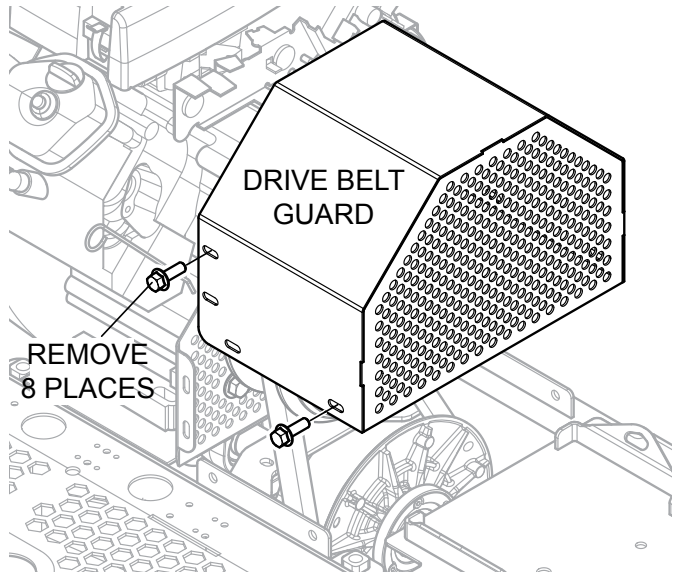


Figure 28. Drive Belt Guard Removal

WARNING



DO NOT attempt to insert hands or tools into the belt area while the engine is running. **NEVER** run the engine with the safety guards removed. Keep fingers, hands, hair and clothing away from all moving parts to prevent bodily injury.

WARNING



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

MAINTENANCE (NEW STYLE CLUTCH)

SPARE DRIVE BELT REMOVAL (USING REPLACEMENT DRIVE BELT)

The trowel is equipped with a replacement drive belt (spare) holder, which is mounted on the inboard side of the left-side gearbox. Make sure that there is **ALWAYS** a spare drive belt in the drive belt holder before the trowel is placed on a slab to finish concrete.

In the event of a drive belt failure, the spare (replacement) drive belt can be used for quick replacement at the job site for continued trowel operation.

1. To replace an existing drive belt with the spare drive belt, remove the 2 bolts that secure the spare belt holder to the left-side gearbox bracket. (Figure 29) Take care not to contaminate the replacement drive belt with grease or dirt.

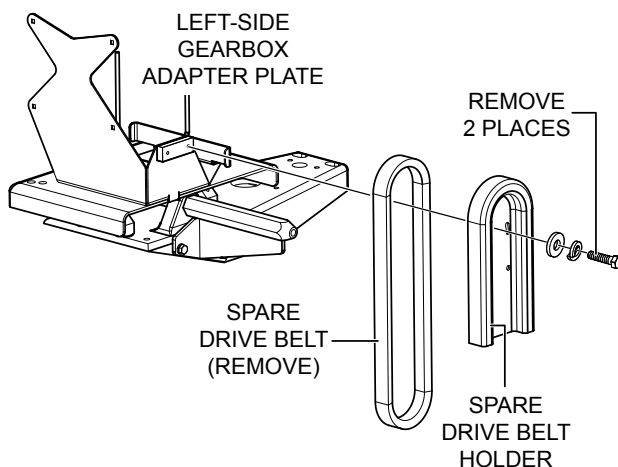


Figure 29. Spare Belt Removal

2. Remove existing drive belt from clutch and lower drive pulley, by cutting belt.
3. Ensure all remnants of old drive belt have been removed from the sheaves/grooves of the clutch and lower pulley
4. Slide spare drive belt over the CV-joint (Figure 30) and onto the lower drive pulley.

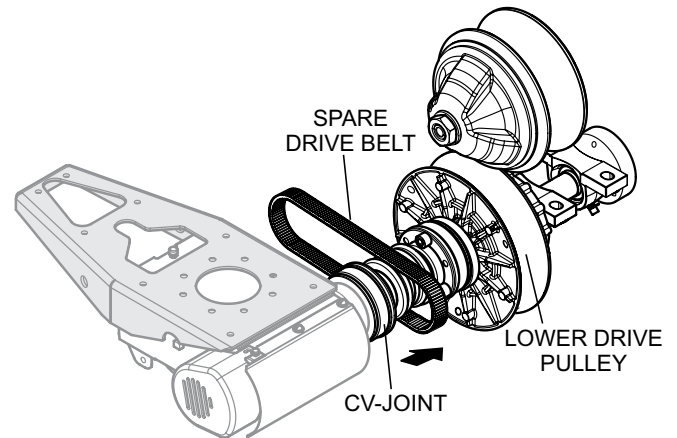
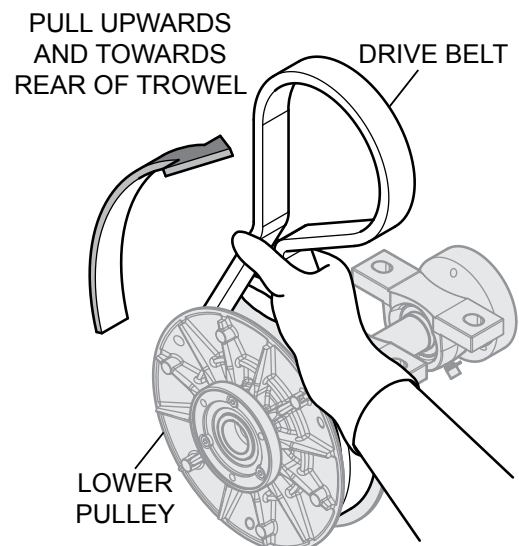


Figure 30. Spare Drive Belt Routing

5. Next, squeeze the drive belt (Figure 31) and pull upwards and towards the rear of the trowel. This will spread open the faces of the lower drive pulley.



**Figure 31. Spare Drive Belt Placement
(Lower Pulley)**

MAINTENANCE (NEW STYLE CLUTCH)

- Place spare drive belt onto clutch as shown in Figure 32.

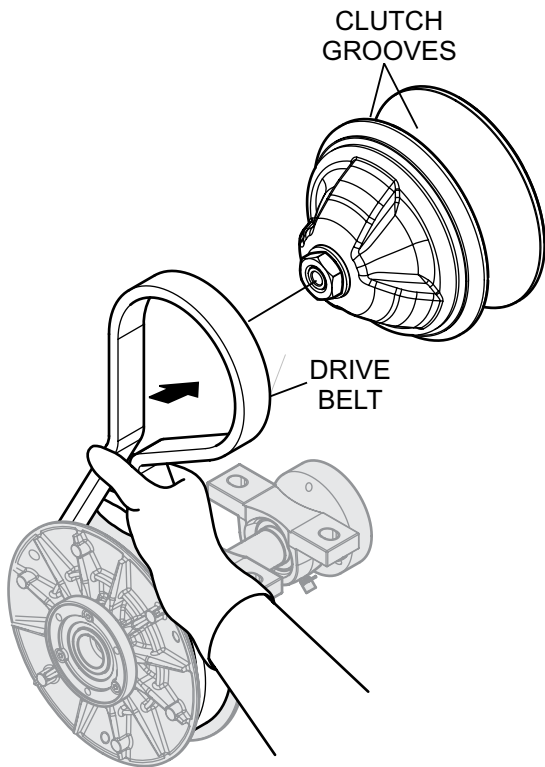


Figure 32. Spare Drive Belt Placement (Clutch)

- Reinstall belt guard assembly.

STARTING THE TROWEL/TESTING

- While sitting in the operator's position, start the trowel. Be sure to check the engine oil level prior to starting the engine.

CAUTION

The engine's exhaust contains harmful emissions. **ALWAYS** have adequate ventilation when operating. Direct exhaust away from nearby personnel.

- Run machine, bringing throttle up so clutch engages. Cycle the engine from idle to full throttle twice, and shut off engine. Remove key.

SPARE DRIVE BELT INSTALLATION

CV-joint Assembly Removal (left-side)

- If necessary, place the trowel on suitable supports (jackstands) and observe all safety precautions.
- Starting at the left-side gearbox, use a 1/4" allen wrench and remove the 3 bolts and lock washers that

secure the CV-joint (Figure 33) to the left-side gearbox. Retain mounting hardware for later use.

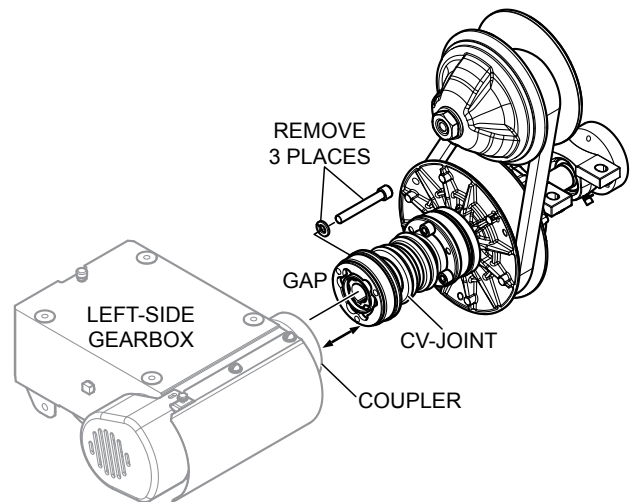


Figure 33. CV-Joint Removal

- Once the CV-joint has been separated from the left-side gearbox coupler, push the CV-joint inward so that a gap (Figure 33) exists between the gearbox coupler and CV-joint.
- Slide new spare drive belt between gearbox coupler and CV-joint.

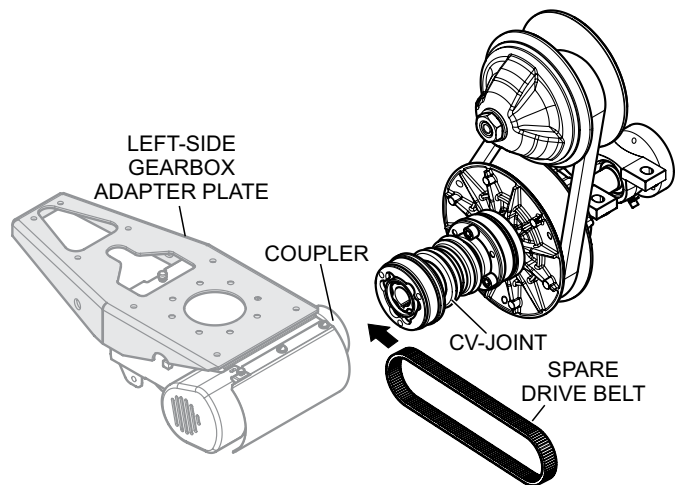


Figure 34. Spare Drive Belt Routing

- Mount new spare drive belt and cover (Figure 34) onto left-side gearbox. Reinstall the 2 bolts that secure the spare belt holder to the left-side gearbox adapter plate.

MAINTENANCE (NEW STYLE CLUTCH)

CV-JOINT ASSEMBLY INSTALLATION (LEFT-SIDE)

1. Apply a thin coat of RVT silicone to mating surfaces of the CV-joint (Figure 35) and left-side gearbox coupler.

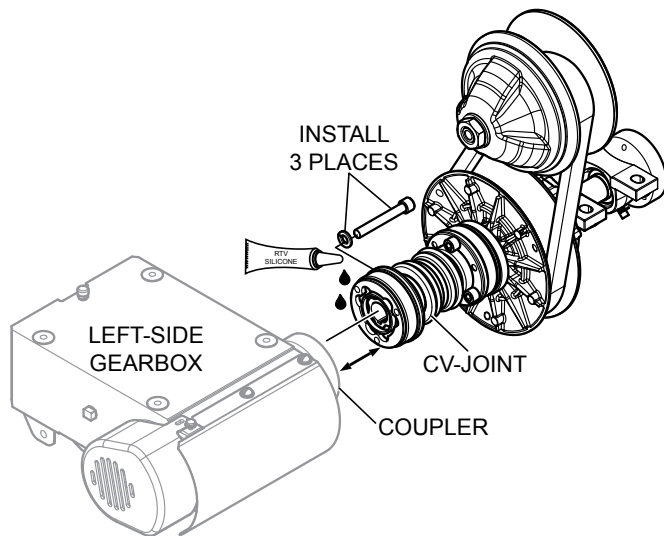


Figure 35. CV-Joint Installation

2. Using a 1/4" allen wrench install the 3 bolts and lock washers that secure the CV-joint (Figure 35) to the left-side gearbox.

HOW IT WORKS

A **continuously variable transmission** (CVT) system consists of two variable clutches connected together via a V-belt. Each clutch has two tapered sides (sheaves) that keep the belt centered. One sheave is fixed to the shaft and does not move while the other one moves in and out, forcing the belt to a higher or lower position on the clutch sheaves.

As the engine RPM's increase, the primary clutch (drive clutch) closes, forcing the belt to ride outwards on the drive sheaves. The closing of the drive clutch also forces the belt to open the driven or secondary sheaves. The opening and closing of these sheaves creates a ratio variation, hence CVT or **continuously variable transmission**.

Primary Clutch (Drive Clutch)

The primary clutch more commonly known as the **drive clutch** is mounted to the output shaft of the engine. This clutch responds to two different forces, centrifugal force from the engine spinning the clutch as well as resistance that the belt transfers from the secondary clutch.

Secondary Clutch (Driven Clutch)

The secondary clutch more commonly known as the **driven clutch** is mounted to the input shaft of the transmission and is connected to the primary clutch via a V-belt.

This clutch responds to two different forces, the force that the belt puts on it from the drive clutch, and the force that the shaft puts on it from the transmission.

The driven clutch is much larger in diameter than the drive clutch and the belt wraps around the outside of the two sheaves, again one being fixed and the other being moveable.

When the drive clutch begins to shift, it forces the belt higher in the drive clutch. This causes the belt to get tighter and tries to pull the belt into the driven clutch, forcing the two sheaves apart causing the clutch to shift.

BLADE PITCH

Matching Blade Pitch for Both Sets of Blades

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

Single Pitch™

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

Twin Pitch™

Trowels equipped with Twin Pitch™ controls may need to have blade pitch between the two sets of blades “synchronized”. If the blades need to be synchronized, perform the following procedure. Refer to Figure 36.

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

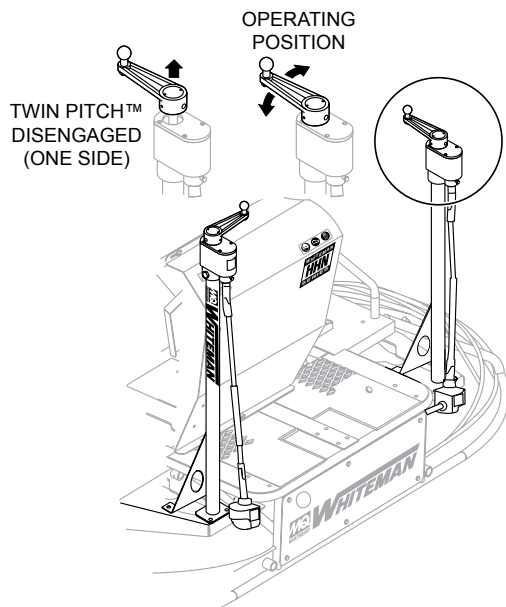


Figure 36. Pitch Towers

TROWEL ARM ADJUSTMENT

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

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

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

1. Place the trowel in a flat, level area.

NOTICE

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

2. Pitch the blades as flat as possible. The adjustment bolts should all barely make contact with the lower wear plate on the spider. If one is not making contact, adjustment will be necessary (Figure 37).

Figure 37 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.

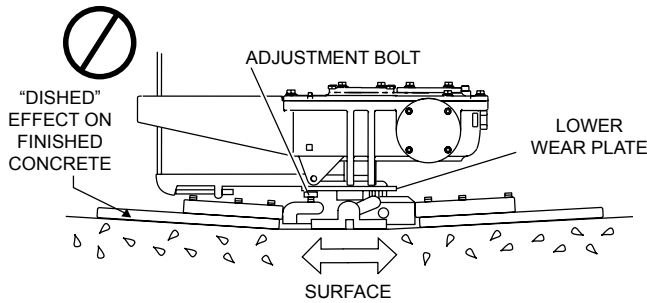


Figure 37. Incorrect Spider Plate Alignment

Figure 38 illustrates the “correct alignment” for a spider plate (as shipped from the factory).

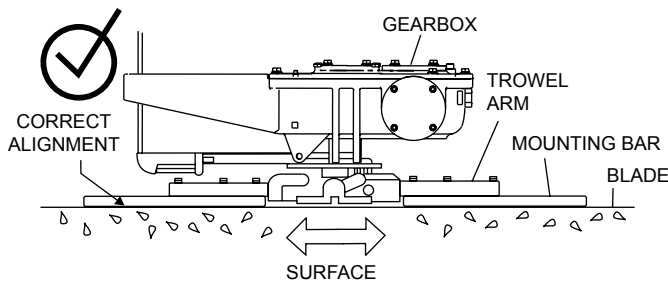


Figure 38. Correct Spider Plate Alignment

STABILIZER RING REMOVAL

1. If the trowel is equipped with an outer stabilizer ring (Figure 39), remove the four bolts at the end of each spider arm.

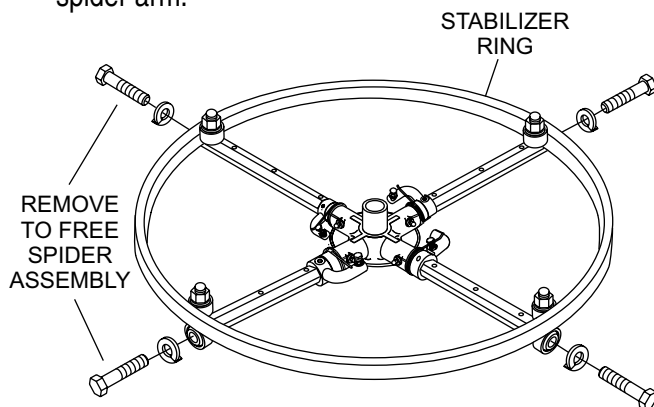


Figure 39. Stabilizer Ring

2. 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.

TROWEL ARM REMOVAL

1. Each trowel arm is held in place at the spider plate by a hex head bolt (with zerk grease fitting). Remove the hex head bolt/zerk grease fitting from the spider plate (Figure 40).
2. Remove the trowel arm from the spider plate.

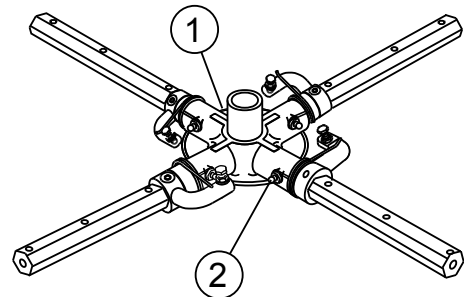


Figure 40. Removing Zerk Grease Fitting

3. 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.
4. Examine the bronze trowel arm bushing insert (Figure 41). Clean if necessary. Replace bushing if out-of-round or worn.

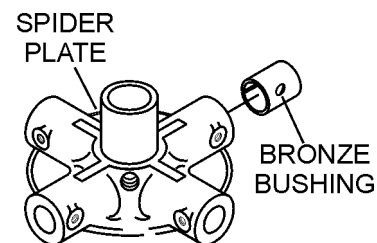


Figure 41. Bronze Bushings

TROWEL BLADE REMOVAL

1. Remove the trowel blades from the trowel arm by removing the three hex head bolts (Figure 42) from the trowel arm. Set blades aside.

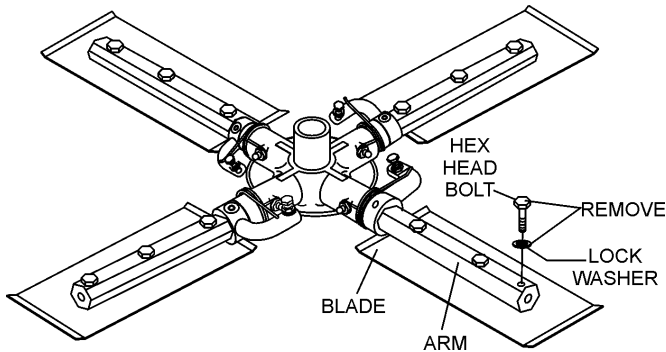


Figure 42. Trowel Blades

2. Wire brush any build-up of concrete from all six sides of the trowel arm. Repeat this for the three 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 43 and Figure 44:

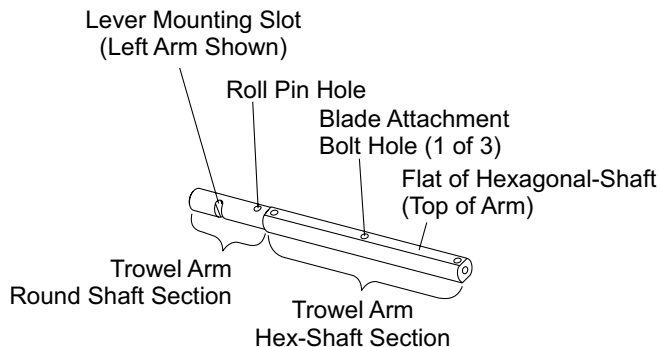


Figure 43. Trowel Arm

1. Use a thick steel plate, granite slab or any surface which is true and flat, to check all six sides of each trowel arm for flatness.
2. Check each of the six sides of the trowel arm (hex section). A feeler gauge of .004 in. (0.10 mm) should not pass between the flat of the trowel arm and the test surface along its length on the test surface. (Figure 44).

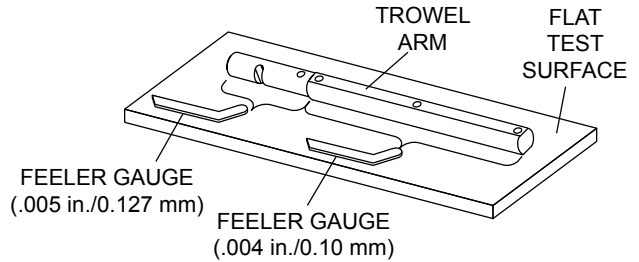


Figure 44. Checking Trowel Arm Flatness

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 0.005 inch (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 45 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.

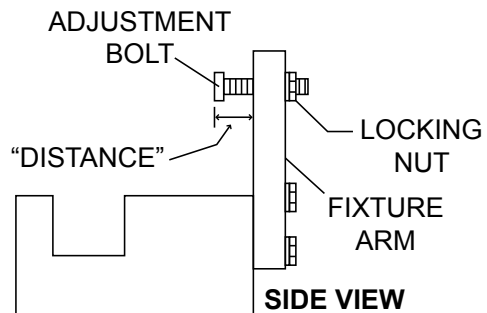


Figure 45. Trowel Arm Adjustment Tool Side View

2. Ensure the fixture arm is in the proper setting (up or down) for your trowel arm rotation as shown in Figure 46.

NOTICE

Arms with **CLOCKWISE** blade rotation use the fixture arm in the **UP** position (Figure 46, A). Arms with **COUNTERCLOCKWISE** blade rotation use the fixture arm in the **DOWN** position (Figure 46, B).

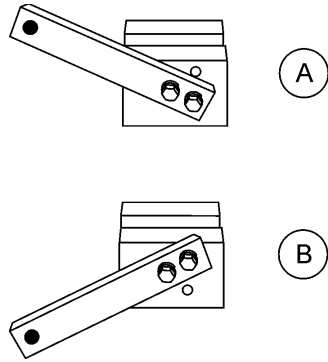


Figure 46. Trowel Arm Adjustment Setup

3. Unscrew the locking bolts on the adjustment tool and place the trowel arm into the fixture channel as shown in Figure 47. 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.

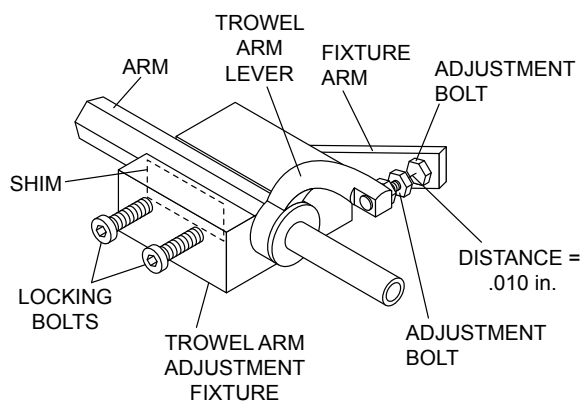


Figure 47. Trowel Arm Adjustment Fixture Components

4. Use an allen wrench to tighten the locking bolts securing the trowel arm in place.
5. Adjust the bolt "distance" shown in Figure 47 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.


REASSEMBLY

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 damaged 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 and 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. Reinstall 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 NLG1 Grade #2 consistency.

INSTALLING PANS ONTO FINISHER BLADES

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

WARNING

 **DO NOT** lift the trowel when the pans are attached.

ALWAYS install pans either on the work area or on an area that is next to and level with the work area.

Refer to Figure 48 when installing pans onto finisher blades.

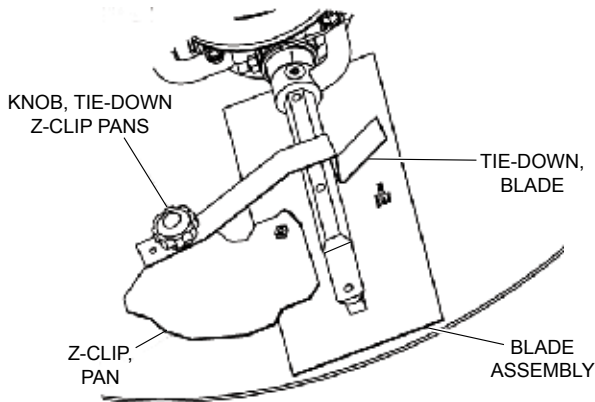


Figure 48. Z-Clip Finisher Pan Installation

1. Lift trowel just enough to slide pan under blades. Lower finisher onto pan with blades adjacent to Z-Clips.
2. Rotate blades into position under Z-Clips. Ensure that the blades are rotated in the direction of travel when the machine is in operation or use the engine to rotate the blades into position.
3. Attach the blade tie-downs to the far side of the Z-Clip brackets with tie-down knobs as shown in Figure 48.
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.

DECOMMISSIONING TROWEL/COMPONENTS

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

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

TROUBLESHOOTING (TROWEL)

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

TROUBLESHOOTING (TROWEL)

Troubleshooting (Ride-On Mechanical Trowel) - continued		
Symptom	Possible Problem	Solution
Lights (optional) not working.	Wiring?	Check all electrical connections in the lighting circuit. Verify wiring is in good condition with no shorts. Replace defective wiring or components immediately.
	Lights?	If +12VDC is present at light fixture connector when light switch is activated and light does not turn on, replace light bulb.
	Bad switch?	Check the continuity of light switch. Replace light switch if defective.
	Bad fuse?	Check fuse. Replace fuse if defective.
Retardant spray (optional) not working.	Retardant?	Check retardant level in tank. Fill tank as required.
	Wiring?	Check all electrical connections in the spray pump circuit. Verify wiring is in good condition with no shorts. Replace defective wiring or components immediately.
	Bad switch?	Check the continuity of both left and right spray switches (palm handles). Replace spray switch if defective..
	Bad spray pump?	If +12VDC is present at pump connector when spray switch is activated and pump does not operate, replace spray pump.
	Bad fuse?	Check fuse. Replace fuse if defective.
Steering is unresponsive.	Blade speed out of adjustment?	See section on blade speed adjustment.
	Steering linkage out of adjustment?	Adjust the connecting linkage found at the base of the handle. Contact your MQ field service manager for instructions.
	Worn components?	Check for wear of steering bearings and linkage components. Replace if necessary.
Operating position is uncomfortable.	Seat adjusted for operator?	Adjust seat with lever located on the front of the seat.
Power head on Electric Pitch (optional) not working.	Broken or loose parts?	If the motor runs and the pitch is not affected, parts inside the power head may be loose or broken. Return power head to dealer for service.
	Wiring?	Check all electrical connections and wiring. Check the continuity at the power head unit. Verify that there is voltage present at the power head switch with the key switch in the "on" position.
	Switch?	Check the continuity of the switch. If switch is malfunctioning, replace immediately.
Linkage on Twin Pitch not working.	Crank handles?	Make sure that both crank handles are pushed down as far as possible to ensure that the linkage is engaged.
	Broken part?	Replace all broken parts immediately.
Clutch slipping or sluggish response to engine speed change.	Worn belts?	Replace belt.
	Clutch out of adjustment?	Adjust per instructions in maintenance section of this manual.
	Worn or defective clutch parts?	Replace parts as necessary.
	Worn bearings in gearbox?	Rotate input shaft by hand. If shaft rotates with difficulty, check the input and output shaft bearings. Replace as necessary.
	Worn or broken gears in gearbox?	Verify that the gearbox shaft rotates when the input shaft is rotated. Replace both the worm and worm gear as a

TROUBLESHOOTING (ENGINE)

Engine Troubleshooting		
Symptom	Possible Problem	Solution
Engine Cranks But Will Not Start	Fuel tank is empty.	Fill fuel tank.
	Shut-off valve is closed.	Open fuel shut-off valve.
	Fuel line has suction leak or is restricted. Fuel filter, or fuel tank cap vent is obstructed.	Check fuel line condition and fuel line clamps. Ensure that fuel line is not kinked. Check fuel filter for restriction and replace if necessary. Check fuel cap vent and clean or replace as necessary.
	Fuel supply is contaminated.	Drain and clean fuel tank, clean tank and refill with fuel.
	If carbureted, carburetor is underchoked or overchoked.	Apply recommended amount of choke for cold and warm weather.
	Spark plug is fouled, improperly gapped, or damaged. Spark plug leads disconnected.	Check spark plug for fouling, check gap, and inspect for damage. Clean or replace spark plug as necessary. Reattach spark plug leads if disconnected.
	Safety stop switch malfunction.	Ensure that the Safety Stop Switch is functioning when the operator is seated. Replace switch if necessary.
Engine Starts But Will Not Continue Running	Fuel tank is empty.	Fill fuel tank.
	Shut-off valve is closed.	Open fuel shut-off valve.
	Fuel line has suction leak or is restricted. Fuel filter is obstructed, or fuel tank cap vent is blocked.	Check fuel line condition and fuel line clamps. Ensure that fuel line is not kinked. Check fuel filter for restriction and replace if necessary. Check fuel cap vent and clean or replace as necessary.
	If engine is carbureted, carburetor is underchoked or over choked.	Apply recommended amount of choke for cold and warm weather.
	Faulty ignition switch or starter.	Replace defective switch or starter.
	Engine is seized.	Repair or replace engine.

TROUBLESHOOTING (ENGINE)

Engine Troubleshooting (Continued)		
Symptom	Possible Problem	Solution
Engine Lacks Power	Air filter is obstructed.	Replace air filter.
	Altitude causes 3% loss of horsepower per 1000 feet of altitude.	If available, install high altitude jets in carburetor.
	Choke is partially closed.	Open choke.
	Faulty spark plugs or spark plug leads. Spark plug lead disconnected.	Replace spark plugs or spark plug leads if faulty. Reattach spark plug lead if disconnected.
	Fuel is contaminated.	Drain and clean fuel tank. Refill with clean fuel.
	There is a lack of lubrication.	Check engine oil.
	Engine is overheated	Allow engine to cool. Find and repair cause of overheating.
	Exhaust is restricted.	Remove or repair restriction.
	Ignition timing incorrect.	Set engine ignition timing to manufacturer's specification.
Engine Overheats	Ignition timing incorrect.	Set engine ignition timing to manufacturer's specification.
	Fuel mixture is too lean.	Look for intake system leak. Repair any leaks found.
	Exhaust is restricted.	Remove or repair restriction.
	Fan shroud or fan is broken or missing.	Replace fan shroud.
	Coolant level is low.	Fill radiator when cool. Add coolant to fill line on reservoir.
	Low or Hi crankcase oil level	Check engine oil. Fill if low, drain if overfilled.
Engine Will Not Crank	Battery is discharged or defective.	Charge and test battery. Replace if defective.
	Loose or faulty wires or connections.	Inspect wiring, repair any bad connections or wires.
	Faulty ignition switch or starter.	Replace defective switch or starter.
	Engine is seized.	Repair or replace engine.

OPERATION MANUAL

HERE'S HOW TO GET HELP

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



Telefono:
01(55)26071637
@Equiconstructor
contacto@equiconstructor.mx



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This manual **MUST** accompany the equipment at all times. This manual is considered a permanent part of the equipment and should remain with the unit if resold.

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