

OPERATION AND PARTS MANUAL



WHITEMAN **HTH-SERIES** **RIDE-ON POWER TROWEL**

Revision #6 (02/22/11)

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THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.



CALIFORNIA — Proposition 65 Warning

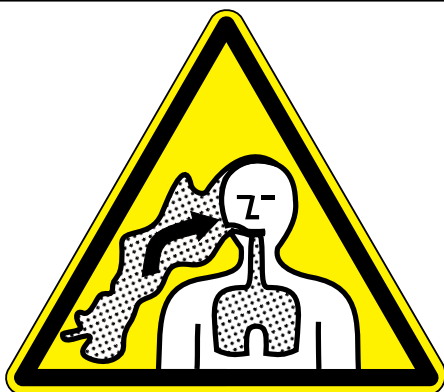
Engine exhaust and some of its constituents, and some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm. Some examples of these chemicals are:

- 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

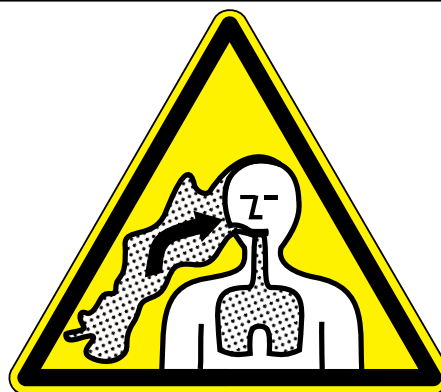
⚠ WARNING



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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*NOTE: Specification and part number
are subject to change without notice.*

PARTS ORDERING PROCEDURES

Ordering parts has never been easier! Choose from three easy options:

Effective:
January 1st, 2006



Order via Internet (Dealers Only):

Order parts on-line using Multiquip's SmartEquip website!

- View Parts Diagrams
- Order Parts
- Print Specification Information



If you have an MQ Account, to obtain a Username and Password, E-mail us at: **parts@multiquip.com**.

To obtain an MQ Account, contact your District Sales Manager for more information.

Goto www.multiquip.com and click on
Order Parts to log in and save!

Use the **internet** and qualify for a **5% Discount** on *Standard orders* for all orders which include complete part numbers.*

Note: Discounts Are Subject To Change



Order via Fax (Dealers Only):

All customers are welcome to order parts via Fax.

Domestic (US) Customers dial:
1-800-6-PARTS-7 (800-672-7877)

Fax your order in and qualify for a **2% Discount** on *Standard orders* for all orders which include complete part numbers.*

Note: Discounts Are Subject To Change



Order via Phone: **Domestic (US) Dealers Call:**
1-800-427-1244

Non-Dealer Customers:

Contact your local Multiquip Dealer for parts or call 800-427-1244 for help in locating a dealer near you.



International Customers should contact their local Multiquip Representatives for Parts Ordering information.

When ordering parts, please supply:

- | | |
|---|--|
| <input type="checkbox"/> Dealer Account Number | <input type="checkbox"/> Specify Preferred Method of Shipment: |
| <input type="checkbox"/> Dealer Name and Address | <input checked="" type="checkbox"/> UPS/Fed Ex <input checked="" type="checkbox"/> DHL |
| <input type="checkbox"/> Shipping Address (if different than billing address) | <input checked="" type="checkbox"/> Priority One <input checked="" type="checkbox"/> Truck |
| <input type="checkbox"/> Return Fax Number | <input checked="" type="checkbox"/> Ground |
| <input type="checkbox"/> Applicable Model Number | <input checked="" type="checkbox"/> Next Day |
| <input type="checkbox"/> Quantity, Part Number and Description of Each Part | <input checked="" type="checkbox"/> Second/Third Day |

NOTICE

All orders are treated as *Standard Orders* and will ship the same day if received prior to 3PM PST.

WE ACCEPT ALL MAJOR CREDIT CARDS!



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TRAINING CHECKLIST

TRAINING CHECKLIST

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

TRAINING CHECKLIST			
NO.	DESCRIPTION	OK?	DATE
1	Read Operator's 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 (if equipped).		
5	Operation of controls (machine not running).		
6	Safety controls, seat kill switch operation.		
7	Emergency stop procedures.		
8	Startup of machine, pre-heat (Kubota), engine choke.		
9	Maintaining a hover.		
10	Maneuvering		
11	Pitching		
12	Matching blade pitch between towers. Twin Pitch™ and Electric Pitch: disengaging the linkage.		
13	Concrete finishing techniques.		
14	Shutdown of machine.		
15	Lifting of machine (lift loops).		
16	Machine transport and storage.		

Operator _____ Trainee _____

COMMENTS:

DAILY PRE-OPERATION CHECKLIST

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	Kill switch (seat) operation.
7	Steering control operation.

COMMENTS:

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**.






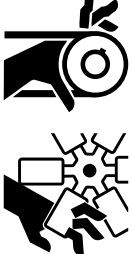


CAUTION

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.

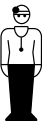
- **ALWAYS** know the location of the nearest fire extinguisher.



- **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.

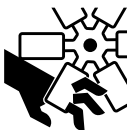


- **NEVER** operate the equipment in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe **bodily harm or even death.**



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.

HTH — SPECIFICATIONS

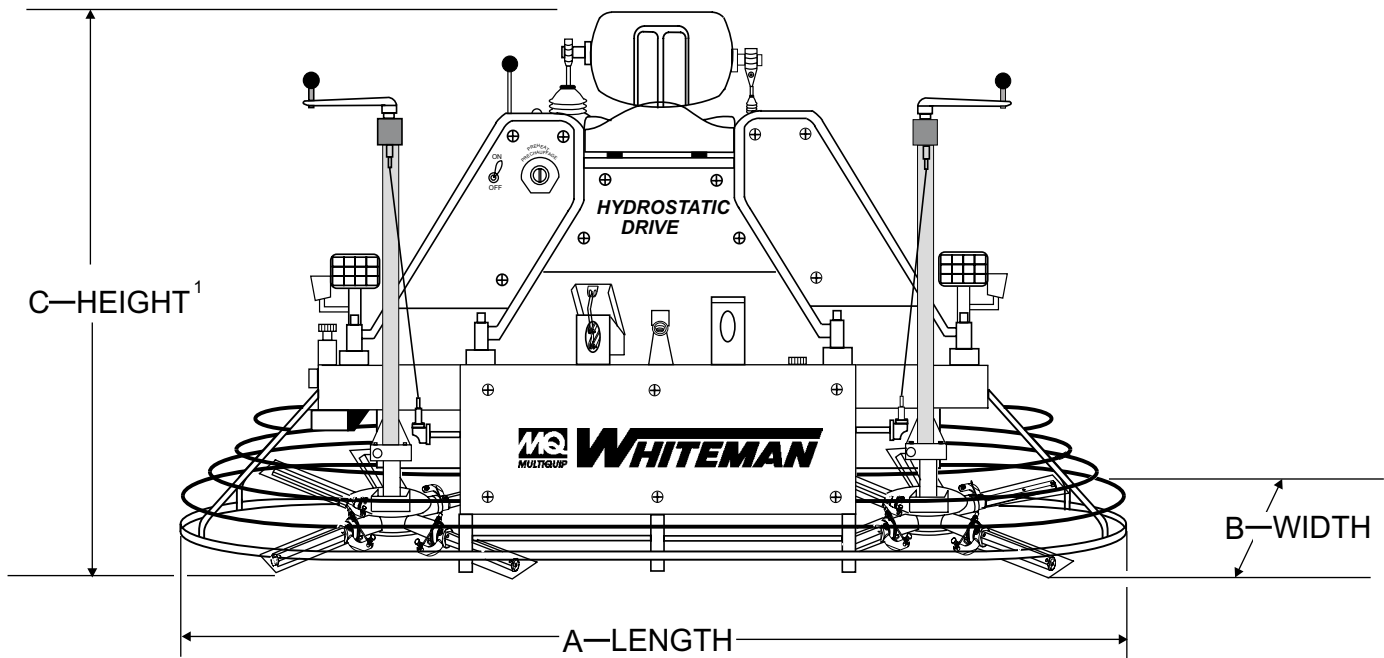


Figure 1. HTH Dimension /Specifications

Table 2. HTH Specifications

SPECIFICATION PARAMETER	HTH-38KD (KUBOTA)	HTH-31V (VANGUARD)
A-Length – in. (cm)	96.75 (245.8)	96.75 (245.8)
B-Width – in. (cm)	50.0 (127)	50.0 (127)
C-Height – in. (cm) ¹	55.0 (140)	55.0 (140)
Weight – lbs. (kgs.) Operating	1,306 (592)	1,200 (544)
Weight – lbs. (kgs.) Shipping	1,700 (771)	1,588 (720)
Sound Pressure – dBA ²	97	96
Vibration – ft/s ² (m/ s ²) ³	<8.0 (2.5)	<8.0 (2.5)
Blade Tip Speed – FPM (m/s)	1924 (9.9)	1804 (9.3)
Engine – H.P.	38	31
Fuel Tank – gallons (liters)	12 (45)	12 (45)
Rotor – RPM	0 to 160	0 to 140
Path Width – in. (cm)	92 (233)	92 (233)
Hydraulic Oil ⁴	AW MV 68	AW MV 68

NOTE:

1. This value includes the seat height.
2. Sound pressure is a weighted measure. Measured at the operators ear position while the ride-on trowel is operating at full throttle on concrete in a manner most often experienced in “**normal**” circumstances. Sound pressure may vary depending upon the condition of the concrete. Hearing protection is always recommended.
3. The vibration level indicated is the maximum RMS (Root Mean Square) value obtained at the handle grip while operating the ride-on trowel on curing concrete in a manner most often experienced in “**normal**” circumstances. Values were obtained from all three axes of motion. The values shown represent the maximum RMS value from these measurements.
4. “AW” stands for **anti-wear** and “MV” stands for **multi-viscosity**. The 68 refers to the general viscosity range and is similar to 10W40-engine oil (hot weather) and 10W30 (cool weather).

HTH RIDE-ON TROWEL FAMILIARIZATION

The HTH series Ride-On Power Trowels are designed for the floating and finishing of concrete slabs.

Take a walk around the HTH Ride-On Power Trowel. Take notice of all the entire major components (see Figures 2 and 3, Page 11) like the engine, blades, pitch towers, air cleaner, ignition switch etc. Check that there is always oil in the engine, and hydraulic oil in the hydraulic oil 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 HTH Ride-On Power Trowel.

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

Engine

The HTH Ride-On Power Trowel is available with either a standard 31 HP Vanguard gas engine or 38 HP Kubota diesel engine. Refer to the engine owner's manual for specific instructions regarding engine operation. This manual is included with the ride-on trowel at the time of shipping from Whiteman. Please contact your nearest Multiquip Dealer for a replacement should the original manual disappear.

Blades

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

Hydraulic Motor

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

Hydraulic Steering

Dual joystick controls located to the left and right of the operator are provided for steering the HTH-Ride on Power Trowel. The joysticks are linked to three hydraulic steering cylinders located within the frame of the machine. When the right side steering joystick is moved either forward or backward it will cause that side of the ride-on power trowel to move in either a forward or reverse direction. Moving the same joystick left or right causes the trowel to move in either the left or right direction.

When the left side steering joystick is moved, it will cause the left side of the ride-on trowel to travel in either a forward or reverse direction.

Hydraulic Pump

Delivers a continuous 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 (Page A). This checklist will provide an outline for an experienced operator to provide training to a new operator.

HTH — CONTROLS AND INDICATORS

Figures 2 and 3 show the location of the controls, indicators and general maintenance parts. Each control may perform more than one function. All functions of each control are described below.

1. **Seat** – Place for operator to sit. Engine will not start unless operator is seated. Seat is adjustable.
2. **Steering Control (right side)** -Allows the unit to move in either a forward, reverse left or right direction.
3. **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).
4. **Light Switch** – When activated, turns on six halogen lights. Lights offer better visibility when working indoors.
5. **Ignition Switch** – With key inserted turn clockwise to start engine.

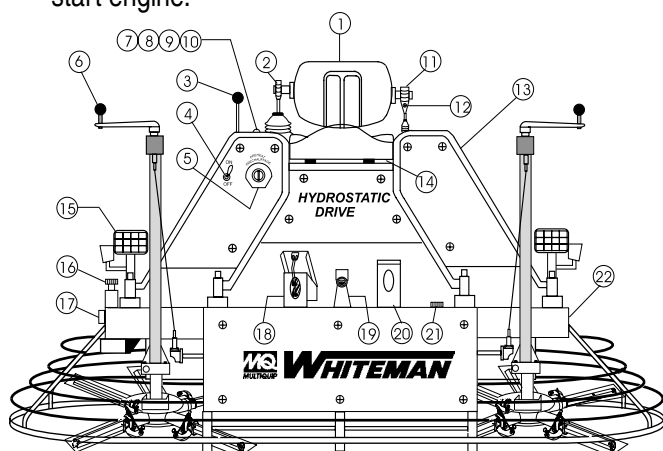


Figure 2. HTH Controls and Indicators (Front)

6. **Twin Pitch Control** – Both pitch towers are linked together. One crank may be turned to adjust the blade pitch simultaneously or individually control for each set of blades.
7. **Pre-Heat Indicator Light** - Lights blue during engine start-up. Indicates that engine glow plugs are being pre-heated. Light will go off after approximately 10 seconds.
8. **Charge Indicator Light** - Lights red when electrical system is not charging properly.
9. **Water Indicator Light** - Lights red when water temperature is high.
10. **Oil Indicator Light** - Lights red when oil pressure is low.
11. **Steering Control (left side)** -Allows the unit to move in a forward or reverse direction only.
12. **Retardant Spray Control Button** – When pressed allows retardant spray to flow through the spray nozzle located at the front of the machine.

13. **Radiator/Filler Cap** –Holds coolant or water necessary to keep engine at a safe operating temperature. Remove this cap to add water or antifreeze.
14. **Kill Switch** - Shuts down engine when operator is not sitting in seat.
15. **Lights** – Low voltage halogen light.
16. **Hydraulic Oil Filler Cap** – Remove this cap to add hydraulic oil.
17. **Hydraulic Oil Sight Glass** - Indicates the level of the hydraulic oil in the reservoir.
18. **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.
19. **Spray Nozzle** – Spray nozzle for retardant.
20. **Left Foot Riser** – Operator foot rest pedal.
21. **Fuel Gauge/Filler Cap** - Indicates the amount of fuel in the fuel tank. Remove this cap to add fuel.
22. **Hydraulic Reservoir** – Part of frame. Holds hydraulic oil necessary for pump operation.
23. **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.
24. **Engine Oil Dipstick** – Indicates engine oil level.
25. **Engine Oil Filler Cap** - Remove this cap to add engine oil.
26. **Air Filter** – Prevents dirt and other debris from entering the fuel system.

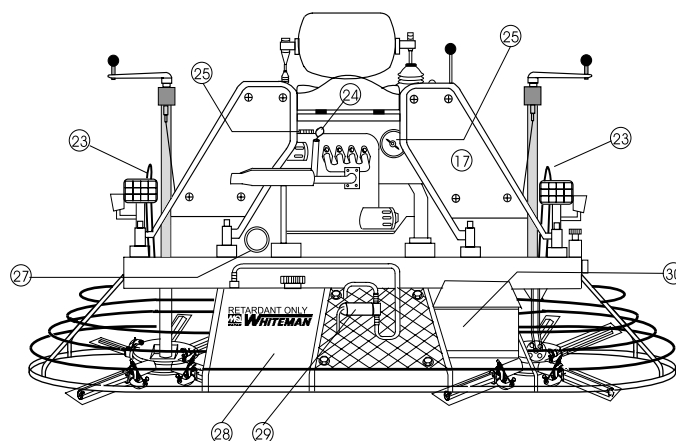


Figure 3. HTH Controls and Indicators (Rear)

- 27. **Oil Filter** – Provides oil filtering for the engine.
- 28. **Retardant Spray Motor** – Used with the spray control button.
- 29. **Retardant Spray Tank** - Holds 5 gallons of retardant or water.
- 30. **Battery** - Provides +12V DC power to the electrical system.
- 31. **Hydraulic Suction Filter** - Filters hydraulic fluid prior to entering the system.
- 32. **Hydraulic Return Filter** - Filters hydraulic returning to reservoir.

NOTE

Read this entire instruction manual completely before attempting to operate this machine.

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.

This section is intended to assist the operator with the initial start-up of the HTH series Ride-On Power 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.

CAUTION

Failure to understand the operation of the HTH Ride-On Power Trowel could result in severe damage to the trowel or personal injury.

See Figures 2 and 3 (Page 11) for the location of any control or indicator referenced in this manual.

Engine Oil

1. Pull the engine oil dipstick from its holder.
2. Determine if engine oil is low (Figure 4), add correct amount of engine oil to bring oil level to a normal safe level.

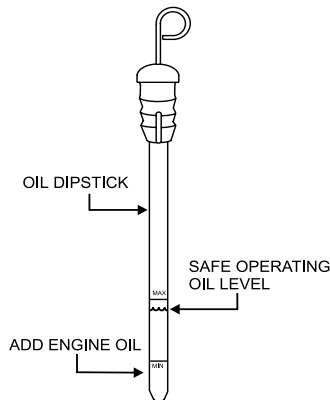


Figure 4. Engine Oil Dipstick

Hydraulic Oil

1. Determine if the hydraulic oil is low by observing the level of oil in the hydraulic Oil Sight Glass (Figure 5).

NOTE

Proper hydraulic operating oil level is **MIDDLE** of sight glass, with trowel on level surface, and engine off.

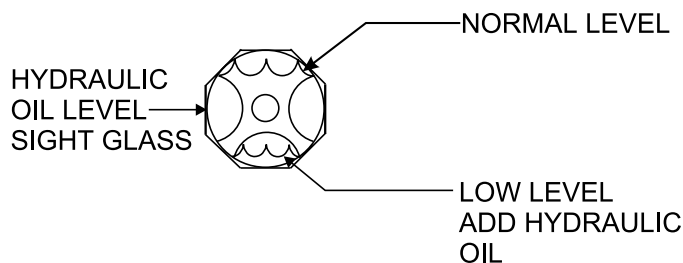


Figure 5. Hydraulic Oil Sight Glass

Fuel

1. Determine if the engine fuel is low (Figure 6). If fuel level is low, remove the fuel filler cap and fill with either diesel fuel or regular unleaded gasoline depending on the type of engine. 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.

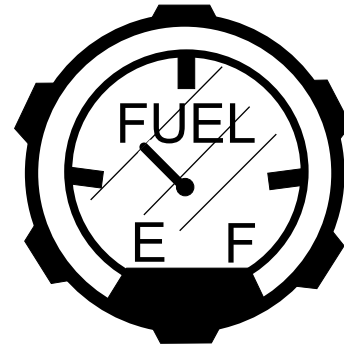


Figure 6. Fuel Gauge

CAUTION

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

Starting the Engine

1. With one foot on the ground and the other foot placed on the trowel's platform, grab hold of any part of the frame and lift yourself onto the trowel. Then sit down in the operator's seat.

CAUTION

DO NOT grab hold of the joysticks or pitch tower assemblies to lift yourself onto the trowel. Pulling on the joysticks or pitch tower assemblies repeatedly will weaken the units. Use any part of the frame to lift yourself onto the trowel.

2. The Whiteman Ride-On Power trowel is equipped with a safety **kill switch**. This switch is located beneath the seat assembly. Remember the engine will not start unless an operator is sitting in the operator's seat. The weight of an operator depresses an electrical switch, which will allow the engine to start.

CAUTION

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

- It is recommended that the kill switch be used to stop the engine after every use. Doing this will verify that the switch is working properly and presents no danger to the operator. Remember to turn the key to the "OFF" position after stopping the machine. Not doing so may drain your units' battery.
- Place the **engine throttle lever** (Figure 7) in the **LOW** position.

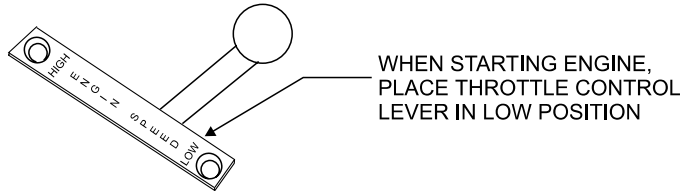


Figure 7. Engine Throttle Control Lever (Low)

- Insert the **ignition key** into the ignition switch (Figure 8).

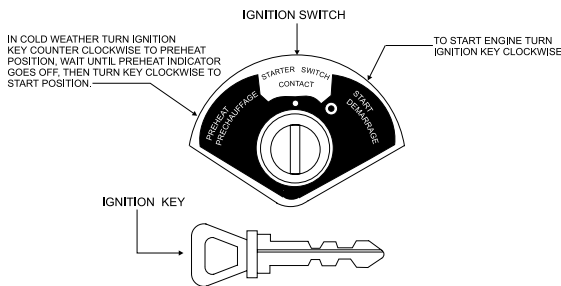


Figure 8. Ignition Switch and Key

- Turn the ignition key clockwise to the (start) position. The **oil** and **charge** indicator lights (Figure 9) should be on.

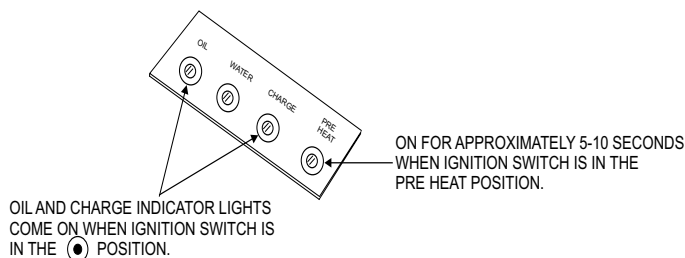


Figure 9. Oil and Charge Indicator Lights

NOTE

In **cold** weather turn the ignition key counter clockwise to the preheat position, wait until the **BLUE** preheat indicator goes off before turning the ignition key clockwise to the start position.

- Turn ignition key fully clockwise and listen for engine to start. Once engine has started release ignition key. Let engine warm for a few minutes.
- Place the **engine throttle lever** (Figure 10) in the **HIGH** position.

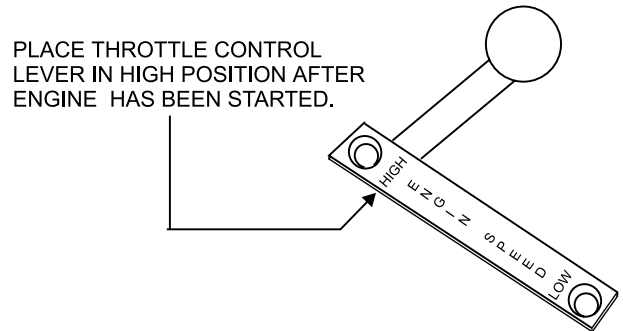


Figure 10. Engine Throttle Control Lever (High)

- The engine should be running at full RPM.
- Repeat this section a few times to get fully acquainted with the engine starting procedure.

Steering

Two joysticks (Figure 11) located to the left and right of the operator's seat provide directional control for the HTH Ride-On Power Trowel. Table 3 (Page 15) illustrates the various directional positions of the joysticks and their effect on the ride-on trowel.

NOTE

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

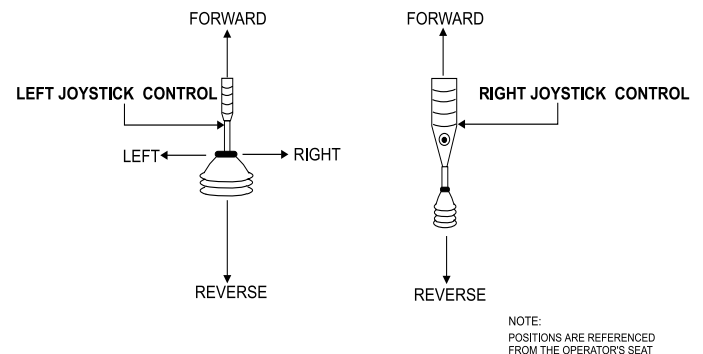


Figure 11. Left and Right Joystick Controls

Table 3. Joystick Directional Positioning

JOYSTICK	DIRECTION	RESULTS
Left	Move Joystick Forward	Causes only the left side of the ride-on trowel to move forward.
Left	Move Joystick Backward	Causes only the left side of the ride-on trowel to move backward.
Right	Move Joystick Forward	Causes only the right side of the ride-on trowel to move forward.
Right	Move Joystick Backward	Causes only the right side of the ride-on trowel to move backward.
Left and Right	Move Both Joysticks Forward	Causes the ride-on trowel to move forward in a straight line.
Left and Right	Move Both Joysticks Backward	Causes the ride-on trowel to move backward in a straight line.
Right	Move Joystick Right	Causes the ride-on trowel to move to the right.
Right	Move Joystick Left	Causes the ride-on trowel to move to the left.

1. The foot pedal (Figure 12) 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.

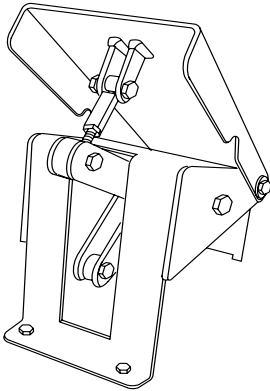


Figure 12. Blade Speed Control Foot Pedal

2. Push both the left and right joysticks forward (Figure 13).

JOYSTICK CONTROL

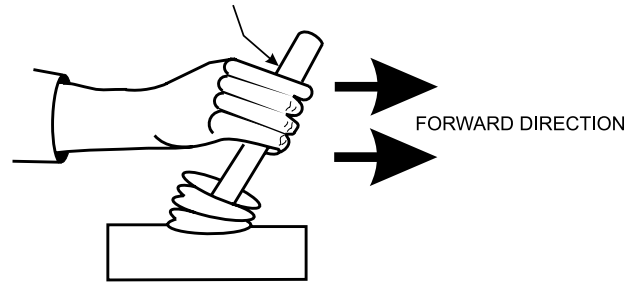


Figure 13. Joystick Control Forward Direction

3. With your right foot slowly depress the right foot pedal halfway. Notice that the ride-on power trowel begins to move in a forward direction. Release both joystick controls 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 3. 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. Push both the left and right joysticks backward (Figure 14) and repeat steps 3 through 6 while substituting the word reverse for forward.

JOYSTICK CONTROL

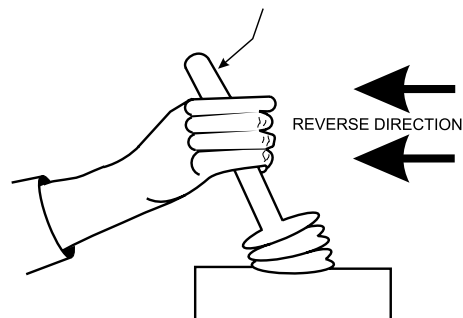


Figure 14. Joystick Control Reverse Direction

NOTE

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

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

CAUTION!

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

MAINTENANCE SCHEDULE

Daily (8-10 Hours)

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

Weekly (30-40 Hours)

1. Relube arms, thrust collar and clutch
2. Replace blades if necessary.
3. Check and clean or replace the engine air filter as necessary.
4. Replace engine oil and filter as necessary, see engine manual.

Monthly (100-125 Hours)

1. Remove, clean, reinstall and relube the arms and thrust collar. Adjust the blade arms.

Yearly (500-600 Hours)

1. Check and replace if necessary the arm bushings, and thrust collar bushings.
2. Check pitch control cables for wear.
3. Adjust blade speed.
4. Replace hydraulic fluid and both hydraulic filters.

NOTE

After the first 200 hours, **replace the hydraulic** filter cartridges.

MAINTENANCE PROCEDURES

Checking/Adjusting Blade Speed

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

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

Left Spider Speed Adjustment

The left spider's speed is adjusted by changing the length of the rod end spacing (Figure 15) at the front of the foot pedal. Lengthening the spacing increases the blade speed; shortening the spacing decreases the blade speed.

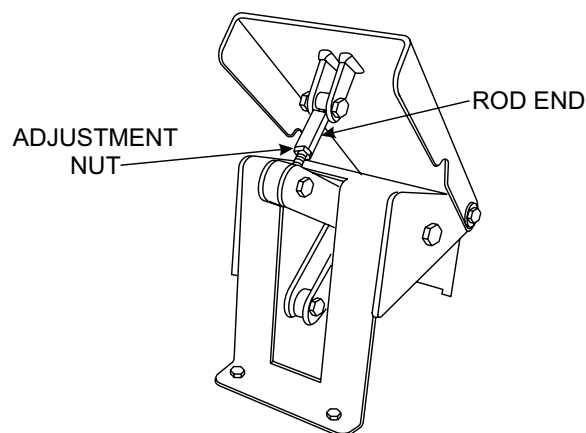


Figure 15. Blade Speed Control Foot Pedal

Right Spider Speed Adjustment

The right spider's speed is adjusted by changing the length of the connecting rod on the pump actuation levers (Figure 16, Page 17). This rod is basically a turnbuckle. Rotating it in one direction increases the length and corresponding spider speed. Rotating it the opposite direction decreases the length and spider speed. The right spider's 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 spiders 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 right spider speed is within the tolerance specified above. A strobe or magnetic pickup type speed indicator is recommended to verify the speeds.

The speeds should be adjusted on a dry concrete floor with the blades pitched flat. Units with a Kubota engine should be set at 155-160 rpm with the engine at full speed. Units with a B&S-Dihatsu (Vanguard) engine should be set at 145-150 rpm with the engine at full speed.

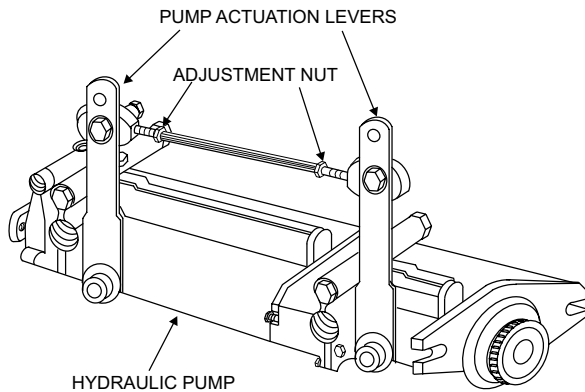


Figure 16. Pump Actuation Levers/Speed Control Rod

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).

To fix this problem, each spider assembly can be pitched individually. With a Single Pitch machine, the operator is forced to constantly make adjustments on each pitch tower. On a Twin Pitch machine, the operator must lift up on one of the pitch control handles, disengaging the linkage between the towers. Once this is done, a pitch control crank can be turned to adjust the difference. Make sure to lock the linkage back in place when finished with adjustments.

Blade Pitch Adjustment Procedure

The maintenance adjustment of blade pitch is an adjustment that is made by a bolt (Figure 17) 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.

There are some things to look for when checking to see if adjustment is necessary. Is the machine wearing out blades unevenly (i.e. one blade is completely worn out while the others look new)? Does the machine have a perceptible rolling or bouncing motion when in use? Look at the machine while it is running, do the guard rings “rock up and down” relative to the ground? Do the pitch control towers rock back and forth? These are some of the indications that the blade pitch may need to be adjusted using the adjustment bolts on the trowel blade finger.

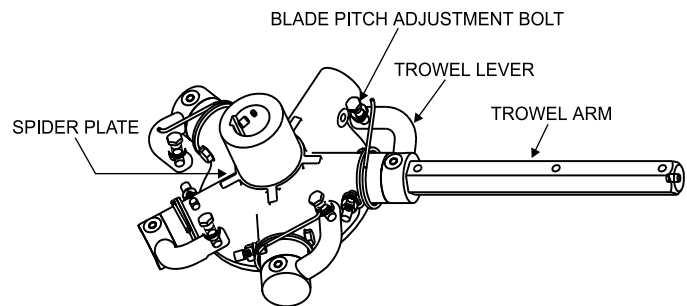


Figure 17. Blade Pitch Adjustment Bolt

The easiest and most consistent way to make this adjustment is to use the Trowel Arm Adjustment Fixture (P.N. 9177) that is manufactured by Whiteman. This fixture will allow consistent adjustment of the trowel arm fingers. It comes with all the hardware necessary to properly accomplish this maintenance and instructions on how to properly utilize this tool. Adjusting the trowel arm fingers without a fixture requires a special talent.

If a trowel arm adjustment fixture is not available and immediate adjustment is necessary; we suggest the following procedure. If you can see or feel which blade is pulling harder, adjust the bolt that corresponds to that blade. Another way to determine which blades need adjustment is to place the machine on a flat surface and pitch the blades as flat as possible. Now, 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.

It will be possible to adjust the “high” bolts down to the level of the one that is not touching, or adjust the “low” bolt up to the level of the higher ones. If possible, adjust the low bolt up to the level of the rest of the bolts. This is the fastest way, but may not always work. Verify that after adjustment, the blades pitch correctly. Often times, if the blades are incorrectly adjusted, they will not be able to pitch flat. This occurs when the adjusting bolts have been raised too high. Conversely, sometimes the adjusting bolts are too low and the blades cannot be pitched high enough for finishing operations.

Changing A Blade

Whiteman recommends that all the blades on the entire machine be changed at the same time. If only one or some of the blades are changed at one time, the machine will not finish concrete consistently and the machine may wobble or bounce.

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

Checking Hydraulic Pressure

It should be mentioned that most hydraulic problems are a result of low fluid levels. Before checking any other possibilities, make sure the hydraulic fluid level is half way up the sight glass which is located at the right end of the frame.

Hydraulic pressure can be checked using a pressure gauge (Figure 18) with a range of at least 5,000 psi. The pressure taps are located on the front side of the hydraulic pumps on elbows. The 1/8" pipe plugs can be removed and a hose, attached to the gauge, screwed into each port. It is best to use two gauges simultaneously, but it is possible to use only one gauge and repeat the procedure for each side.

To fully test the hydraulic system, the spiders will need to be locked so that they cannot rotate. This can easily 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 200 to 300 psi. If the pressure is less than 200 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 3,100 psi. If the pressure will not attain 3,100 psi, the pump should be inspected and/or serviced by an authorized service representative.

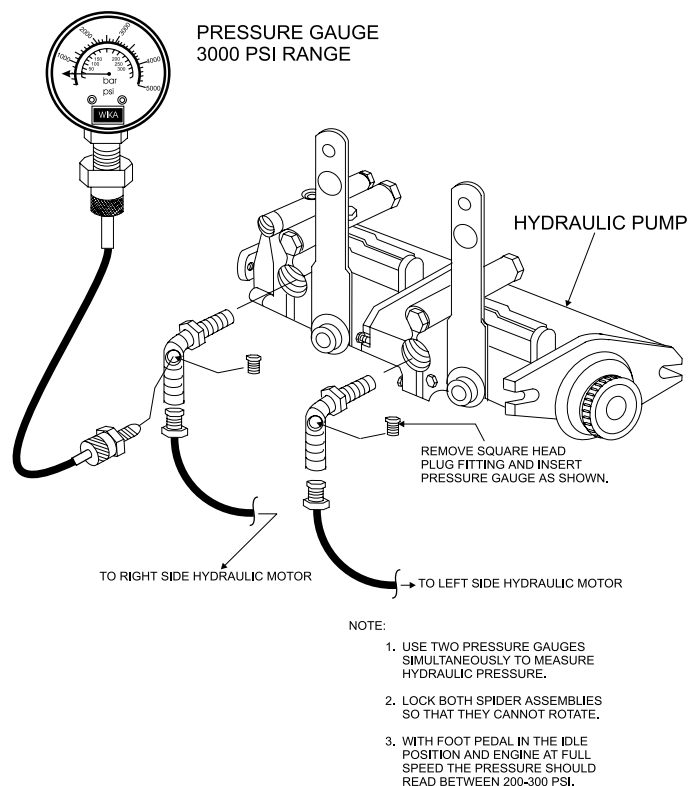


Figure 18. Pressure Gauge (Hydraulic Pump)

HTH — TROUBLESHOOTING

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.

HTH — TROUBLESHOOTING

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.

EXPLANATION OF CODE IN REMARKS COLUMN

The following section explains the different symbols and remarks used in the Parts section of this manual. Use the help numbers found on the back page of the manual if there are any questions.

NOTICE

The contents and part numbers listed in the parts section are subject to change **without notice**. Multiquip does not guarantee the availability of the parts listed.

SAMPLE PARTS LIST

NO.	PART NO.	PART NAME	QTY.	REMARKS
1	12345	BOLT.....	1	INCLUDES ITEMS W/%
2%		WASHER, 1/4 IN.....		NOT SOLD SEPARATELY
2%	12347	WASHER, 3/8 IN.....	1	MQ-45T ONLY
3	12348	HOSE.....	A/R	MAKE LOCALLY
4	12349	BEARING.....	1	S/N 2345B AND ABOVE

NO. Column

Unique Symbols — All items with same unique symbol

(@, #, +, %, or >) in the number column belong to the same assembly or kit, which is indicated by a note in the “Remarks” column.

Duplicate Item Numbers — Duplicate numbers indicate multiple part numbers, which are in effect for the same general item, such as different size saw blade guards in use or a part that has been updated on newer versions of the same machine.

NOTICE

When ordering a part that has more than one item number listed, check the remarks column for help in determining the proper part to order.

PART NO. Column

Numbers Used — Part numbers can be indicated by a number, a blank entry, or TBD.

TBD (To Be Determined) is generally used to show a part that has not been assigned a formal part number at the time of publication.

A blank entry generally indicates that the item is not sold separately or is not sold by Multiquip. Other entries will be clarified in the “Remarks” Column.

QTY. Column

Numbers Used — Item quantity can be indicated by a number, a blank entry, or A/R.

A/R (As Required) is generally used for hoses or other parts that are sold in bulk and cut to length.

A blank entry generally indicates that the item is not sold separately. Other entries will be clarified in the “Remarks” Column.

REMARKS Column

Some of the most common notes found in the “Remarks” Column are listed below. Other additional notes needed to describe the item can also be shown.

Assembly/Kit — All items on the parts list with the same unique symbol will be included when this item is purchased.

Indicated by:

“INCLUDES ITEMS W/(unique symbol)”

Serial Number Break — Used to list an effective serial number range where a particular part is used.

Indicated by:

“S/N XXXXX AND BELOW”

“S/N XXXX AND ABOVE”

“S/N XXXX TO S/N XXX”

Specific Model Number Use — Indicates that the part is used only with the specific model number or model number variant listed. It can also be used to show a part is NOT used on a specific model or model number variant.

Indicated by:

“XXXXX ONLY”

“NOT USED ON XXXX”

“Make/Obtain Locally” — Indicates that the part can be purchased at any hardware shop or made out of available items. Examples include battery cables, shims, and certain washers and nuts.

“Not Sold Separately” — Indicates that an item cannot be purchased as a separate item and is either part of an assembly/kit that can be purchased, or is not available for sale through Multiquip.

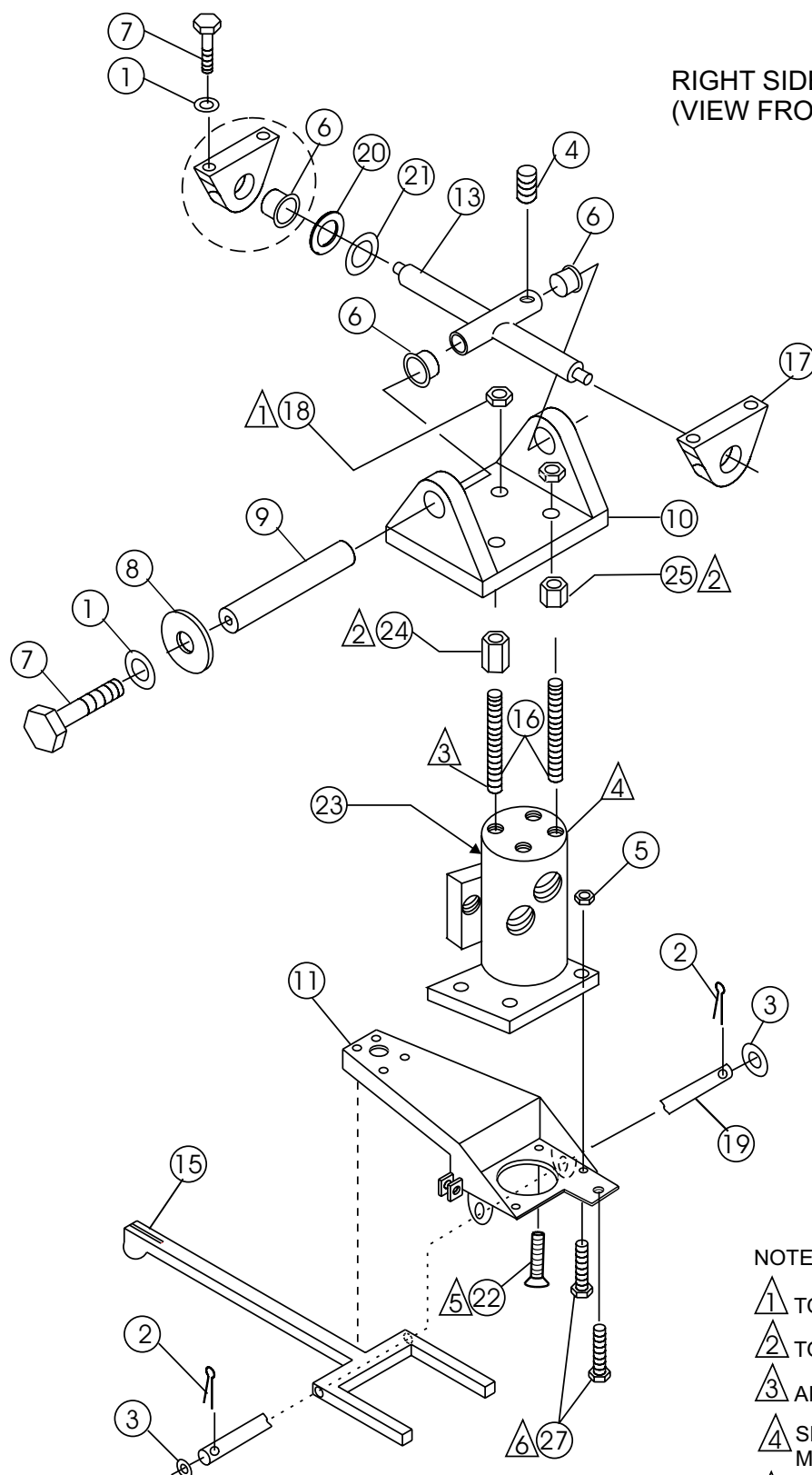
HTH — SUGGESTED SPARE PARTS

1 to 3 Units

Qty.	P/N	Description			
4.....	0183.....	COTTER PIN	3.....	2673.....	CIRCUIT BREAKER
6.....	10221.....	BUSHING	3.....	4682.....	SWITCH, LIGHT
2.....	11648.....	YOKE PIVOT SHAFT	3.....	8381.....	BOOT, SWITCH
1.....	10208.....	MUFFLER (VANGUARD)	3.....	11694.....	HOUR METER
1.....	11732.....	MUFFLER (KUBOTA)	1.....	10313.....	BATTERY CABLE (-)
1.....	12194.....	HEAT SHIELD (VANGUARD)	1.....	10314.....	BATTERY CABLE (+)
1.....	11993.....	OVERFLOW BOTTLE	3.....	11418.....	FUEL CAP
6.....	11984.....	IN-LINE FUEL FILTER	3.....	11491.....	THROTTLE CABLE ASSY
10.....	11141.....	SPACER ROD END	6.....	11611.....	ROD END (FEMALE)
10.....	11142.....	ROD END	3.....	11638.....	SPEED CONTROL SPRING
20.....	11146.....	JAM NUT	5.....	11641.....	THROTTLE SPRING
1.....	11422.....	STEERING CLY. VALVE (Right Hand)	3.....	11643.....	ROD END
1.....	11423.....	STEERING CLY. VALVE (Left Hand)	3.....	11610.....	ROD ACTUATOR
1.....	11619.....	HANDLE ASSY (Left Valve)	10.....	11819.....	SCREW
1.....	11455.....	HANDLE ASSY (Right Valve)	6.....	1484.....	BUSHING BRONZE
3.....	12473.....	SPRAY SWITCH(Left Handle)	3.....	3353.....	CAP FILLER/BREATHER
2.....	12487.....	BOOT, TOP HANDLE (Left Side)	6.....	2737.....	KNOB ASSY (PITCH CONTROL)
3.....	OEM2783AM.....	2-PIECE HANDLE w/HARDWARE (L/S)	2.....	11623.....	CABLE PITCH CONTROL
6.....	OEMAA5.....	UPPER SCREW, LEFT SIDE HANDLE	1.....	10511.....	SHAFT PITCH CONTROL(Left Side)
6.....	OEMAA7.....	LOWER SCREW, LEFT SIDE HANDLE	2.....	1617.....	LEVER ASSY
6.....	11402.....	FILTER HYDRAULIC RETURN	1.....	10510.....	SHAFT PITCH CONTROL(Right Side)
1.....	11579.....	MOTOR 12VOLT FAN	1.....	10722.....	SLIDE BLOCK (LEFT HAND)
2.....	11580.....	FAN COOLING BLADE	1.....	10721.....	SLIDE BLOCK (RIGHT HAND)
5.....	11884.....	FILTER HYDRAULIC SUCTION	1.....	10043.....	SPRAY PUMP
5.....	2829.....	ARM	5.....	12009.....	SCREEN FILTER
5.....	1986.....	LEVER (RIGHT HANDLE)	2.....	19661.....	VALVE FUEL DRAIN
10.....	9006.....	ROLL PIN	2.....	2108.....	CAP SPRAY TANK
10.....	11039.....	BUSHING	2.....	2816.....	COVER SPRAY MOTOR
3.....	2143.....	SPRING (RIGHT HANDLE)	2.....	392292.....	NOZZLE SPRAY
2.....	12048.....	SPIDER PLATE	3.....	2896.....	LIGHT ASSY
10.....	1162 A.....	GREASE CAP	2.....	12005.....	KILL SWITCH SEAT
10.....	11602.....	SCREW	3.....	12305.....	PLUG, INDICATOR LIGHT (RED)
3.....	11419.....	WEAR PLATE	3.....	11959.....	PLUG, INDICATOR LIGHT (BLUE)
3.....	11431.....	THRUST COLLAR	6.....	12307.....	BULB, INDICATOR LIGHTS
3.....	11464.....	BUSHING			
3.....	11493.....	BEARING			
5.....	2621.....	GREASE FITTING			
3.....	11952.....	SPACER			
3.....	11953.....	RETAINER			
6.....	12181.....	RING RETAINING			
3.....	9005.....	LEVER (LEFT SIDE)			
3.....	9111.....	SPRING (LEFT HAND)			
10.....	1322.....	SCREW			
4.....	11078.....	KEY IGNITION (VANGUARD)			
2.....	10958.....	SWITCH IGNITION (VANGUARD)			
3.....	10568.....	CABLE THROTTLE			
3.....	11098.....	CIRCUIT BREAKER			
1.....	11246.....	DECAL KIT			
10.....	2153.....	ROD END			
Qty.	P/N	Description			
			6.....	1627132092.....	OIL FILTER
			16.....	1624165510.....	GLOW PLUG
			3.....	1624197010.....	FAN BELT
			3.....	1574111080.....	AIR FILTER
			6.....	7000043081.....	FUEL FILTER
			1.....	10958.....	SWITCH IGNITION
			3.....	12001.....	STARTER KEYS (2 per set)

NOTE:.....Part numbers on this Suggested Spare Parts List may supercede/replace the P/N shown in the text pages of this book.

HTH — LEFT/RIGHT PIVOT ASSY



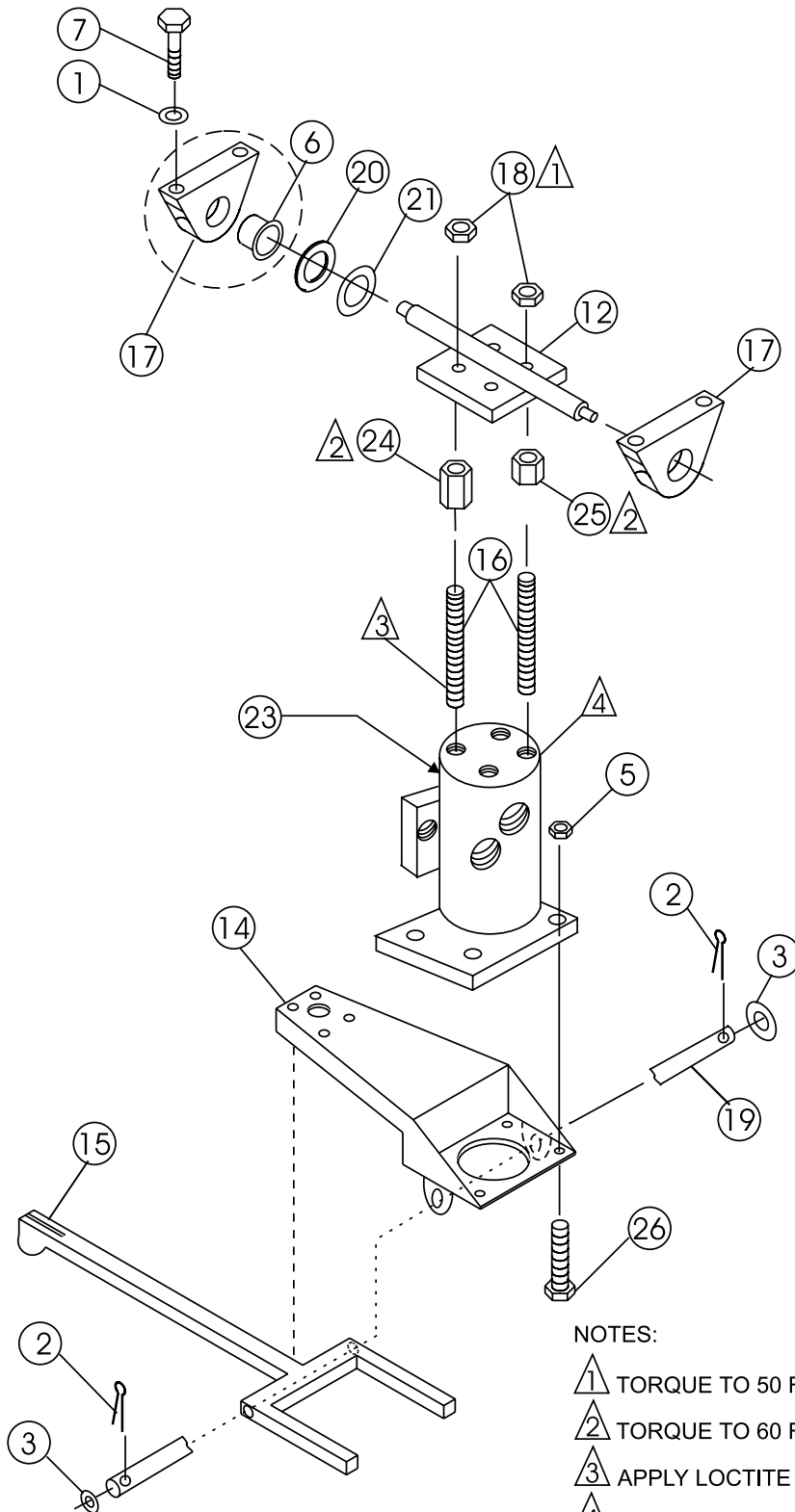
RIGHT SIDE PIVOT ASSEMBLY
(VIEW FROM OPERATORS SEAT)

NOTES:

- ① TORQUE TO 50 FT. LBS
- ② TORQUE TO 60 FT. LBS
- ③ APPLY LOCTITE.
- ④ SEE PAGE 44 FOR HYDRAULIC MOTOR HOSE CONNECTIONS.
- ⑤ PLACE FLUSH HEAD SCREW IN BACK OF MOUNT AS SHOWN.
- ⑥ PLACE HEX HEAD SCREW IN FRONT OF MOUNT AS SHOWN.

HTH — LEFT/RIGHT PIVOT ASSY

LEFT SIDE PIVOT ASSEMBLY (VIEW FROM OPERATORS SEAT)



NOTES:

- ① TORQUE TO 50 FT. LBS
- ② TORQUE TO 60 FT. LBS
- ③ APPLY LOCTITE
- ④ SEE PAGE 48 FOR HYDRAULIC MOTOR HOSE CONNECTIONS

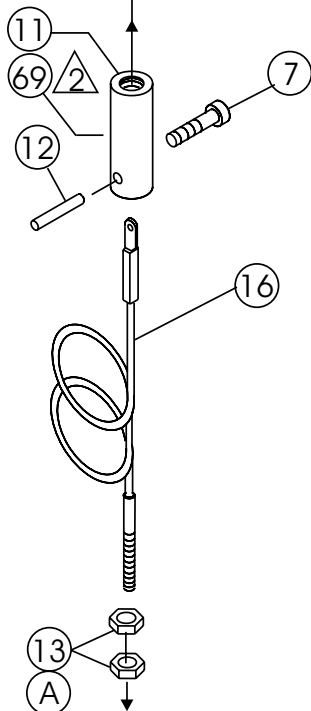
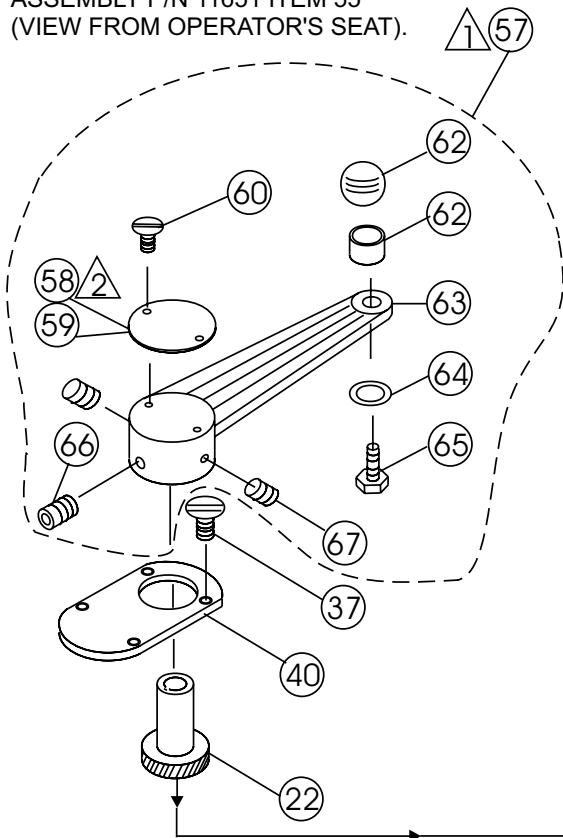
HTH — LEFT/RIGHT PIVOT ASSY

<u>NO</u>	<u>PART NO</u>	<u>PART NAME</u>	<u>QTY</u>	<u>REMARKS</u>
1	0166 A	WASHER, LOCK, 3/8 MED	10	
2	0183	PIN, COTTER 1/8 X 1 1/4	4	
3	0448	WASHER, FLAT, 7/16 SAE	4	
4	10138	SCREW, SHS 1/4-20 X 1/2, N.P.	1	
5	10176	NUT, NYLOC 1/2-13	9	
6	10221	BUSHING, 1 ID x 1.1/8 OD x 1 1G	6	
7	1023	SCREW, HHC 3/8-16 X 1 1/4	8	
8	11154	RETAINER, CENTRIFUGAL CLUTCH	2	
9	11420	SHAFT, PIVOT	1	
10	11425	SADDLE W/A	1	
11	11434	MOUNT, HYD MOTOR RIGHT	1	
12	11445	PIVOT, HYD MOTOR SUPPORT W/A	1	
13	11450	TRUNNION W/A	1	
14	11474	MOUNT, HYD MOTOR LEFT W/A	1	
15	11499	YOKE, ARM	2	
16	11548	STUD, HYD MOTOR MOUNT	8	
17	11555	ROCKER BLOCK	4	
18	11578	NUT, NYLOC 7/16-20	8	
19	11648	SHAFT, YOKE PIVOT	2	
20	11772	SHIM, TRUNNION .063 THICK	4	
21	11773	SHIM, TRUNNION .031 THICK	4	
22	11882	SCREW, FHSC 1/2-13 X 2 1/4	4	
23	12051	MOTOR, HYD EATON 109-1339 (40MM)	2	
24	12065	NUT, HYD MOTOR LONG	6	
25	12066	NUT, HYD MOTOR SHORT	2	
26	13178	SCREW, HHC 1/2-13 X 2 1/4	3	
27	2549	SCREW, HHC 1/2-13 X 3	2	

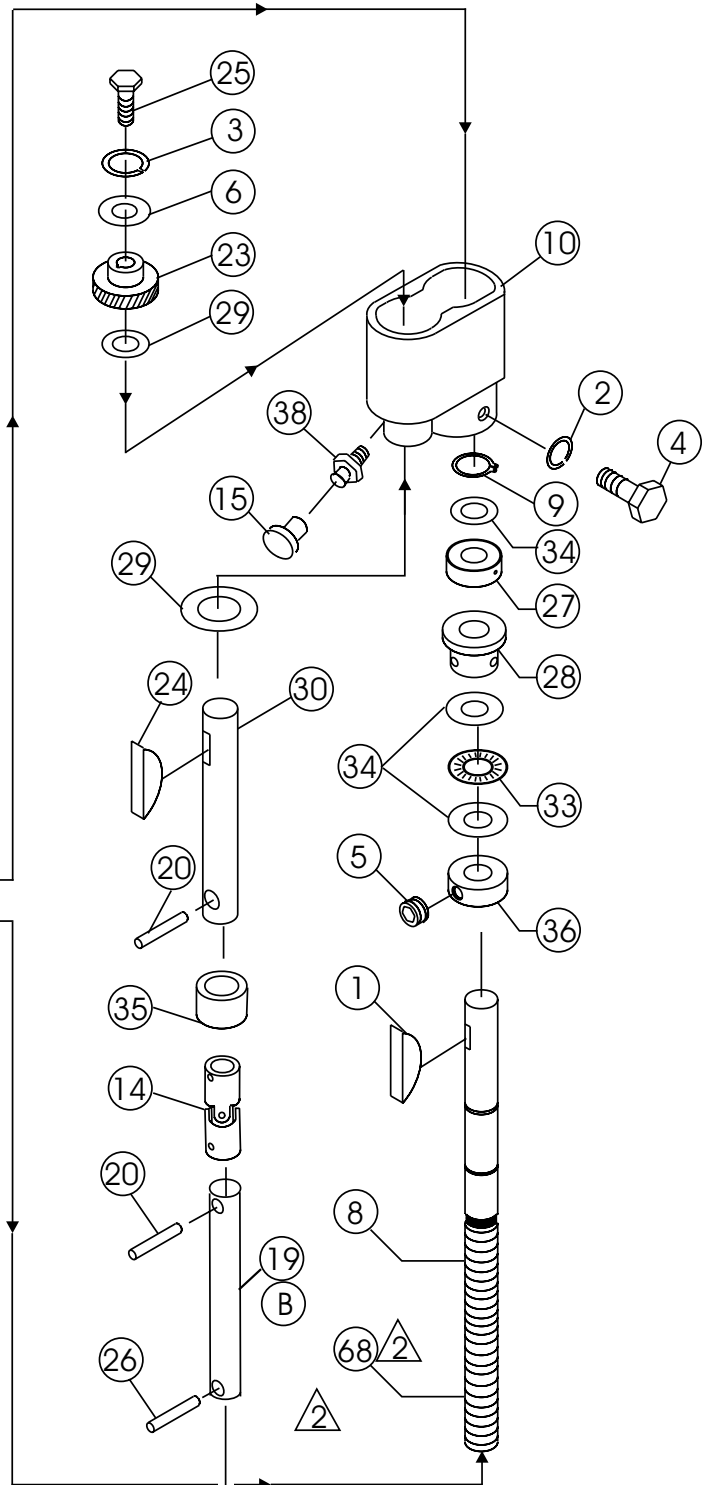
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HTH — LEFT/RIGHT TWIN PITCH ASSY

LEFT SIDE TWIN PITCH TOWER
ASSEMBLY P/N 11651 ITEM 55
(VIEW FROM OPERATOR'S SEAT).



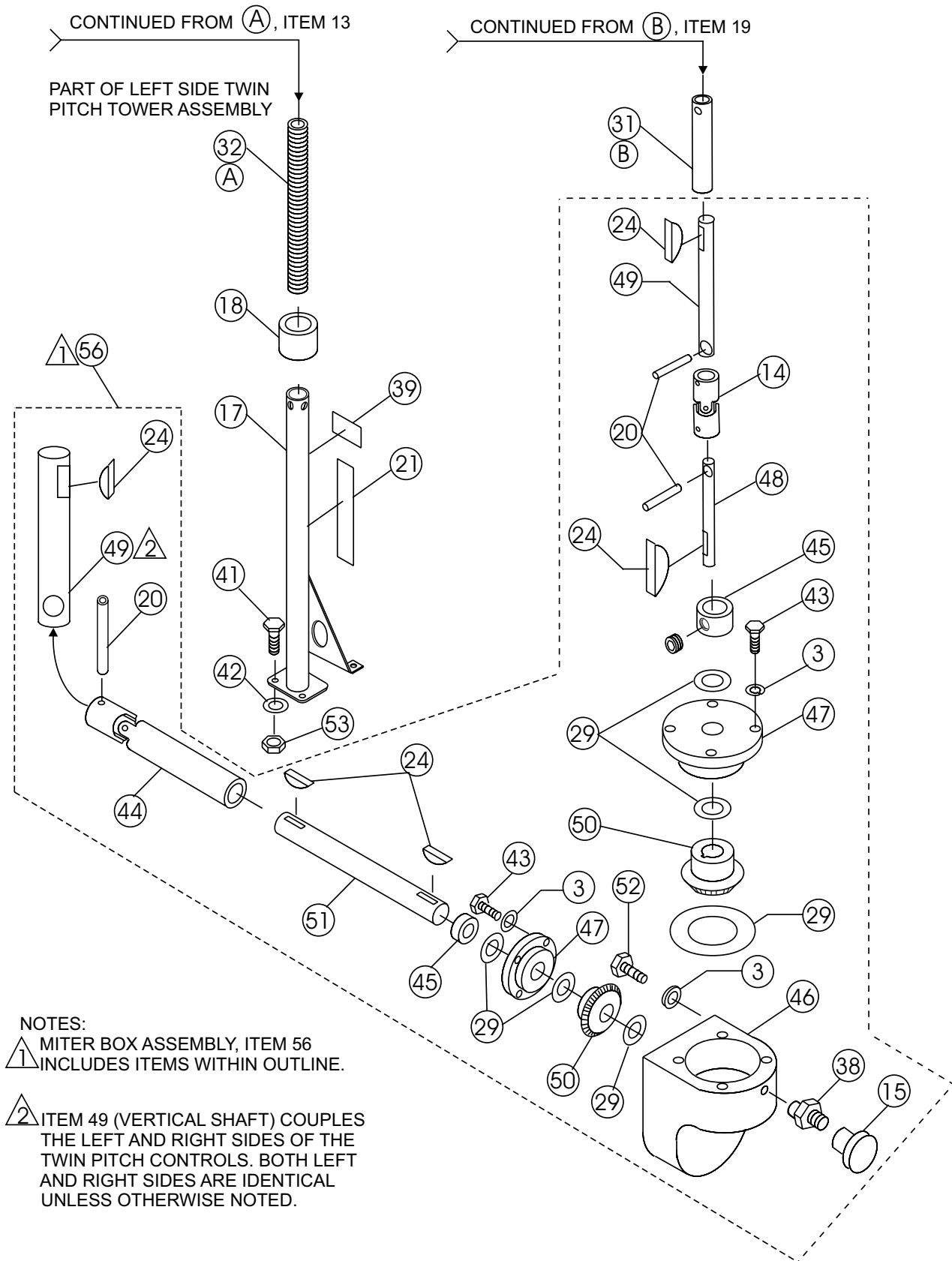
CONTINUED ON NEXT PAGE
SEE (A), ITEM 32.



CONTINUED ON NEXT PAGE
SEE (B), ITEM 31.

- NOTES:
- 1 LEVER ASSEMBLY, ITEM 57
INCLUDES ITEMS WITHIN OUTLINE.
 - 2 RIGHT SIDE TWIN PITCH
ASSEMBLY P/N 11650 ITEM 54
IS IDENTICAL TO LEFT SIDE
TWIN PITCH ASSEMBLY UNLESS
OTHERWISE NOTED.

HTH — LEFT/RIGHT TWIN PITCH ASSY



HTH — LEFT/RIGHT TWIN PITCH ASSY

LEFT/RIGHT TWIN PITCH ASSY

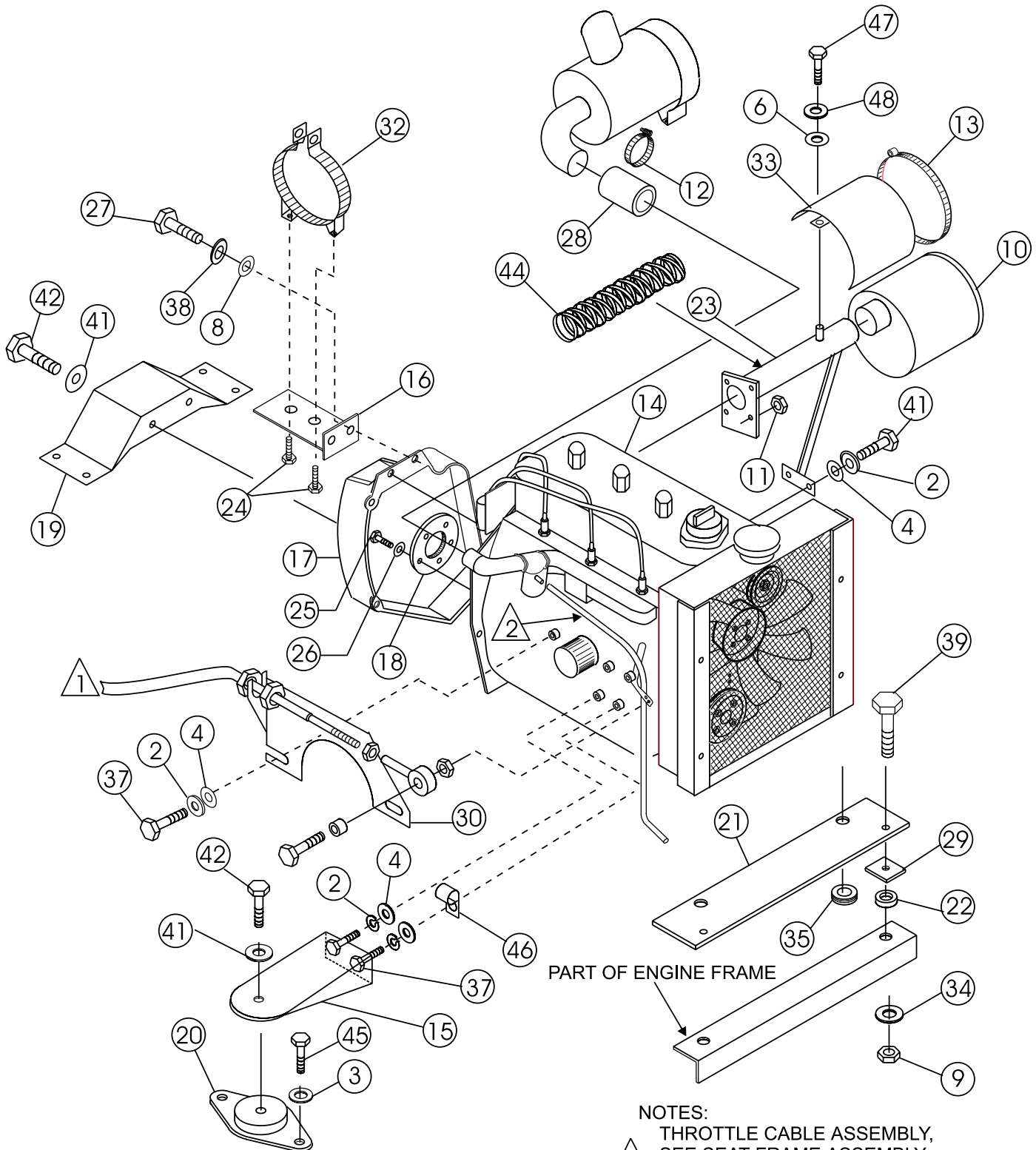
NO	PART NO	PART NAME	QTY.	REMARKS
1+%	0126 B	KEY, WOODRUFF #9	1	
2+%	0161C	WASHER, LOCK 5/16 MED	3	
3 +%	0181 B	WASHER, LOCK, 1/4 MED	1	
4+%	0655	SCREW, HHC 5/16 – 18 X 3/4	3	
5+%	0685	SCREW, SHS 5/16 – 18 X 5/16	1	
6+%	0948	WASHER, FLAT, 1/4 SAE	1	
7+%	10382	BOLT, SHOULDER, 3/8 X 3/8 LONG	1	
8+	10511	SHAFT, PITCH CONTROL, LH TPC	1	
9+%	10512	RING, SNAP, TRUARC 5160 – 75	1	
10+%	10546	HOUSING, PITCH CONTROL, 1-3/4	1	
11+	10722	SLIDE BLOCK, LH PITCH CON	1	
12+%	10723	PIN, SPIROL 3/16 X 1 3/8 HD	1	
13+%	1116	NUT, BRASS JAM 5/16 – 18	2	
14+%	11583	U-JOINT, PITCH CONTROL	1	
15 +%	1162 A	CAP, GREASE ZERK, #2 YELLOW	1	
16+%	11623	CABLE, PITCH ASM	1	
17	11630	TUBE, PITCH CONTROL W/A	1	
18	11649	SPACER, PITCH SPRING	1	
19+%	11652	SHAFT, TWIN PITCH	1	
20 +%	11654	PIN, ROLL 1/8 Z 1 PLATED	2	
21	1499	DECAL, WHITEMAN	1	
22+%	1529	GEAR, MASTER, TPC	1	
23+%	1530	GEAR, SLAVE, TPC	1	
24 +%	1578	KEY, WOODRUFF, #3	1	
25+%	1579	SCREW, HHC 1/4 – 20 X 1/2	1	
26+%	1586	PIN, ROLL 1/8 X 3/4	1	
27+%	1604	BEARING, BALL	1	
28+%	1612	BEARING, ALUM – PITCH CONTR	1	
29 +%	1733	WASHER, 1/32 X 1/2 HARDENED	6	
30+%	2007	SHAFT	1	
31	2012	SLEEVE, ADJ – LONG, RIDER	1	
32	2156	SPRING, COIL	1	
33+%	2169	BEARING, THRUST, TORR #NTA 1220	1	
34+%	2170	BEARING, RACE, TORR #TRA 1220	3	
35+%	2311	SPACER, 3/4 X 1/2 X 8L	1	
36+%	2367	SET COLLAR	1	
37+%	2620	SCREW, BHC 10 – 24 X 5/8	4	
38 +%	2621	ZERK, GREASE STR 1/4 – 28	1	
39	2634	DECAL, PITCH TOWER	1	
40+%	2649	COVER, PITCH CONT HOUSING	1	
41	0202	SCREW, HHC 5/16 – 18 X 1	8	
42*	0300 B	WASHER, FLAT, 5/16 SAE	8	
43*	0730	SCREW, HHC 1/4 – 20 X 1	16	
44*	11653	SLEEVE W/U JOINT	1	
45*	1577	SET COLLAR, 1/2	4	
46*	1987	MITER BOX, PITCH CONTROL	2	
47*	1988	MIT BOX, BEARING CAP RIDERS	4	
48*	2021	SHAFT, MITER VERT JRT	2	
49*	2022	SHAFT, MITER VERTICAL	3	
50	2062	GEAR, MITER, TPC	4	

HTH — LEFT/RIGHT TWIN PITCH ASSY

LEFT/RIGHT TWIN PITCH ASSY

NO.*	PART NO	PART NAME	QTY	REMARKS
51*	2845	SHAFT, MITER BOX HORIZ	1	
52	4514	SCREW, HHC 1/4 – 20 X 5/8	4	
53	5283	NUT, NYLOC 5/16 – 18	8	
54*	11650	RIGHT SIDE TWIN PITCH CONT ASSY	1.....	INCLS ITEM W/%
55	11651	LEFT SIDE TWIN PITCH TOWER ASSY	1.....	INCLS ITEM W/±
56	11655	MITER BOX ASSY	1.....	INCLS ITEM W/
57	1617	LEVER ASSY, TROWEL ADJUSTMENT	2.....	INCLS ITEM W/#
58#	2300	DECAL, AL PITCH, RH	1	
59#	2332	DECAL, AL PITCH, LH	1	
60#	4014	SCREW, 2-3/16 P-K TYPE U DRIVE	4	
61#	4403	CRANK KNOB	1	
62#	3231	SPACER	1	
63#	1615	CRANK LEVER	1	
64#	1733	HARDEN WASHER	1	
65#	1616	SHOULDER BOLT	1	
66#	0185	SCREW, SHSS 3/8 – 16 X 3/8"	1	
67#	1528	SCREW, SHSS 1/4 – 20 X 5/16"	1	
68%	10510	SHAFT, PITCH CONTROL, RH TPC	1	
69%	10721	SLIDE BLOCK, RH PITCH CONTROL	1	

HTH — ENGINE (VANGUARD)

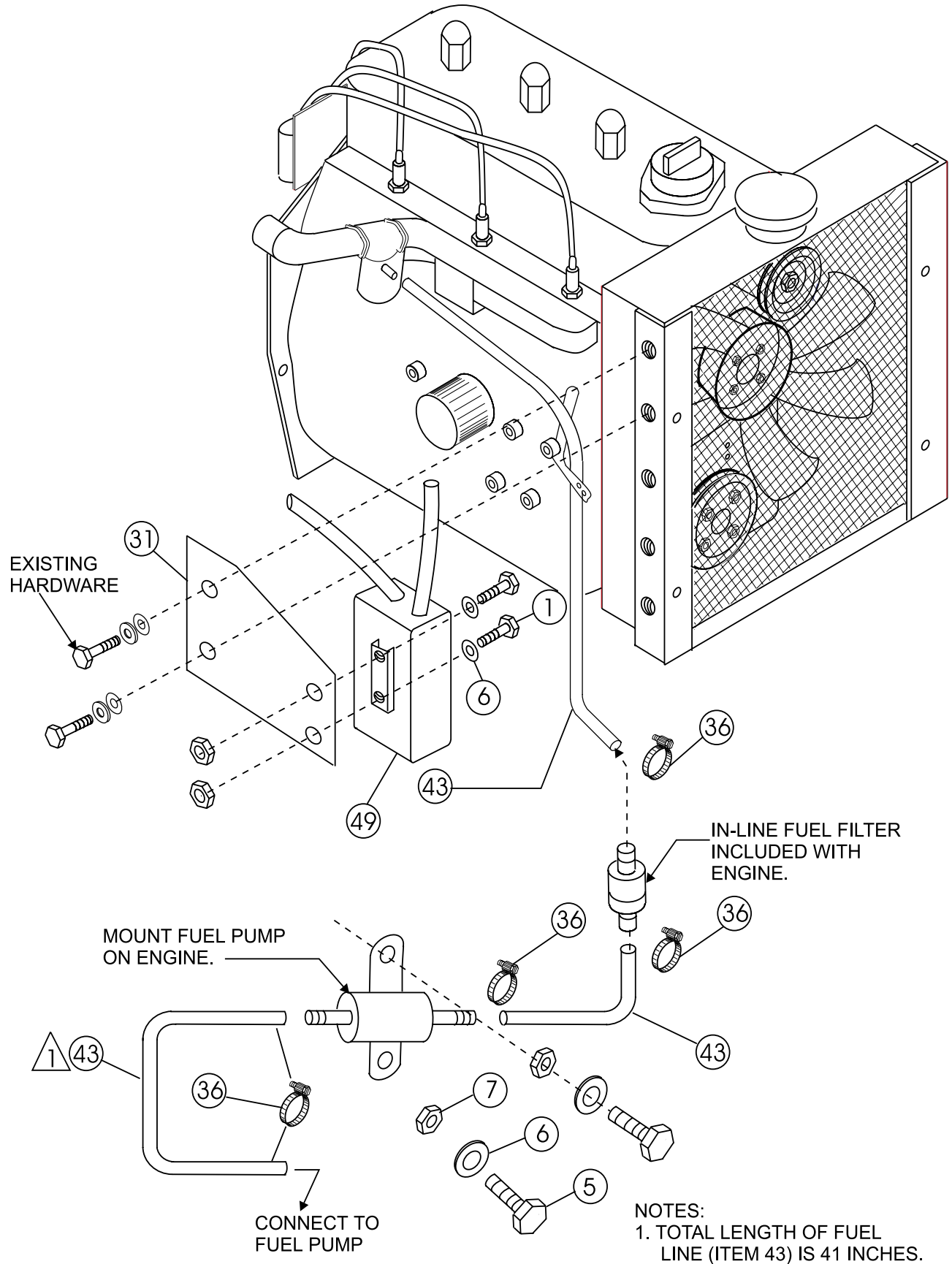


NOTES:

1 THROTTLE CABLE ASSEMBLY,
SEE SEAT FRAME ASSEMBLY
PAGE XX.

2 SEE PAGE XX FOR FUEL CONNECTIONS.

3 REFER TO ENGINE PARTS MANUAL FOR
PARTS THAT ARE NOT REFERENCED.

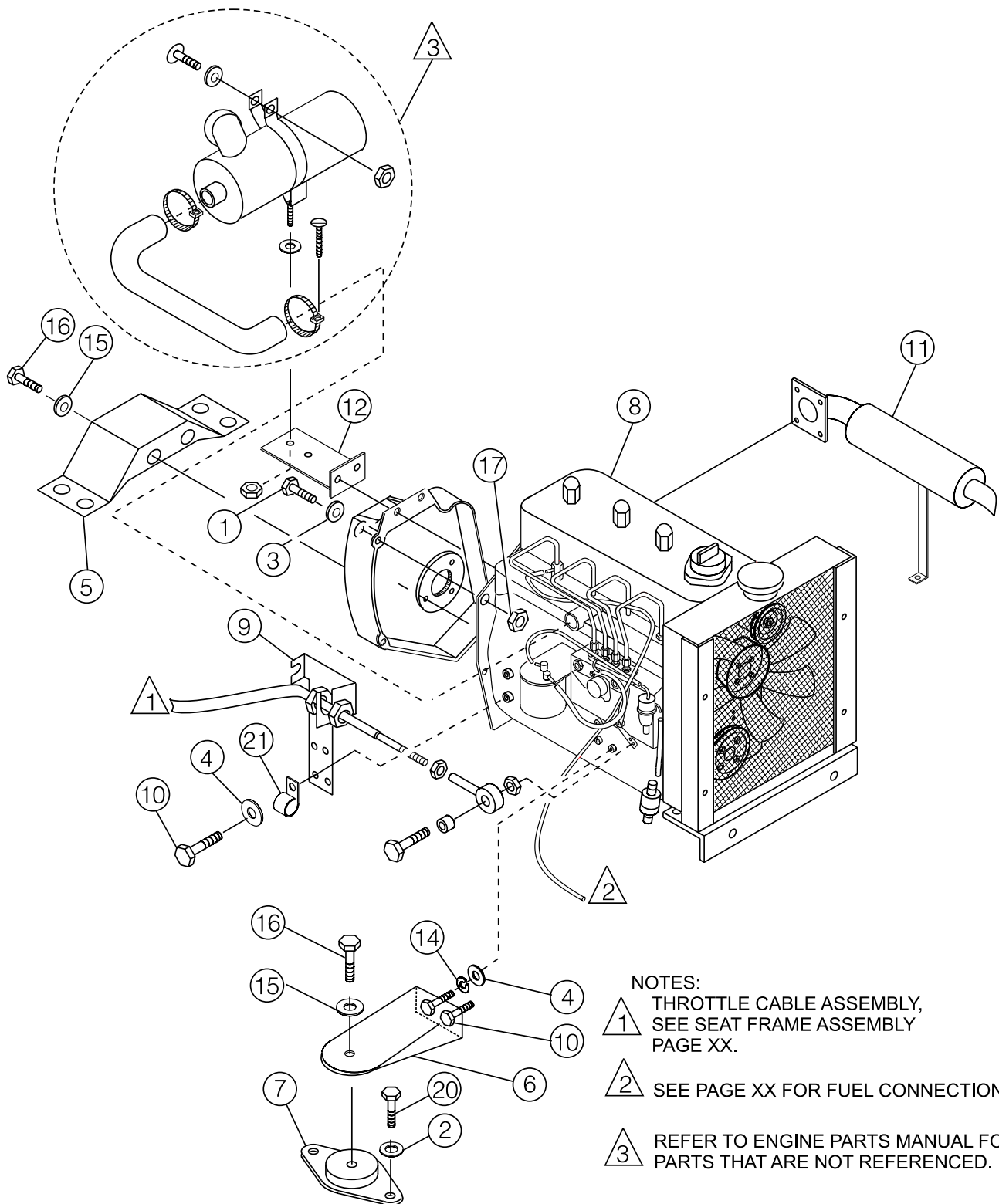


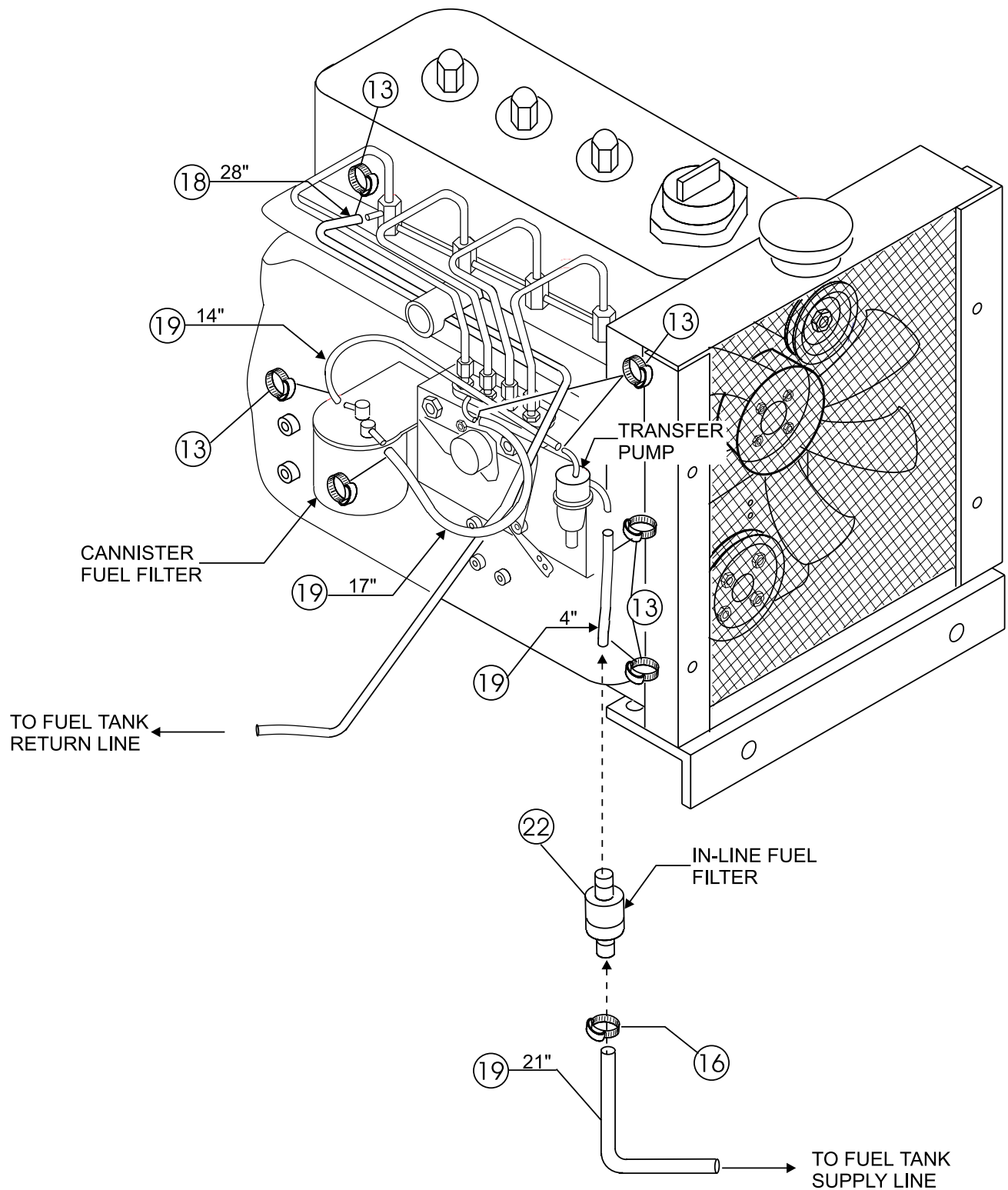
HTH — ENGINE (VANGUARD)

ENGINE (VANGUARD)

NO	PART NO	PART NAME	QTY.	REMARKS
1	0131 A	SCREW, HHC 1/4-20 X 3/4	2	
2	0161 C	WASHER, LOCK, 5/16 MED	9	
3	0166 A	WASHER, LOCK, 3/8 MED	8	
4	0300 B	WASHER, FLAT, 5/16 SAE	9	
5	0730	SCREW, HHC 1/4-20 X 1	2	
6	0948	WASHER, FLAT, 1/4 SAE	6	
7	10024	NUT, NYLOC 1/4-20	4	
8	10136	WASHER, FLAT, 3/8 SAE	2	
9	10176	NUT, NYLOC 1/2-13	2	
10	10208	MUFFLER, W/CLAMP	1	
11	10370	NUT, HEX M8-125	4	
12	10434	CLAMP, 2" HOSE	2	
13	10463	CLAMP, 7" HOSE, SIZE 104	2	
14	11292	ENGINE, BRIGGS 31HP, DM950G	1	
15	11323	MOUNT, LEFT MOTOR W/A	2	
16	11353	MOUNT, AIR CLEANER W/A	1	
17	11363	BELL HOUSING	1	
18	11377	FLANGE, ENGINE	1	
19	11517	MOUNT, RIGHT MOTOR W/A	1	
20	11577	MOUNT, MACHINERY	4	
21	11756	MOUNT, RADIATOR	1	
22	11757	SPACER, RADIATOR MOUNT	2	
23	11804	PIPE, EXHAUST W/A	1	
24	11819	SCREW, HHC 1/4-20 X 3/4 W/WASH	2	
25	11821	SCREW, SHC M8-125 X 25, G109, NP	5	
26	11822	WASHER, 5/16 SAE HARDEN NONPLA	5	
27	11827	SCREW, HHC M10-125 X 50 mm PLAT	2	
28	11833	HOSE, 1-3/4 id X 3-1/2 (INTAKE)	1	
29	11834	SPACER, RADIATOR	2	
30	11899	BRACKER, THROTTLE	1	
31	11900	MOUNT, RADIATOR OVERFLOW	1	
32	12103	CLAMP, 31V AIR CLEANER ASM	1	
33	12194	HEAT SHIELD W/A	1	
34	13211	WASHER, FLAT, 1/2 USS	2	
35	19468	GROMMET, MINOR PN Z-4004	2	
36	19473	CLAMP, WORM HOSE, #4 (1/4-5/8)	6	
37	2866	SCREW, HHC M8-125 X 20 mm	9	
38	2955	WASHER, LOCK, 7/16	2	
39	3242	SCREW, HHC 1/2-13 X 1 3/4	2	
40	3333	CLAMP, 1 1/4 HOSE	2	
41	5054 A	WASHER, LOCK, 1/2 MED	6	
42	5218	SCREW, HHC 1/2-13 X 1 1/2	6	
43	60013	HOSE, 25 id RUBBER FUEL LINE	3	
44	60025	TAPE, 1/8 X 2 FIBERGLASS HI TEMP	5	
45	6869	SCREW, HHC 3/8-24 X 1/2	7	
46	8126	CLAMP, HOSE SUPPORT 1/2" SMALL	1	
47	4514	SCREW, HHCS 1/4-20 X 5/8"	1	
48	0181 B	LOCK WASHER 1/4"	1	
49	11993	OVERFLOW BOTTLE	1	
50	12497	FUEL PUMP	1	
51	11984	FUEL FILTER	1	

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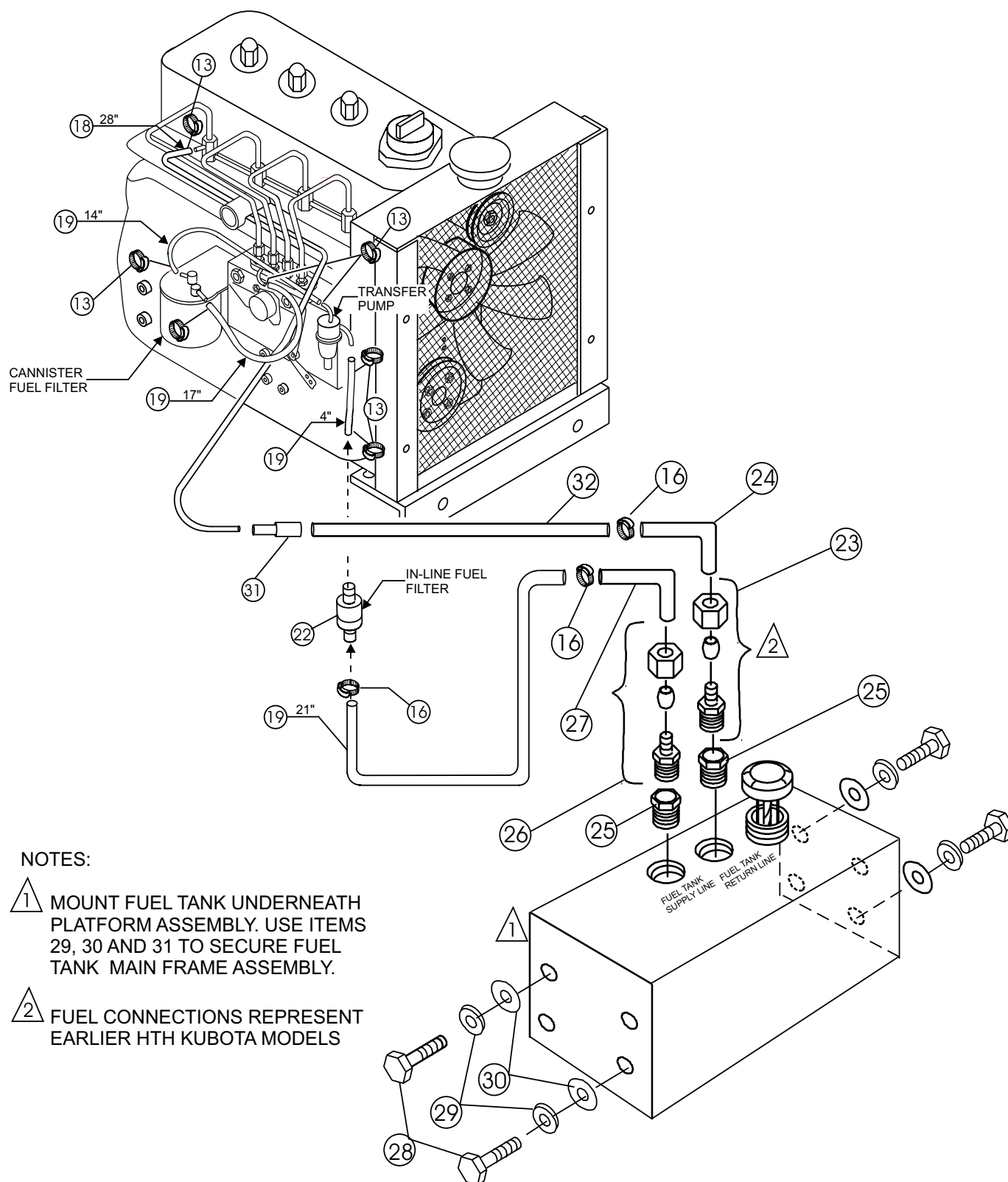
HTH — ENGINE (KUBOTA)

ENGINE (KUBOTA)

<u>NO</u>	<u>PART NO</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0105	SCREW, HHC 5/16-18 X 1 1/2	2	
2	0166 A	WASHER, LOCK, 3/8 MED	8	
3	0300 B	WASHER, FLAT, 5/16 SAE	1	
4	10136	WASHER, FLAT, 3/8 SAE	5	
5	11517	MOUNT, RIGHT MOTOR W/A	1	
6	11520	MOUNT, LEFT MOTOR W/A	2	
7	11577	MOUNT, MACHINERY	4	
8	11597	ENGINE, KUBOTA 33HP, V1505	1	
9	11618	BRACKET, THROTTLE W/A	1	
10	11662	SCREW, HHC M10 – 125 X 25 MM	5	
11	11732	MUFFLER W/A, 38 KUB (ASSY ONLY)	1	
12	11740	BRACKET, AIR FILTER W/A	1	
13	19473	CLAMP, WORM HOSE, #4 (1/4 – 5/8)	12	
14	2955	WASHER, LOCK, 7/16	4	
15	5054 A	WASHER, LOCK, 1/2 MED	6	
16	5218	SCREW, HHC 1/2 – 13 X 1 1/2	6	
17	5283	NUT, NYLOC 5/16 – 18	2	
18	60004	HOSE, 187 ID RUBBER FUEL	2	
19	60028	HOSE, 312 ID RUBBER FUEL	4	
20	6869	SCREW, HHC 3/8 – 24 X 1/2	7	
21	8125	CLAMP, HOSE SUPPORT 5/8"	1	
22	11984	IN-LINE FUEL FILTER	1	

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HTH — ENGINE (KUBOTA) BELOW S/N JG53027



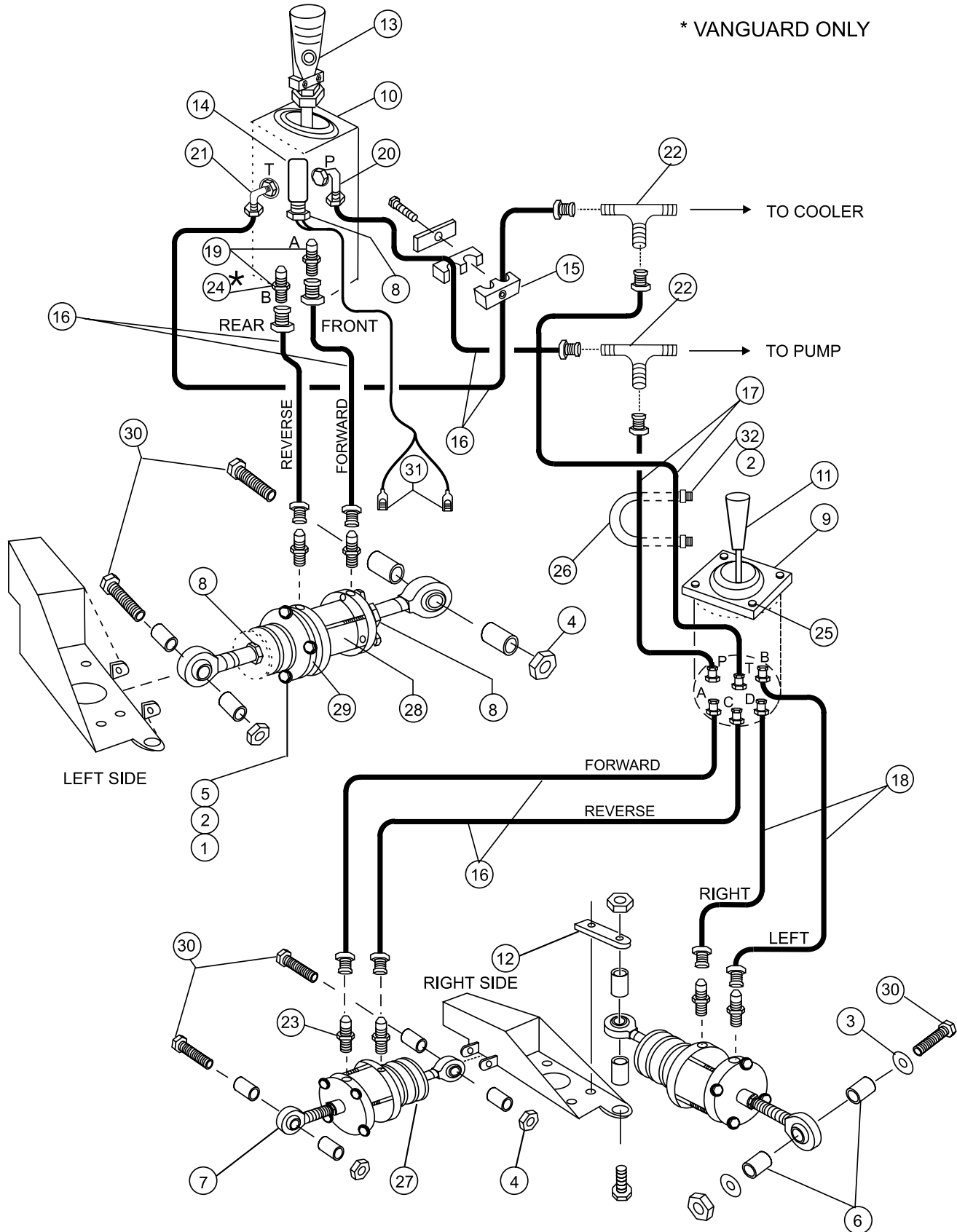
HTH — ENGINE (KUBOTA) BELOW S/N JG53027

ENGINE (KUBOTA) BELOW S/N JG53027

<u>NO</u>	<u>PART NO</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0105	SCREW, HHC 5/16-18 X 1 1/2	2	
2	0166 A	WASHER, LOCK, 3/8 MED	8	
3	0300 B	WASHER, FLAT, 5/16 SAE	1	
4	10136	WASHER, FLAT, 3/8 SAE	5	
5	11517	MOUNT, RIGHT MOTOR W/A	1	
6	11520	MOUNT, LEFT MOTOR W/A	2	
7	11577	MOUNT, MACHINERY	4	
8	11597	ENGINE, KUBOTA 33HP, V1505	1	
9	11618	BRACKET, THROTTLE W/A	1	
10	11662	SCREW, HHC M10 – 125 X 25 MM	5	
11	11732	MUFFLER W/A, 38 KUB (ASSY ONLY)	1	
12	11740	BRACKET, AIR FILTER W/A	1	
13	19473	CLAMP, WORM HOSE, #4 (1/4 – 5/8)	12	
14	2955	WASHER, LOCK, 7/16	4	
15	5054 A	WASHER, LOCK, 1/2 MED	6	
16	5218	SCREW, HHC 1/2 – 13 X 1 1/2	6	
17	5283	NUT, NYLOC 5/16 – 18	2	
18	60004	HOSE, 187 ID RUBBER FUEL	2	
19	60028	HOSE, 312 ID RUBBER FUEL	4	
20	6869	SCREW, HHC 3/8 – 24 X 1/2	7	
21	8125	CLAMP, HOSE SUPPORT 5/8"	1	
22	11984	IN-LINE FUEL FILTER	1	
23	12002	FITTING BRASS 4 COMPR-1/4MP	1	
24	12019	TUBE, FUEL RETURN HTHK	1	
25	19601	FITTING BUSH 1/2 MP-1/4 FP BRASS	1	
26	19594	FITTING BRASS 1/4 MP-5TUBE NUT	1	
27	11675	TUBE FUEL PICK-UP	1	
28	0131A	HHCS 1/4 20 X 3/4"	8	
29	0181B	LOCK WASHER 1/4	8	
30	0948	FLAT WASHER 1/4	8	
31	11978	FITTING, PLASTIC 4BARB 3 BARB	1	
32	2914	HOSE 1/4" ID (6 INCHES)	1	

HTH — HYDRAULIC STEERING ASSY

* VANGUARD ONLY

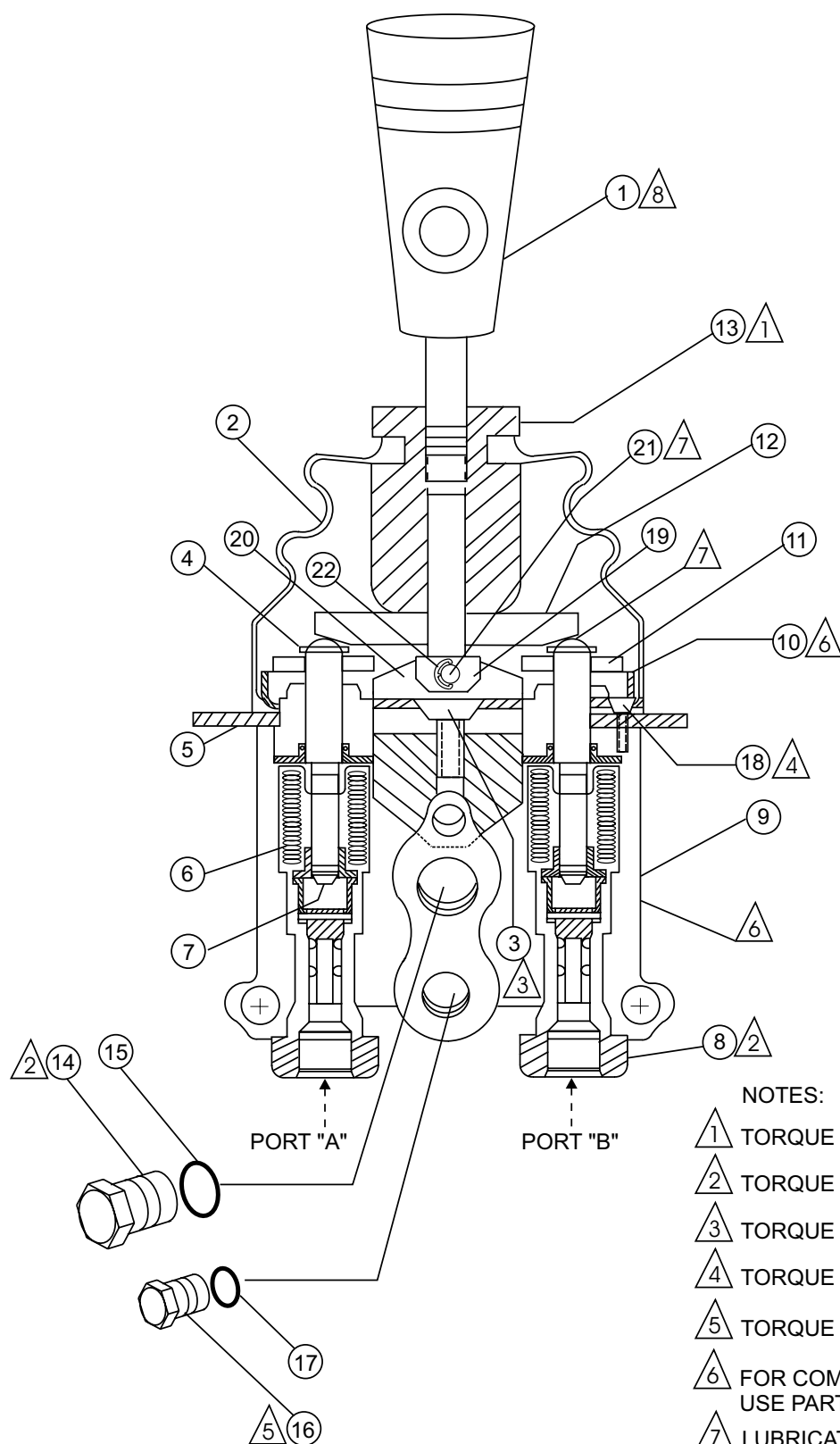


HTH — HYDRAULIC STEERING ASSY

HYDRAULIC STEERING ASSY

<u>NO</u>	<u>PART NO</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0161 C	WASHER, LOCK, 5/16 MED	12	
2	0300 B	WASHER, FLAT, 5/16 SAE	16	
3	0447	WASHER, FLAT, 1/2 SAE	2	
4	10176	NUT, NYLOC 1/2-13	6	
5	10229	SCREW, HHC 5/16-24 X 1	12	
6	11141	SPACER, ROD END	12	
7	11142	ROD END, 1/2-20 MALE RH	6	
8	11146	NUT, HEX JAM 1/2-20	7	
9	11422	VALVE, STRG CTL RT HUS7480-61	1	
10	11423	VALVE, STRG CTL LF HUS7470-A43	1	
11	11455	HANDLE, STRG CTL HUSCO 51973	1	
12	11614	BRACKET, CYLINDER MOUNT	1	
13	11619	HANDLE, LEFT VALVE	1	
14	11676	TUBE, HANDLE	1	
15	11686	CLAMP, SMALL HOSE #19	2	
16	11696	HOSE, BLACK 35 1/2, 3/8 ID	6	
17	11698	HOSE, BLACK 15 1/2, 3/8 ID	2	
18	11699	HOSE, BLACK 52 1/2, 3/8 ID	2	
19	11721	FITTING, STR 6MJ-6MO	7	
20	11722	FITTING, 90 6MJ-6MO	1	
21	11723	FITTING, 90 6MJ-8MO	1	
22	11724	FITTING, TEE 6MJ UNION	2	
23	11725	FITTING, STR 6MJ-1/4 MP	6	
24	11780	FITTING, 45 6MJ-6MO	1.....	* VANGUARD ONLY
25	11910	SHIM, STEERING PRESSURE	6	
26	11956	U-BOLT, 5/16-18, 1 3/4 DIA	2	
27	12038	BELLOWS, STEERING CYL	3	
28	12056	CYLINDER, HYD STEERING	3	
29	12060	PLATE, BELLOWS MOUNTING	3	
30	2549	SCREW, HHC 1/2-13 X 3	6	
31	4692	TERMINAL, BULLET, MALE, 14-16	2	
32	5283	NUT, NYLOC 5/16-18	4	

HTH — VALVE ASSY (LEFT SIDE)



NOTES:

- 1 TORQUE TO 48 ± 5 FT. LBS
- 2 TORQUE TO 33 ± 3.5 FT. LBS
- 3 TORQUE TO 14 ± 1.5 FT. LBS
- 4 TORQUE TO 7 ± 1.0 FT. LBS
- 5 TORQUE TO 18 ± 2.0 FT. LBS
- 6 FOR COMPLETE VALVE ASSY. USE PART NUMBER 11423.
- 7 LUBRICATE PIVOT JOINT, PLATE AND PLUNGER CONTACT AREAS AS REQUIRED.
- 8 FOR LEFT HANDLE PARTS BREAK-DOWN SEE PAGE 46.

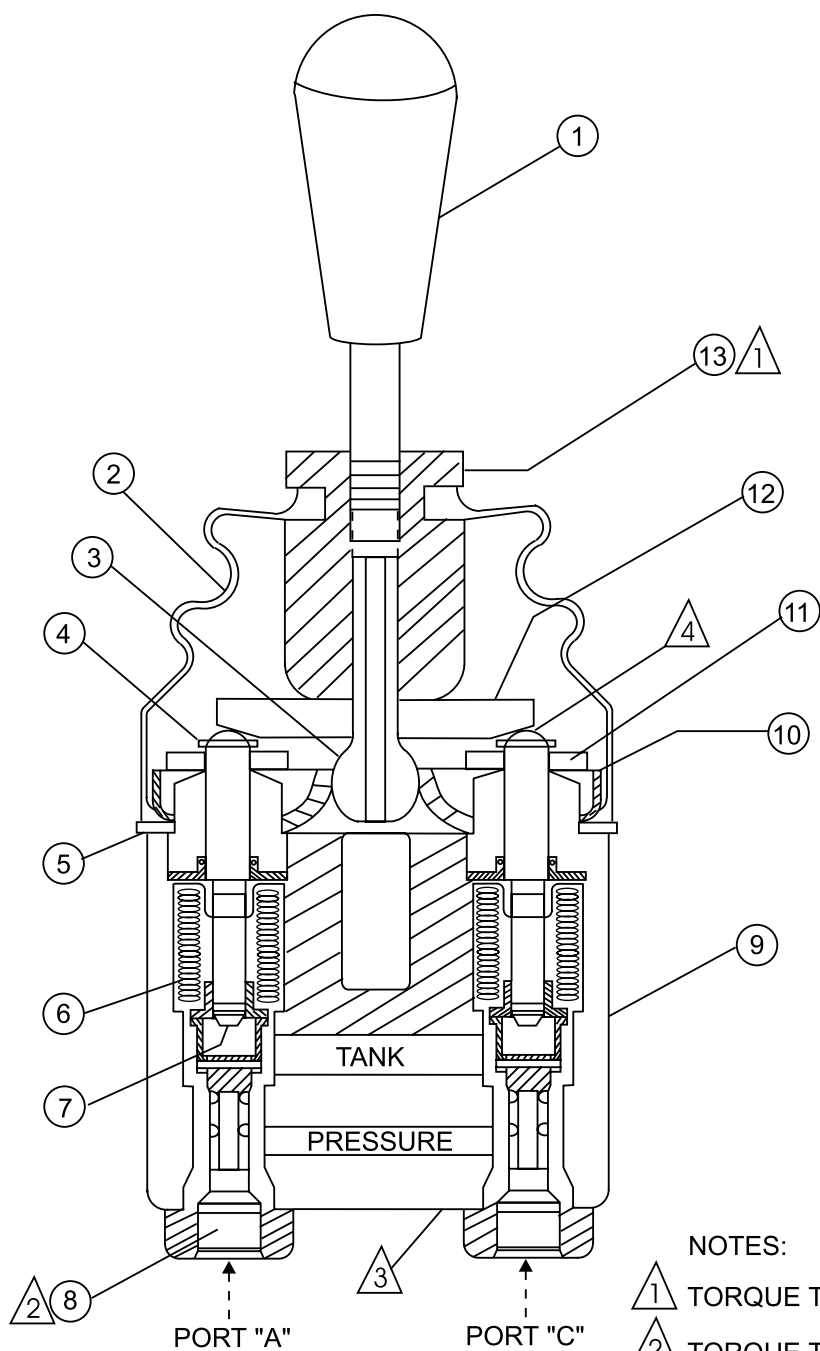
HTH — VALVE ASSY (LEFT SIDE)

VALVE ASSY (LEFT SIDE)

NO	PART NO	PART NAME	QTY.	REMARKS
				*
*	11423	VALVE ASSY	1	INCLS. ITEMS W/
1*	11619	HANDLE, LEFT VALVE	1	
2*	12519	BOOT, RIGHT	1	
3*	HU51761	CAP SCREW-FLAT HD	1	
4*	HU53616	RETAINING RING-EXT	2	
5*	12536	GASKET	2	
6*	HU53748	SPRING	2	
7*	12522	PLUNGER CAPSULE ASSY.	2	
8*	12521	METERING CAPSULE ASSY.	2	
9*	HU7472-A11	HOUSING- PILOT VALVE	1	
10*	HU51773-1	CLAMP BOOT	1	
11	11910	SHIM	6	KUBOTA: S/N KK48264 TO IC60121 w/SHIMS S/N IC60122 AND LATER w/o SHIMS VANGUARD: S/N KL48771 TO J154148 w/SHIMS
12*	HU51941	PLATE-PIVOT	1	
13*	HU51494	NUT-SPECIAL	1	
14*	HU3108	PLUG-SAE	1	
15*	HU53-908	O-RING	1	
16*	HU3182	PLUG-SAE	1	
17*	HU53-906	O-RING	1	
18*	HU51775	CAP SCREW-FLAT HD	1	
19*	HU51771-1	BOLT-PIVOT	1	
20*	HU51769	BRACKET-PIVOT	1	
21*	HU51774	PIN-PIVOT	1	
22	HU51770	RETAINING RING-EXT	2	

HTH — VALVE ASSY (RIGHT SIDE)

VALVE ASSY (RIGHT SIDE)



NOTES:

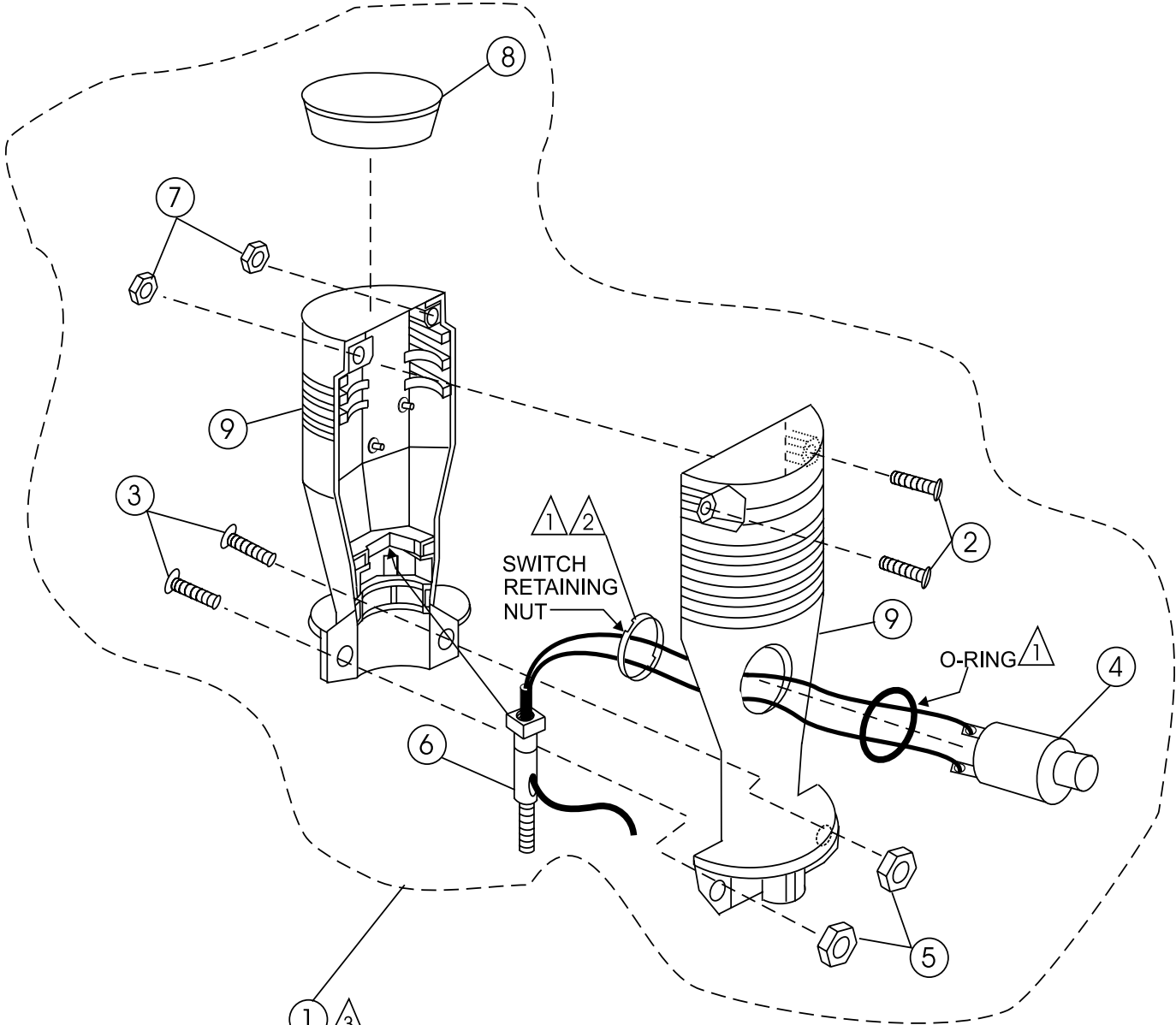
- ① TORQUE TO 48 ± 5 FT. LBS
- ② TORQUE TO 33 ± 3.5 FT. LBS
- ③ FOR COMPLETE VALVE ASSY. USE PART NUMBER 11422
- ④ LUBRICATE BALL AND SOCKET JOINT, ACTUATOR PLATE, AND PLUNGER CONTACT AREAS AS REQUIRED.

HTH — VALVE ASSY (RIGHT SIDE)

VALVE ASSY (RIGHT SIDE)

<u>NO</u>	<u>PART NO</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u> *
*	11422	VALVE ASSY	1.....	INCLS. ITEMS W/
1 *	11455	HANDLE, RIGHT VALVE	1	
2 *	12518	BOOT, RIGHT	1	
3 *	HUP51999	BOLT ASSY, PIVOT	1	
4 *	HU53616	RETAINING RING-EXT	2	
5 *	12535	GASKET	4	
6 *	HU53748	SPRING	4	
7 *	12522	PLUNGER CAPSULE ASSY.	4	
8 *	12521	METERING CAPSULE ASSY.	4	
9 *	HU51505-A1	HOUSING VALVE	1	
10 *	HU52698	CLAMP, BOOT	1	
11	11910	SHIM	6.....	KUBOTA: S/N KK48264 TO IC60121 w/SHIMS S/N IC60122 AND ABOVE w/o SHIMS VANGUARD: S/N KL48771 TO J154148 w/SHIMS
12 *	HU51489	PLATE-PIVOT	1	
13	HU51494	NUT-SPECIAL	1	
14	HU515022	PLATE, MOUNTING	1	

HTH — HANDLE ASSY (LEFT SIDE)



NOTES:

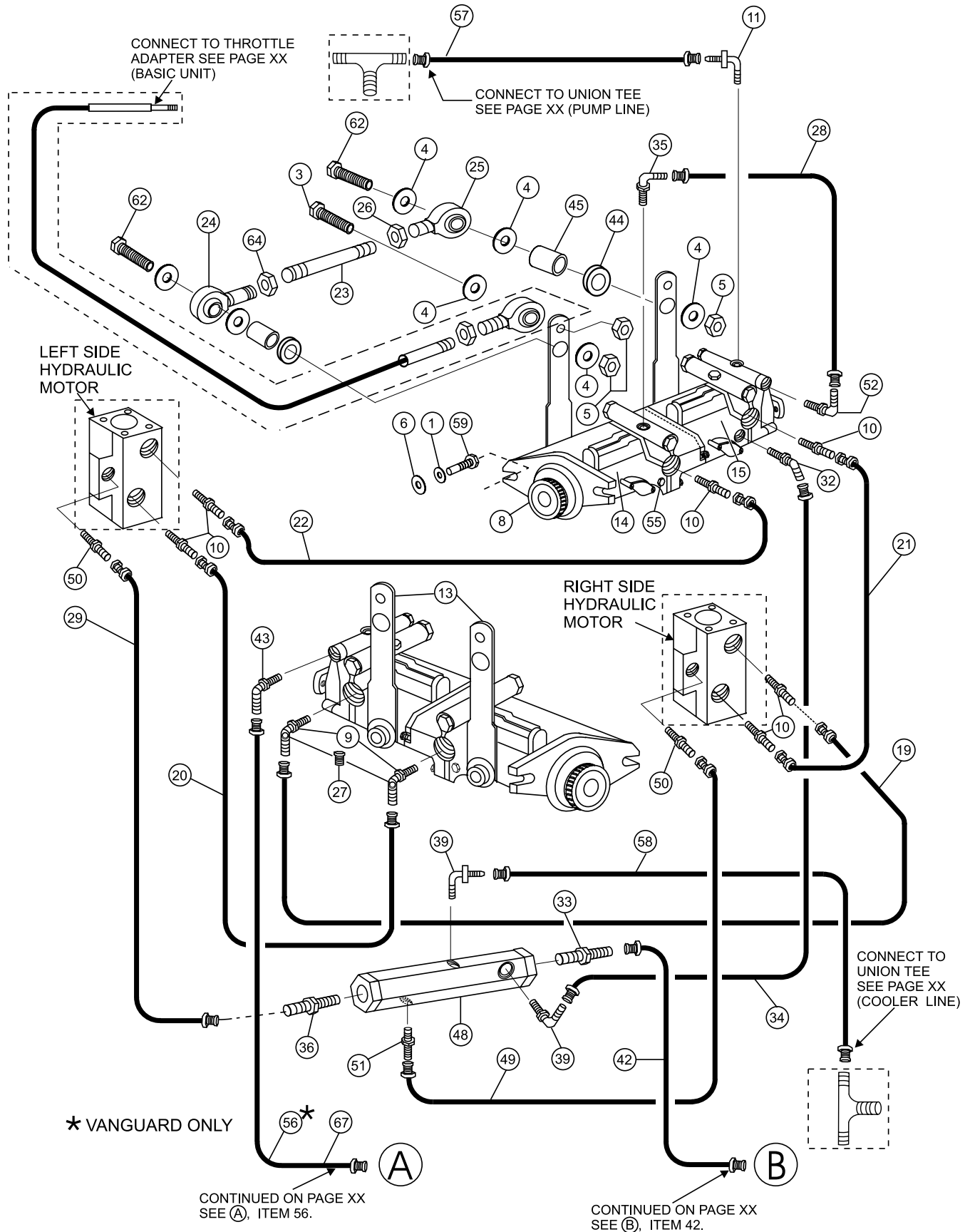
- 1 O-RING AND SWITCH RETAINING NUT ARE PART OF ITEM 4 (P/N 12473).
- 2 APPLY A SMALL AMOUNT OF LOW STRENGTH LOCTITE TO HOLD SWITCH RETAINING NUT IN PLACE.
- 3 INCLUDES ALL ITEMS WITHIN OUTLINE. FOR COMPLETE HANDLE ASSEMBLY USE P/N 11619.

HTH — HANDLE ASSY (LEFT SIDE)

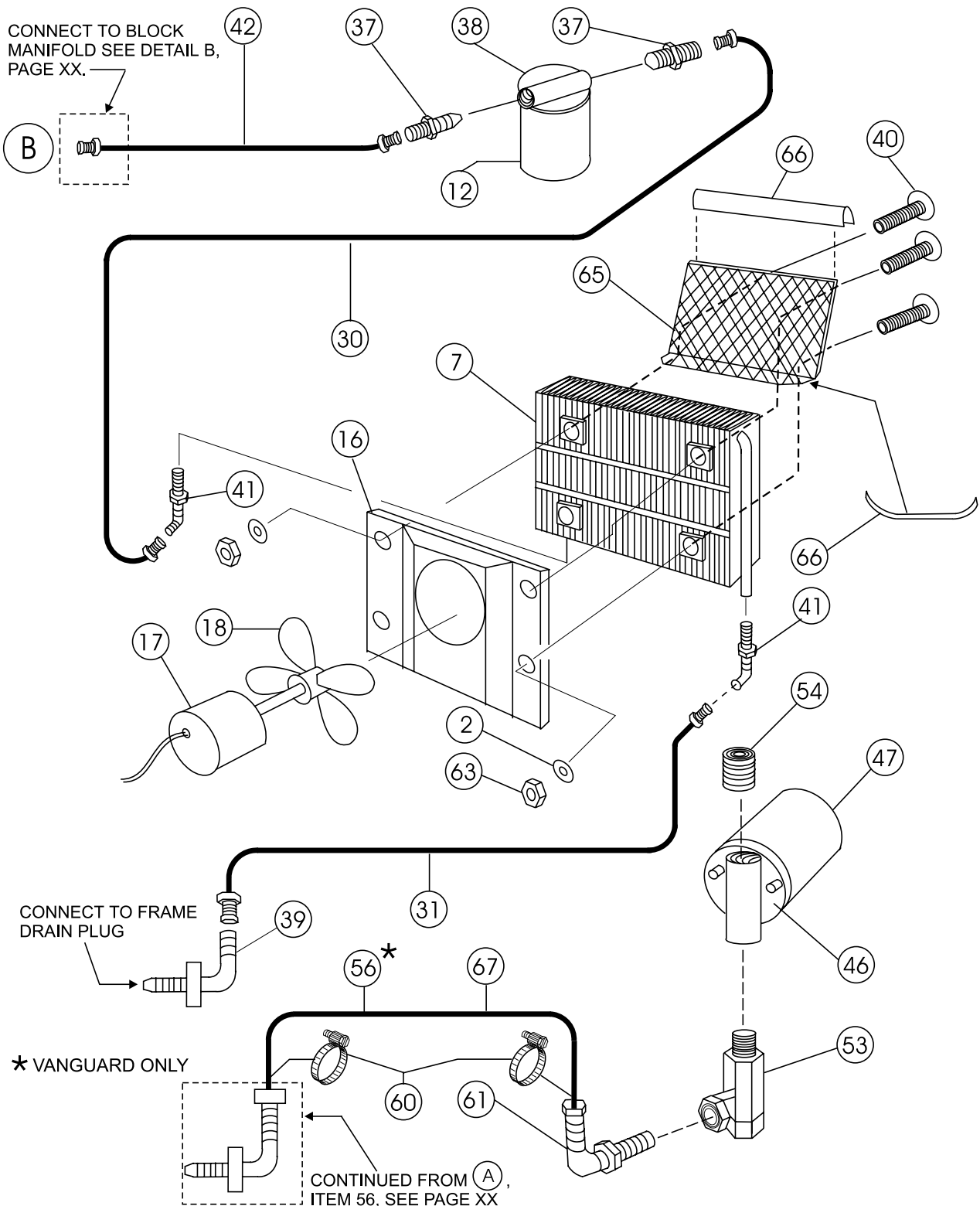
HANDLE ASSY (LEFT SIDE)

<u>NO</u>	<u>PART NO</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1*	11619	HANDLE ASSY, LEFT VALVE	1	INCLS. ITEMS W/ *
2*	OEMAA5	UPPER SCREW	2	
3*	OEMAA7	LOWER SCREW	2	
4*	12473	10 AMP MOMENTARY SPST PB SWITCH	1	
5*	OEMAA8	LOWER NUT	2	
6*	11676	ADAPTER COUPLING W/CABLE PASSAGE	1	
7*	OEMAA6	UPPER NUT	2	
8*	12487	BOOT, TOP HANDLE	1	
9	OEM2783AM	2-PIECE HANDLE W/HARDWARE	1	

HTH — HYDRAULIC DRIVE ASSY



HTH — HYDRAULIC DRIVE ASSY



HTH — HYDRAULIC DRIVE ASSY

HYDRAULIC DRIVE ASSY

NO	PART NO	PART NAME	QTY.	REMARKS
1	0166 A	WASHER, LOCK, 3/8 MED	2	
2	0300 B	WASHER, FLAT, 5/16 SAE	4	
3	0424	SCREW, HHC 1/4-20 X 1 1/4	1	
4	0948	WASHER, FLAT, 1/4 SAE	7	
5	10024	NUT, NYLOC 1/4-20	3	
6	10136	WASHER, FLAT, 3/8 SAE	2	
7	11297	COOLER, OIL (DUN & BUSH DB 1232)	1	
8	11378	COUPLING, PUMP	1	
9	11385	FITTING, 90 12MJ-12MO & 2FP	2	
10	11386	FITTING, STR 12MJ-12MO	6	
11	11396	FITTING, 90 8MJ-8MO	1	
12	11402	FILTER, ZINGA AE-10	1	
13	11421	LEVER, PUMP TL SPEN SP791-11	2	
14	11486	PUMP, LF EATON 70144-DBK-SP	1	COMPLETE ASSY ORDER P/N 12804
15	11490	PUMP, RIGHT EATON 70144-RFD-SP	1	COMPLETE ASSY ORDER P/N 12804
16	11546	SHROUD, OIL COOLING FAN W/A	1	
17	11579	MOTOR, 12 VOLT FAN	1	
18	11580	FAN, COOLING (BLADE)	1	
19	11588	HOSE ASM, 3/4 ID X 27 LG 90 END	1	
20	11589	HOSE, MOTOR SUP LEFT SIDE 56"	1	
21	11590	HOSE, MOTOR RETURN RT SIDE 24"	1	
22	11591	HOSE, MOTOR RETURN LF SIDE 46"	1	
23	11610	ROD, PUMP ACTUATOR	1	
24	11611	ROD END, 1/4-28 FEMALE RH	1	
25	11612	ROD END, 1/4-28 FEMALE LH	1	
26	11613	NUT, FULL HEX 1/4-28 LEFT HAND	1	
27	11682	FITTING, PLUG 1/8 MP SF HEAD	2	
28	11698	HOSE, BLACK 15 1/2, 3/8 ID	1	
29	11699	HOSE, BLACK 52 1/2, 3/8 ID	1	
30	11704	HOSE, BLACK 22 1/2, 1/2 ID	1	
31	11705	HOSE, BLACK 75 1/2, 1/2 ID	1	
32	11716	FITTING, 45 8MJ-6MO	1	
33	11719	FITTING, STR 1/2 MP-8MJ	1	
34	11720	HOSE, 9 1/2 LONG X 1/2	1	
35	11723	FITTING, 90 6 MJ-8MO	1	
36	11725	FITTING, STR 6MJ-1/4 MP	1	
37	11749	FITTING, STR 8MJ-8MO	2	
38	11754	HOUSING, FILTER, ZINGA ZAF08050	1	
39	11755	FITTING, 90 8MJ-3/8MP	3	
40	11783	BOLT, CARRIAGE 5/16-18 X 3"	4	
41	11786	FITTING, 45 8MJ-1/2 MP	2	
42	11794	HOSE, 1/2 X 10"	1	
43	11870	FITTING, 90 12 BARB-8MO	1	
44	11874	GROMMET, LEVER MINOR	2	
45	11875	SPACER, PUMP LEVER GROMMET	2	
46	11883	HOUSING, SUC FLTR ZINGA SF-100	1	
47	11884	ELEMENT, SUC FLTR ZINGA SE-10	1	
48	11885	BLOCK, MANIFOLD	1	
49	11886	HOSE, LEFT MOTOR DRAIN	1	
50	11887	FITTING, STR 6MJ-4MO	2	

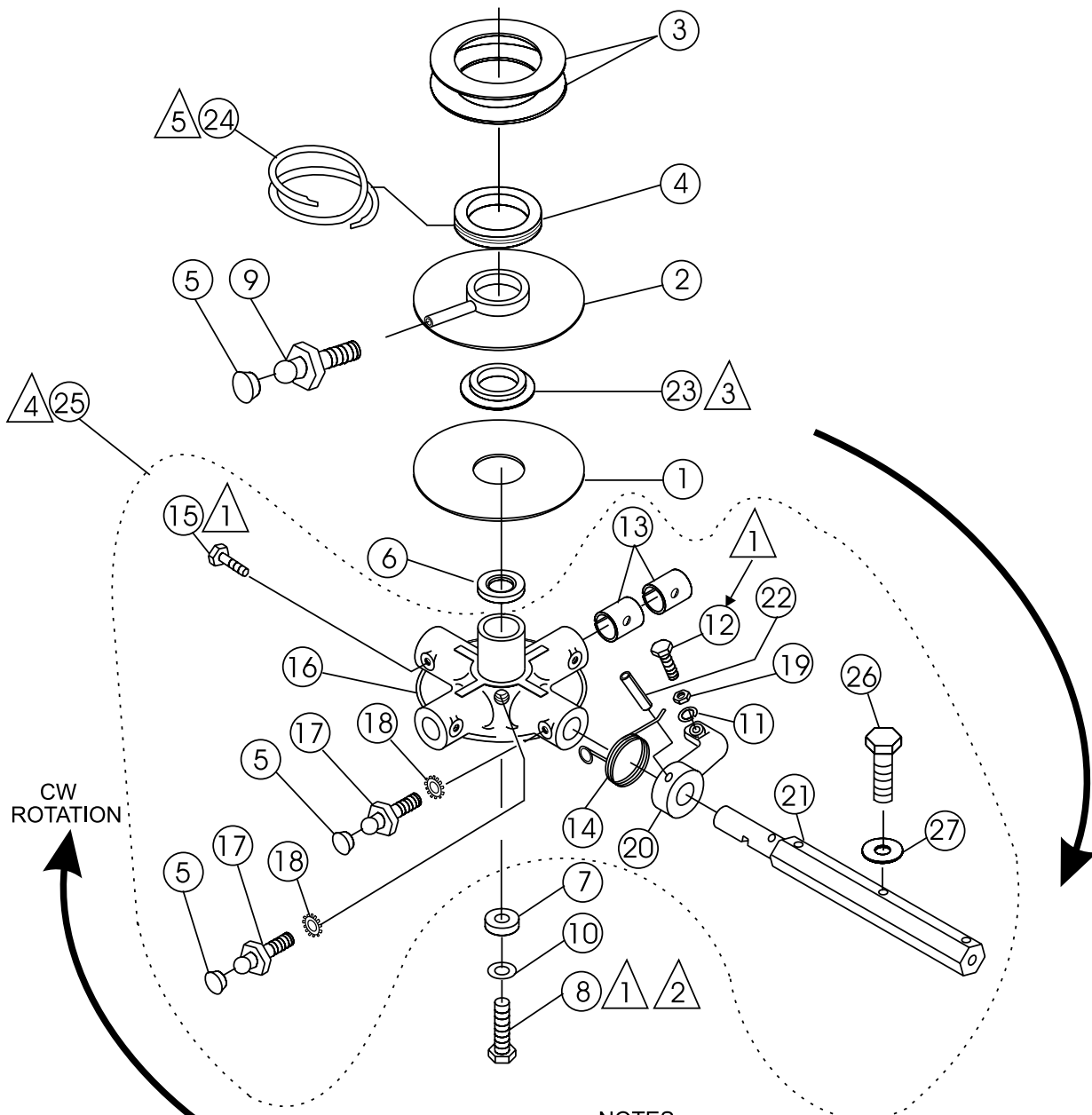
HTH — HYDRAULIC DRIVE ASSY

HYDRAULIC DRIVE ASSY

NO	PART NO	PART NAME	QTY.	REMARKS
51	11888	FITTING, STR 8MJ-3/8 MP	1	
52	11889	FITTING, 45 6MJ-8MO	1	
53	11892	FITTING, 90 1 MP-3/4 FP SWIV	1	
54	11893	FITTING, NIPPLE 1 MP CLOSE	1	
55	11894	FITTING, PLUG HEX HEAD 6 MO	1	
56	11896	HOSE, SUCTION 3/4 100 R4 18" LG	1.....	* VANGUARD ONLY
57	11948	HOSE, 15-1/2" X 3/8 ID -06-08	1	
58	11949	HOSE, 23 X 3/8 ID -06-08	1	
59	1284	SCREW, HHC 3/8-16 X 1 1/2	2	
60	3333	CLAMP, 11/4 HOSE	2	
61	3367	FITTING, 90 128 ARB - 3/4 MP	1	
62	5277	SCREW, HHC 1/4-20 X 1 1/2	2	
63	5283	NUT, NYLOC 5/16-18	4	
64	6904	NUT, HEX FINISH 1/4-28	1	
65	11681	COVER, OIL COOLER & RADIATOR	2	
66	60049	TRIM EDGE 1/32	2	
67	3462	HOSE, SUCTION	2.....	KUBOTA ONLY

HTH — 4-BLADE SPIDER (LEFT) ASSY

LEFT SIDE SPIDER ASSEMBLY
(VIEW FROM DRIVERS SEAT)



NOTES:

- ① APPLY LOCTITE P/N 1477
- ② TORQUE TO 90 FT. LBS
- ③ INCLUDED WITH ITEM 2 OR CAN BE ORDERED SEPARATELY(P/N 11464).
- ④ LEFT SIDE SPIDER ASSEMBLY P/N 11850 INCLUDES ALL ITEMS WITHIN OUTLINE.
- ⑤ INCLUDED WITH ITEM 4 OR CAN BE ORDERED SEPARATELY(P/N 12212).

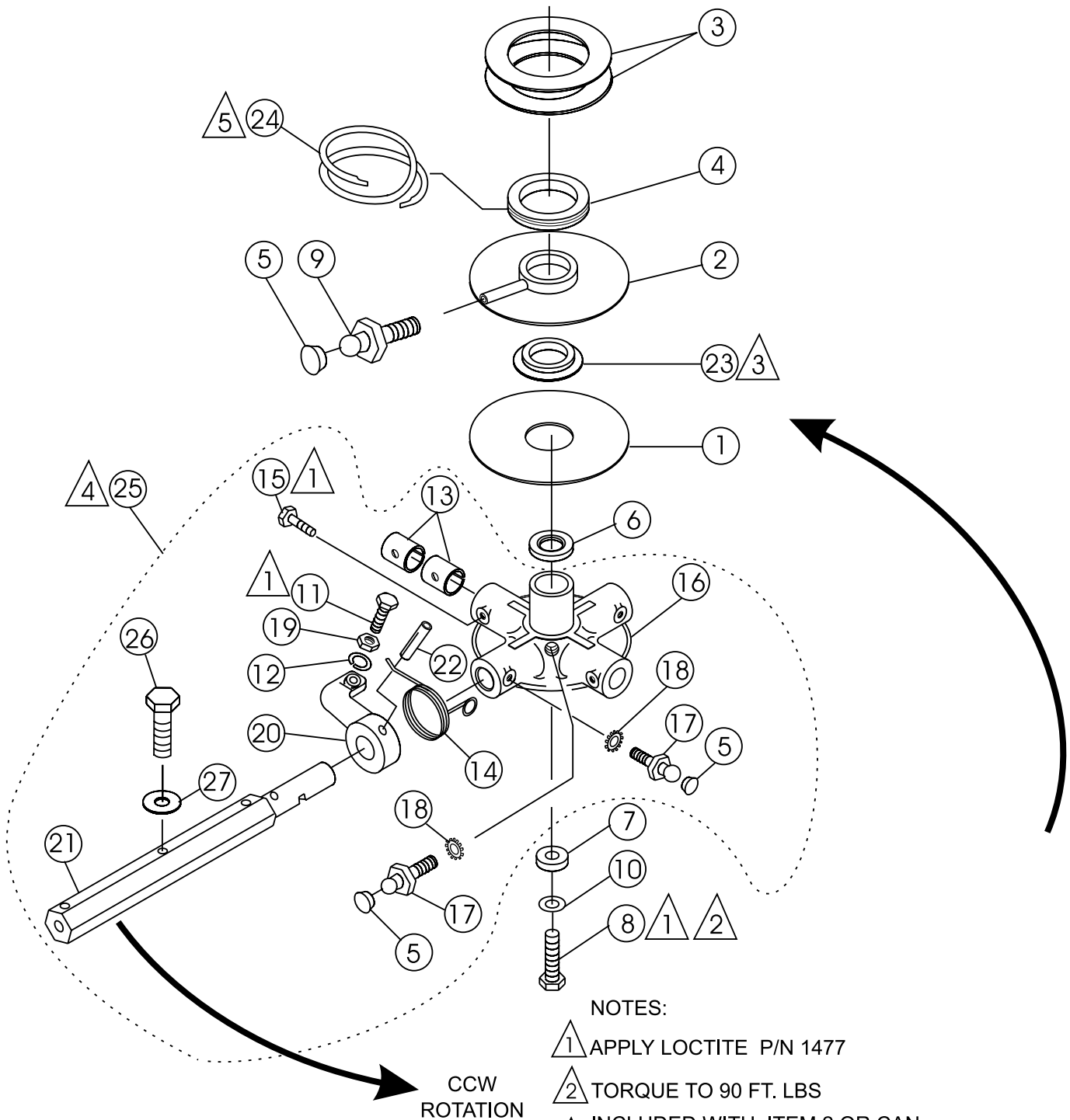
HTH — 4-BLADE SPIDER (LEFT) ASSY

4-BLADE SPIDER (LEFT) ASSY

NO	PART NO	PART NAME	QTY.	REMARKS
1	11419	PLATE, WEAR	1	
2	11431	THRUST COLLAR W/BUSHING	1.....	INCLS. ITEM W/+
3	12406	WEAR, CAP	2	
4	11493	BEARING, 6017 2 RSNR W/3200-130	1.....	INCLS. ITEM W/*
5#	1162 A	CAP, GREASE ZERK, #2 YELLOW	1	
6	11952	SPACER, 12MMX.12L	1	
7	11953	RETAINER, SPIDER	1	
8	12050	SCREW, HHC M12-1.75 X 60 10.9, NP	1	
9	2621	ZERK, GREASE STR 1/4-28	1	
10	5054 A	WASHER, LOCK, 1/2MED.	1	
11#	0164 B	SCREW, HHC 3/8-16 X 1 1/4 F.T.	4	
12#	0166 A	WASHER, LOCK, 3/8 MED.	4	
13#	11039	BUSHING, 1/2HD TROWEL ARM	8	
14#	11595	SPRING, L.S. ARM RETURN	4	
15#	11602	SCREW, HHC 3/8-16 X 3/8	4	
16#	12049	PLATE, SPIDER, 40MM BORE	1	
17#	1322	SCREW, RETAINING	4	
18#	1875	WASHER, INT. SHKP, 3/8	4	
19#	1876	NUT, HEX JAM 3/8-16 CLASS 2B	4	
20#	9005	LEVER, TROWEL RH	4	
21#	2829	ARM, TROWEL	4	
22#	9006	PIN, ROLL 5/16 X 2, N.P.	4	
23#	11464	THRUST COLLAR BUSHINGS	1	
24	12212	RING, RETAINING	1	
25	11850	SPIDER ASSY, LEFT SIDE	1.....	INCLS. ITEM W/#
26#	0105	HHCS 5/16-18 X 1.1/2"	16	
27#	0161C	LOCK WASHER 5/16"	16	
15#	11602	SCREW, HHC 3/8-16 X 3/8	4	
16#	12049	PLATE, SPIDER, 40 MM BORE	1	
17#	1322	SCREW, RETAINING	4	
18#	1875	WASHER, INT SHKP, 3/8	4	
19#	1876	NUT, HEX JAM 3/8-16 CLASS 2B	4	
20#	1986	LEVER, TROWEL LH	4	
21#	2829	ARM, TROWEL, HD	4	
22#	9006	PIN, ROLL 5/16 X 2, NP	4	
23#	11464	THRUST COLLAR BUSHINGS	1	
24	12212	RING, RETAINING	1	
25	11849	SPIDER ASSY, RIGHT SIDE	1.....	INCLS ITEM W/#
26#	0105	HHCS 5/16-18 X 11/2"	16	
27#	0161C	LOCK WASHER 5/16"	16	

HTH — 4-BLADE SPIDER (RIGHT) ASSY

RIGHT SIDE SPIDER ASSEMBLY
(VIEW FROM DRIVERS SEAT)



NOTES:

- △ 1 APPLY LOCTITE P/N 1477
- △ 2 TORQUE TO 90 FT. LBS
- △ 3 INCLUDED WITH ITEM 2 OR CAN BE ORDERED SEPARATELY(P/N 11464).
- △ 4 RIGHT SIDE SPIDER ASSEMBLY P/N 11849 INCLUDES ITEMS WITHIN OUTLINE.

△ INCLUDED WITH ITEM 4 OR CAN BE

HTH — 4-BLADE SPIDER (RIGHT) ASSY

4-BLADE SPIDER (RIGHT) ASSY

NO	PART NO	PART NAME	QTY.	REMARKS
1	11419	PLATE, WEAR	1	
2	11431	THRUST COLLAR W/BUSHING	1.....	INCLS ITEM W/+
3	12406	WEAR, CAP	2	
4	11493	BEARING, 6017 2RSNR W/3200-130	1.....	INCLS ITEM W/*
5#	1162 A	CAP, GREASE ZERK, #2 YELLOW	1	
6	11952	SPACER, 12MMX12L	1	
7	11953	RETAINER, SPIDER	1	
8	12050	SCREW, HHC M12-175 X 60 109, NP	1	
9	2621	ZERK, GREASE STR 1/4-28	1	
10	5054 A	WASHER, LOCK, 1/2 MED	1	
11#	0164 B	SCREW, HHC 3/8-16 X 1 1/4 FT	4	
12#	0166 A	WASHER, LOCK, 3/8 MED	4	
13#	11039	BUSHING, 1/2 HD TROWEL ARM	8	
14#	11594	SPRING, RS ARM RETURN	4	
15#	11602	SCREW, HHC 3/8-16 X 3/8	4	
16#	12049	PLATE, SPIDER, HTH 40 MM BORE	1	
17#	1322	SCREW, RETAINING	4	
18#	1875	WASHER, INT SHKP, 3/8	4	
19#	1876	NUT, HEX JAM 3/8-16 CLASS 2B	4	
20#	1986	LEVER, TROWEL LH	4	
21#	2829	ARM, TROWEL, HD / HRT EXT	4	
22#	9006	PIN, ROLL 5/16 X 2, NP	4	
23#	11464	THRUST COLLAR BUSHINGS	1	
24	12212	RING, RETAINING	1	
25	11849	SPIDER ASSY, RIGHT SIDE	1.....	INCLS ITEM W/#
26#	0105	HHCS 5/16-18 X 11/2"	16	
27#	0161C	LOCK WASHER 5/16"	16	

HTH — CONVERSION 4-BLADE TO 5-BLADE

The following is a material parts list for those customers that want to convert from a 4-blade spider to a 5-blade spider assembly.

CASE #1

Customer does not want to use parts from his current 4-blade assembly:

Description	Part No.#	Qty
R.S. Spider Assy.	12047	1
L.S. Spider Assy.	12046	1
Stabilizer Ring	12095	2
Male Rod End	1723	10
Screw	1237	10
Washer	0161C	10
Nut	6014C	20

CASE #2

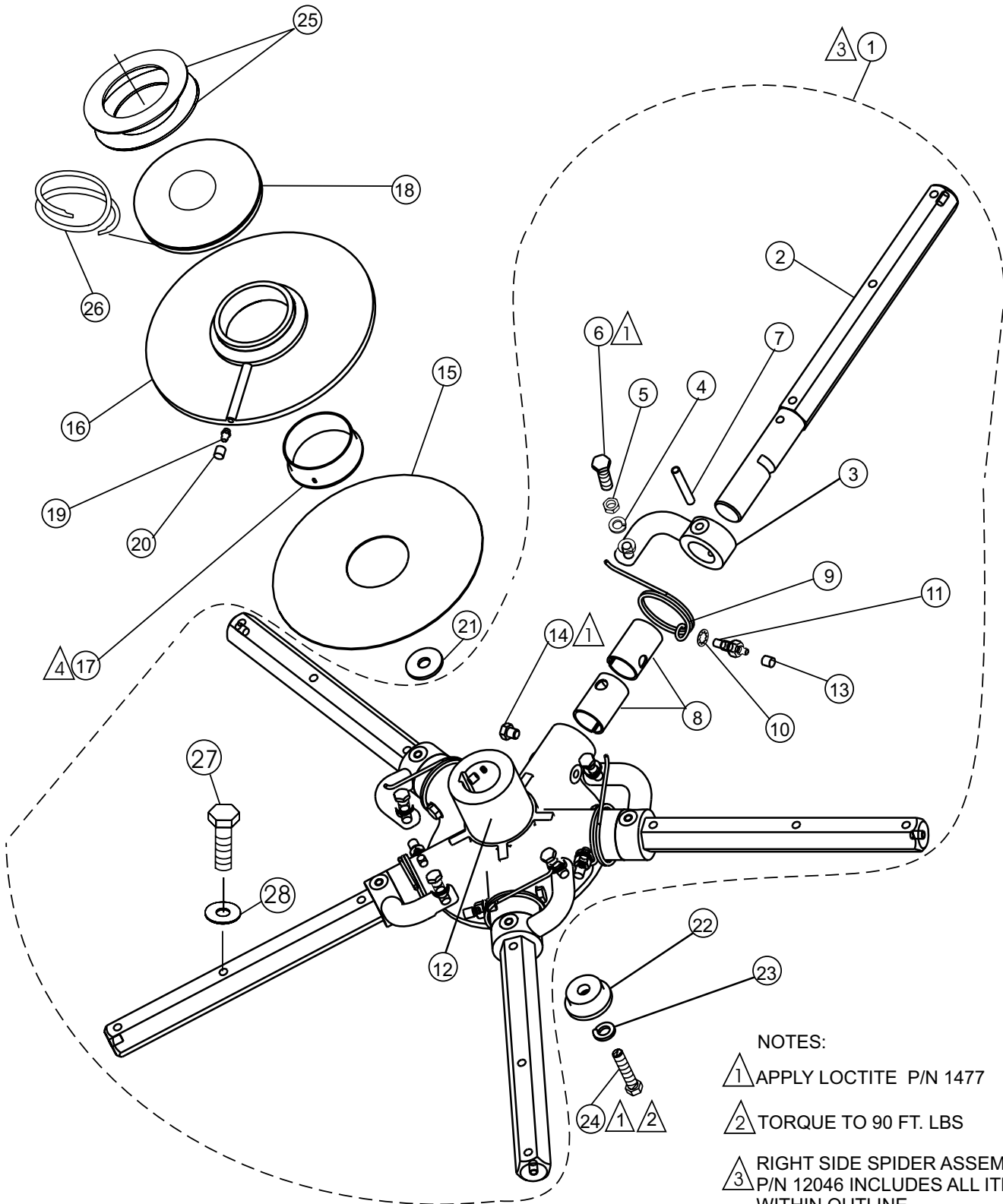
Customer reusing applicable parts from their 4-blade assembly.

Description	Part No.#	Qty
Stabilizer Ring	12095	2
Male Rod End	1723	2
Screw	1237	2
Washer	0161C	2
Nut	6014C	4
Spider Plate	12048	2
Arm	2829	2
Spring Right hand	11595	1
Spring Left hand	11594	1
Trowel Arm Lever R.S.	1986	1
Trowel Arm Lever L.S.	9005	1
Roll Pin	9006	2
Washer	0166A	2
Jam Nut	1876	2
Screw	0164B	2
Bushing	11039	20
Washer 3/8	1875	2
Retaining Screw	1322	2
Cap	1162A	2
Cap Screw	11602	2

[illegible]

HTH — 5-BLADE SPIDER ASSY (LEFT)

LEFT SIDE SPIDER ASSEMBLY (5-BLADE).
VIEW FROM OPERATORS SEAT.



NOTES:

1 APPLY LOCTITE P/N 1477

2 TORQUE TO 90 FT. LBS

3 RIGHT SIDE SPIDER ASSEMBLY
P/N 12046 INCLUDES ALL ITEMS
WITHIN OUTLINE.

4 PART OF ITEM 16 (P/N11431)

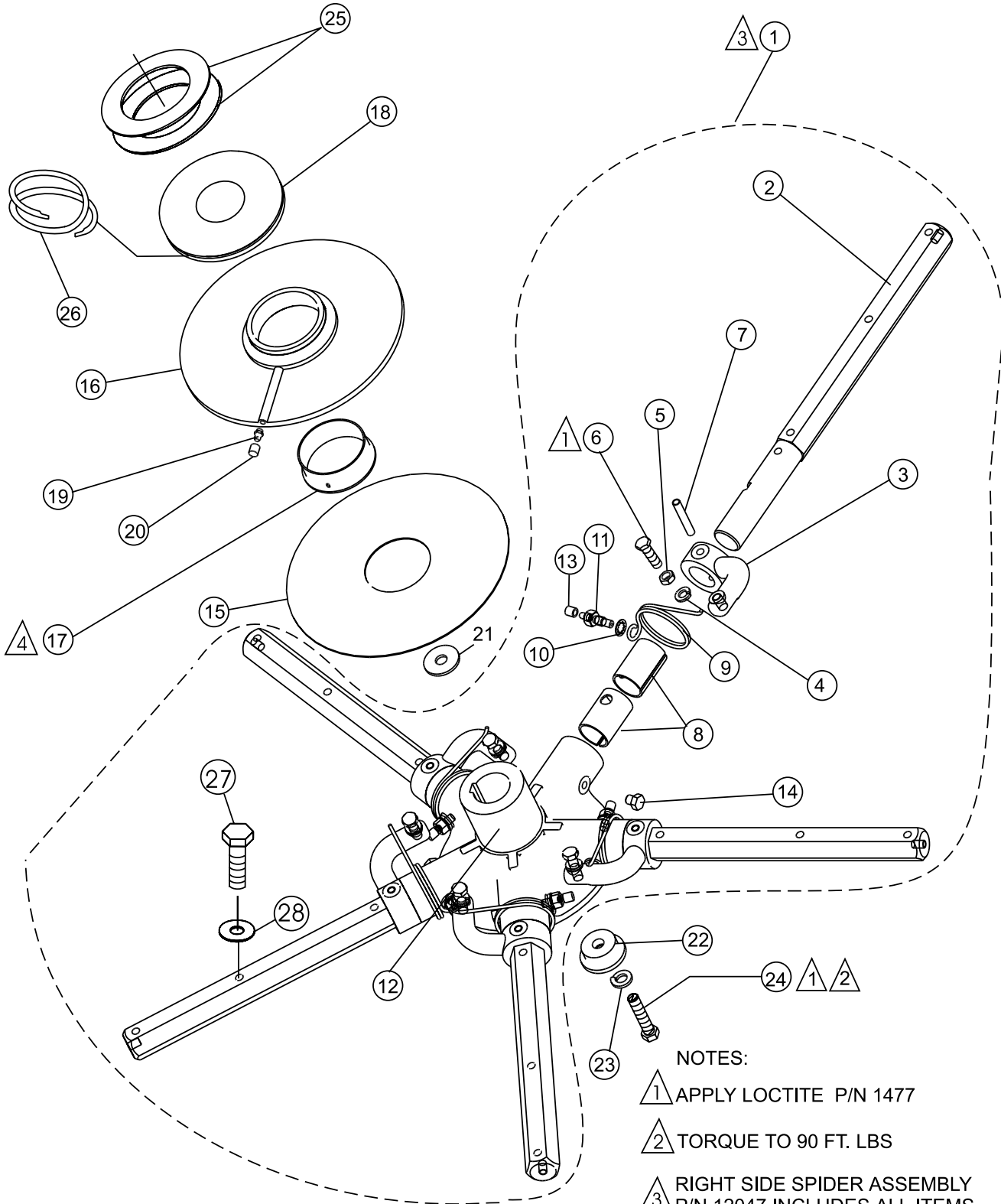
HTH — 5-BLADE SPIDER ASSY (LEFT)

5-BLADE SPIDER ASSY (LEFT)

NO	PART NO	PART NAME	QTY.	REMARKS
1*	12046	SPIDER ASM, LEFT SIDE	1	INCLS. ITEM W/ *
2*	2829	ARM, TROWEL EXTENDED	5	
3*	9005	LEVER, TROWEL ARM LEFT SIDE	5	
4*	0166 A	WASHER, LOCK, 3/8 MED	5	
5*	1876	NUT, HEX JAM 3/8	5	
6*	0164 B	SCREW, HHC	5	
7*	9006	PIN, ROLL 5/16 X 2	5	
8*	11039	BUSING, ARM 1 PIECE	10	
9 *	9111	SPRING, LEFT TROWEL	5	
10*	1875	WASHER, INT SHKP 3/8	5	
11*	1322	SCREW ASSY, ARM RETAINING	5	
12*	12048	PLATE, SPIDER 5 BLADE	1	
13*	1162 A	CAP, GREASE ZERK / 2	5	
14	11602	SCREW, HHC 3/8-16 X 3/8	5	
15	11419	PLATE, WEAR	1	
16	11431	THRUST COLLAR	1	INCLS. ITEM W/+
17+	11464	BUSING, THRUST COLLAR	1	
18	11493	BEARING, THRUST 60172 RSNR	1	INCLS. ITEM W/#
19	2621	FITTING, GREASE	1	
20	1162 A	CAP, GREASE ZERK / 2	1	
21	11952	SPACER 12MM X 40MM X 012	1	
22	11953	RETAINER, SPIDER	1	
23	5054 A	WASHER, LOCK, 1/2 MED	1	
24	12050	SCREW, HHC M12-175 X 60	1	
25	12406	CAP, WEAR	2	
26#	12181	RING, RETAINING	1	
27*	0105	SCREW, HHCS 5/16-18 X 11/2"	16	
28	0161C	LOCK WASHER 5/16"	16	

HTH — 5-BLADE SPIDER ASSY (RIGHT)

RIGHT SIDE SPIDER ASSEMBLY (5-BLADE).
VIEW FROM OPERATORS SEAT.



NOTES:

1 APPLY LOCTITE P/N 1477

2 TORQUE TO 90 FT. LBS

3 RIGHT SIDE SPIDER ASSEMBLY
P/N 12047 INCLUDES ALL ITEMS
WITHIN OUTLINE.

4 PART OF ITEM 16 (P/N11431)

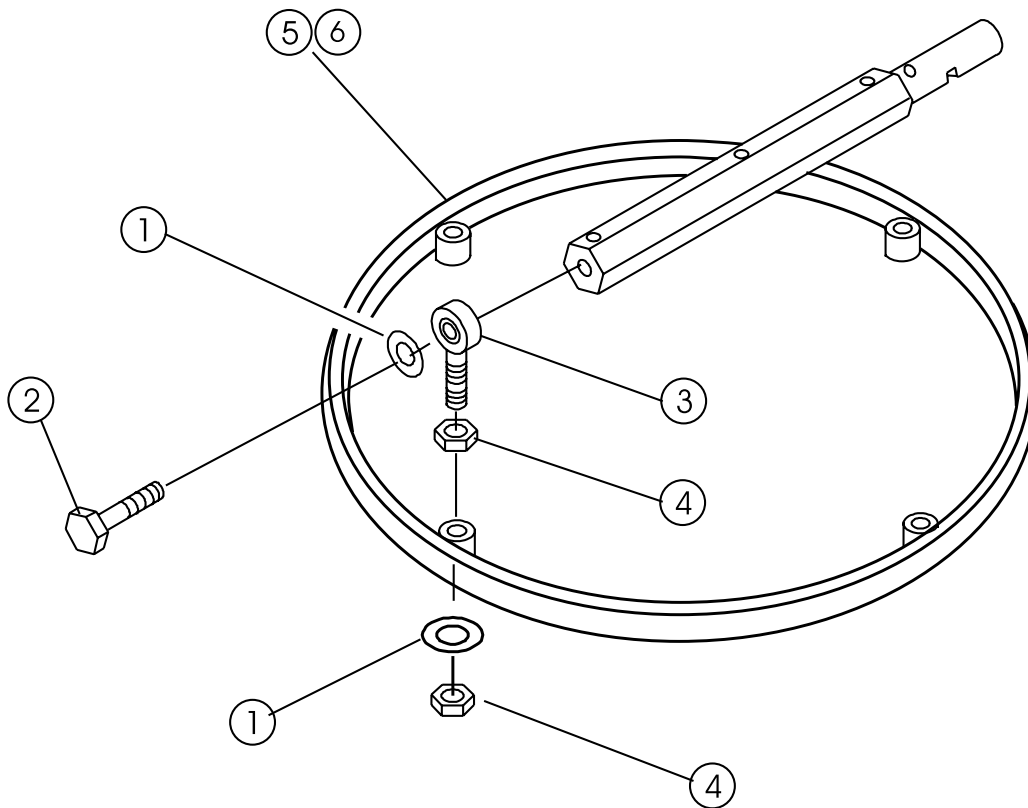
HTH — 5-BLADE SPIDER ASSY (RIGHT)

5-BLADE SPIDER ASSY (RIGHT)

NO	PART NO	PART NAME	QTY.	REMARKS
1*	12047	SPIDER ASSY, RIGHT SIDE	1	INCLS ITEM W/*
2*	2829	ARM, TROWEL EXTENDED	5	
3*	1986	LEVER, TROWEL ARM RIGHT SIDE	5	
4*	0166 A	WASHER, LOCK, 3/8 MED	5	
5*	1876	NUT, HEX JAM 3/8	5	
6*	0164 B	SCREW, HHC	5	
7*	9006	PIN, ROLL 5/16 X 2	5	
8*	11039	BUSING, ARM 1 PIECE	10	
9*	2143	SPRING, RIGHT TROWEL	5	
10*	1875	WASHER, INT SHKP 3/8	5	
11*	1322	SCREW ASSY, ARM RETAINING	5	
12*	12048	PLATE, SPIDER 5 BLADE	1	
13*	1162 A	CAP, GREASE ZERK / 2	5	
14	11602	SCREW, HHC 3/8-16 X 3/8	5	
15	11419	PLATE, WEAR	1	
16	11431	THRUST COLLAR	1	INCLS ITEM W/+
17+	11464	BUSING, THRUST COLLAR	1	
18	11493	BEARING, THRUST 60172 RSNR.....	1	INCLS ITEM W/#
19	2621	FITTING, GREASE	1	
20	1162 A	CAP, GREASE ZERK / 2	1	
21	11952	SPACER 12MM X 40MM X 012	1	
22	11953	RETAINER, SPIDER	1	
23	5054 A	WASHER, LOCK, 1/2 MED	1	
24	12050	SCREW, HHC M12-175 X 60	1	
25	12406	CAP, WEAR	2	
26#	12181	RING, RETAINING	1	
27*	0105	SCREW, HHCS 5/16-18 X 11/2"	16	
28	0161C	LOCK WASHER 5/16"	16	

HTH — STABILIZER RING ASSY

STABILIZER RING ASSY



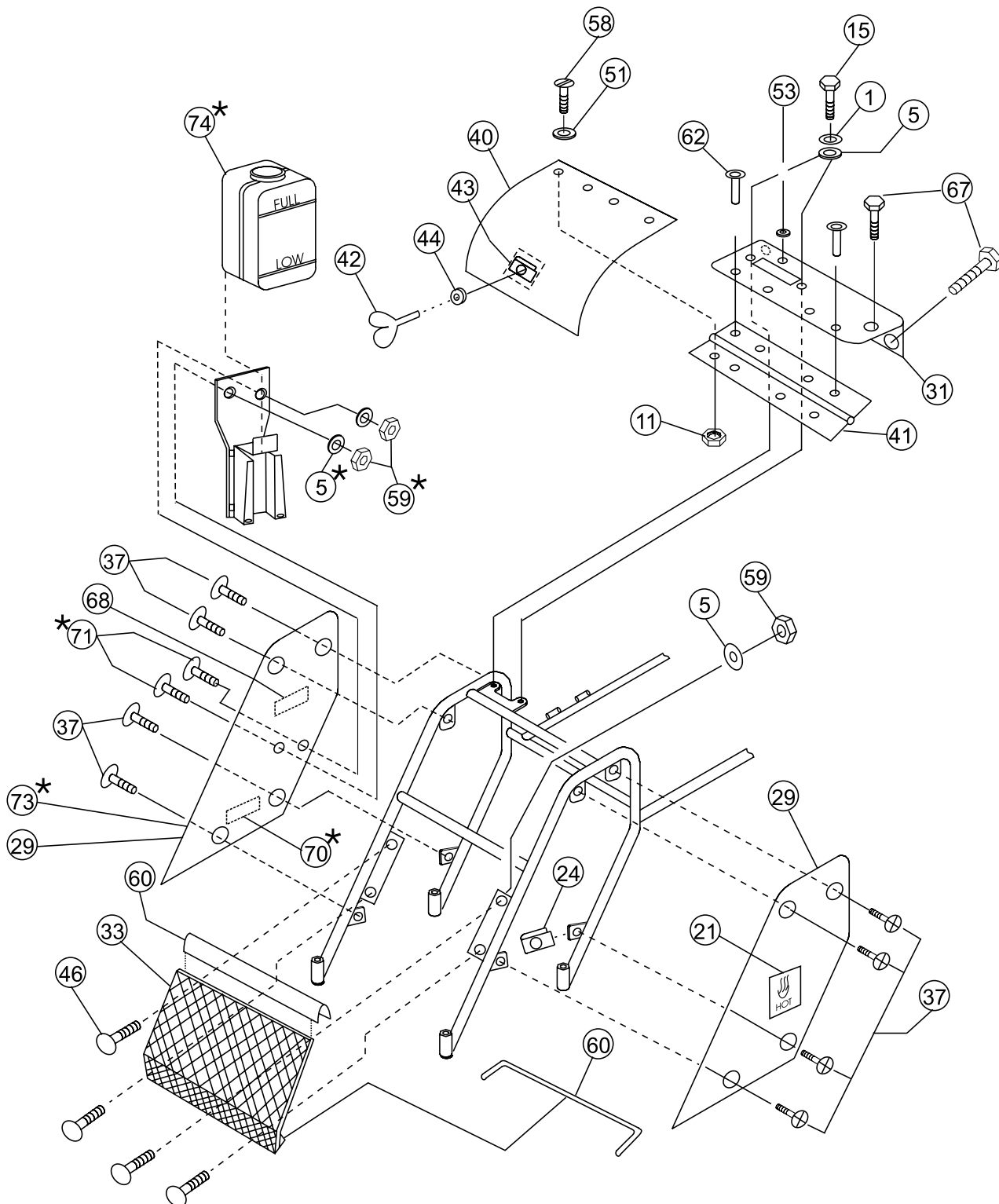
HTH — STABILIZER RING ASSY

STABILIZER RING ASSY

NO	PART NO	PART NAME	QTY.	REMARKS
1	0161C	WASHER, LOCK, 5/16 MED	4.....	QTY 5 For 5-Blade
2	1237	SCREW, SCH 5/16-18 X 7/8, NYL, NP	4.....	QTY 5 For 5-Blade
3	1723	ROD END, 5/16-24 MALE	4.....	QTY 5 For 5-Blade
4	6014C	NUT, HEX FINISH 5/16-24	8.....	QTY 10 For 5-Blade
5	9148	RING, STABILIZER, EXT ARM, HD	1.....	4-Blade
6	12095	RING, STABILIZER, EXT ARM, HD	1.....	5-Blade

HTH — TOP PANEL (LEFT SIDE)

TOP PANEL (LEFT SIDE)



LEFT SIDE (VIEW FROM DRIVERS SEAT)

* KUBOTA ONLY

HTH — TOP PANEL (LEFT SIDE)

TOP PANEL (LEFT SIDE)

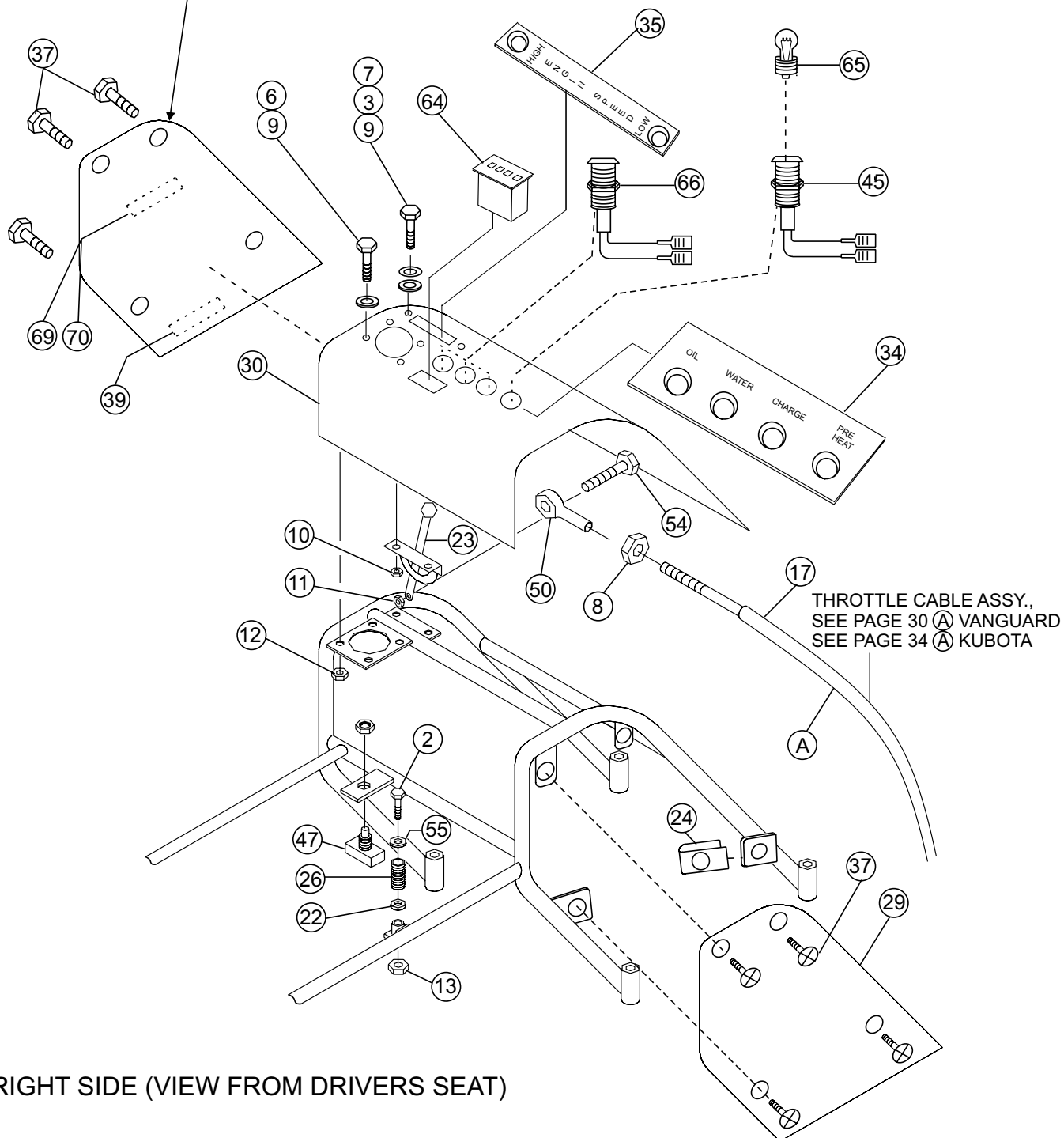
NO	PART NO	PART NAME	QTY.	REMARKS
1	0161 C	WASHER, LOCK, 5/16 MED	2	
5	0300	WASHER, FLAT, 5/16 SAE	10	
11	10019	NUT, NYLOC 10-32	10.....	KUBOTA ONLY
15	10229	SCREW, HHC 5/16-24 X 1	2	
21	11246	DECAL SET, INTERNATIONAL STDS	1	
24	11534	NUT, "U" TYPE, 1/4-20	28	
29	11663	PANEL, FRONT LEFT	3	
31	11671	PANEL, TOP LEFT	1	
33	11681	COVER, OIL COOLER, & RADIATOR	2	
37	11819	SCREW, HHC 1/4-20 X 3/4 W/WASH	28	
40	11928	PANEL, RADIATOR COVER	1	
41	11930	HINGE, PANEL	1	
42	11934	STUD, 1/4 TURN WING	1	
43	11935	RECEPTACLE, CLIP-ON	1	
44	11936	RETAINER	1	
46	11963	BOLT, CARRIAGE 5/16-18 X 1	4	
51	2203	WASHER, FLAT, #10	6	
53	2923	GROMMET, 7/16 ID, 1/16 X 9/16	1	
58	5065 B	SCREW, RHM 10-32 X 1/2	6	
59	5283	NUT, NYLOC 5/16-18	8.....	KUBOTA ONLY
60	60049	TRIM EDGE, 1/32	3	
62	8239	RIVET, POP 1/8 X 400	4	
67	12287	BOLT	2	
68	11247	DECAL (HELMET, FOOT, HAND)	1	
70	11811	DECAL (DIESEL FUEL)	1.....	KUBOTA ONLY
71	0202	SCREW, HHC 5/16-18 X 1	2.....	KUBOTA ONLY
73	11982	PANEL, FRONT LEFT	1.....	KUBOTA ONLY
74	11983	TANK, OVERFLOW (RADIATOR)	1.....	KUBOTA ONLY

HTH — TOP PANEL (RIGHT SIDE)

TOP PANEL (RIGHT SIDE)

SEE DETAIL (A) PAGE 70 (KUBOTA)

SEE DETAIL (A) PAGE 68 (VANGUARD)



RIGHT SIDE (VIEW FROM DRIVERS SEAT)

HTH — TOP PANEL (RIGHT SIDE)

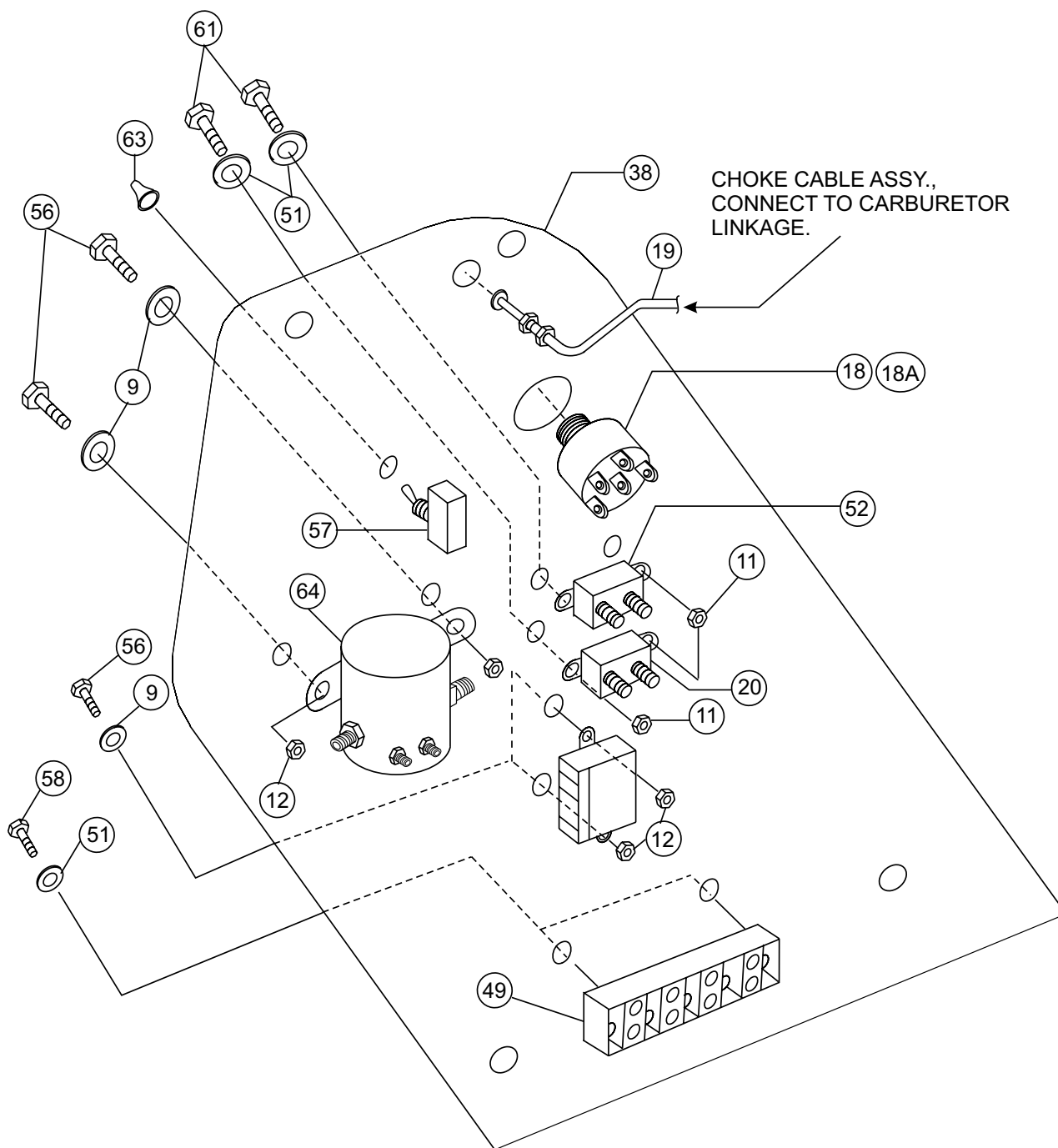
TOP PANEL (RIGHT SIDE)

NO	PART NO	PART NAME	QTY.	REMARKS
2	0169	SCREW, HHC 3/8-16 X 3	1	
3	0181	WASHER, LOCK, 1/4 MED	2	
6	0424	SCREW, HHC 1/4-20 X 1 1/4	4	
7	0730	SCREW, HHC 1/4-20 X 1	2	
8	0937	NUT, HEX 10-32	2	
9	0948	WASHER, FLAT, 1/4 SAE	8	
10	0949	NUT, HEX FINISH 1/4-20	2	
11	10019	NUT, NYLOC 10-32	10	
12	10024	NUT, NYLOC 1/4-20	6	
13	10133	NUT, NYLOC 3/8-16	1	
17	10568	CABLE, THROTTLE	1	
22	11265	WASHER, STEERING HANDLE	2	
23	11379	HANDLE, THROTTLE CONTROL	1	
24	11534	NUT,"U" TYPE, 1/4-20	28	
26	11593	SPRING, SEAT	1	
29	11663	PANEL, FRONT LEFT	3	
30	11670	PANEL, TOP RIGHT	1	
34	11711	DECAL, OPERATING LIGHTS	1	
35	11712	DECAL, ENGINE SPEED	1	
37	11819	SCREW, HHC 1/4-20 X 3/4 W/WASH	28	
39	11912	DECAL, "PATENT PENDING"	1	
45	11959	PLUG, INDICATOR LIGHT PREHEAT(BLUE)	1	
47	12005	SWITCH, KILL	1	
50	2153	ROD END, 10-32 FEMALE RH	2	
54	3513	SCREW, HHC 10-32 X 1	2	
55	4001	WASHER, FLAT, 3/8 USS PLD	1	
64	11694	HOUR METER	1	
65	12307	BULB, INDICATOR LIGHT	4	
66	12305	PLUG, INDICATOR LIGHT		
		OIL, WATER, CHARGE (RED)	3	
69	2697	DECAL, CHOKE/LIGHT KEY SWITCH	1.....	VANGUARD ONLY
70	2814	DECAL, LIGHT KEY SWITCH	1.....	KUBOTA ONLY

HTH — FRONT PANEL (RIGHT) (VANGUARD)

FRONT PANEL (RIGHT) (VANGUARD)

DETAIL A



VANGUARD ONLY

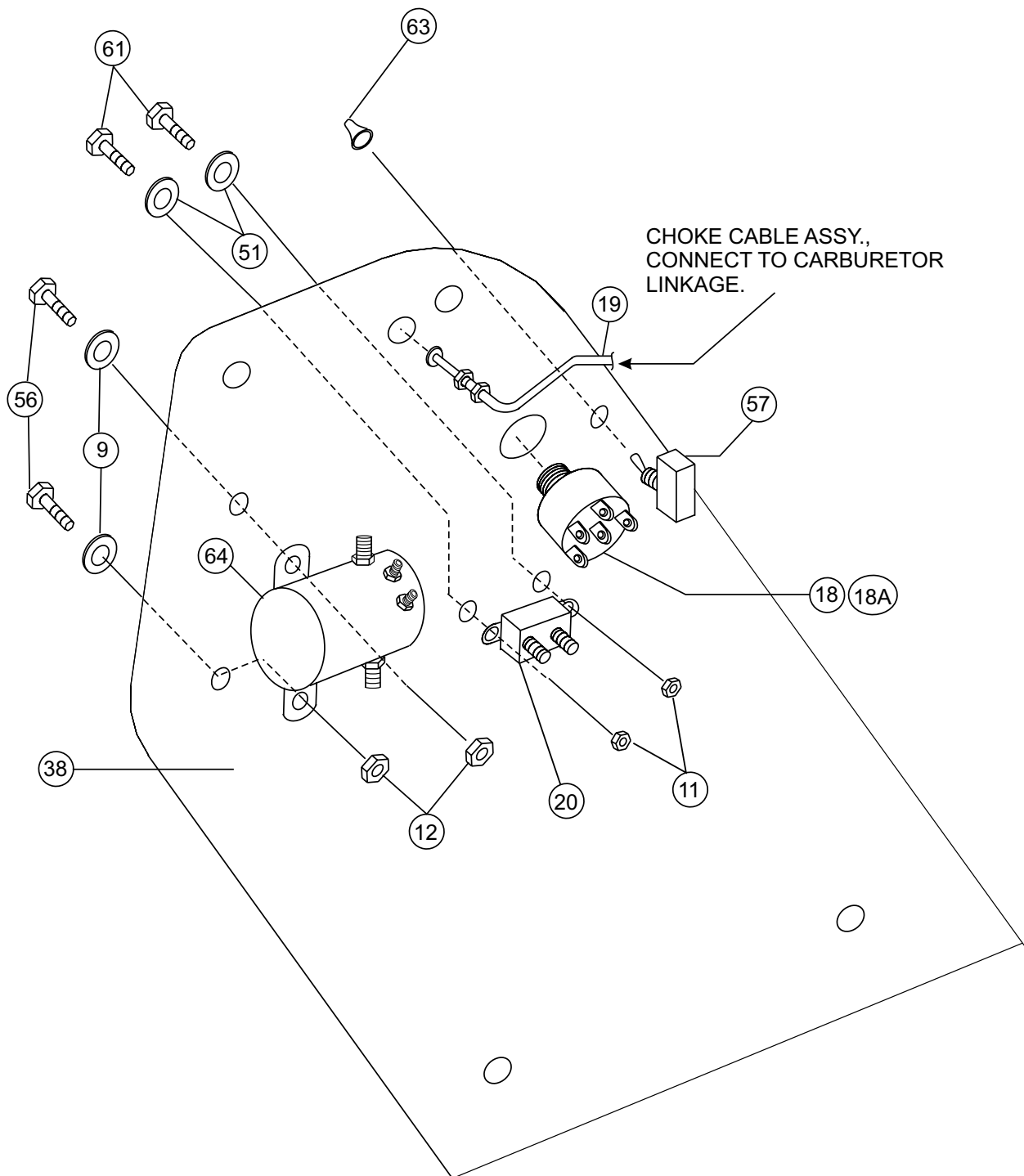
HTH — FRONT PANEL (RIGHT) (VANGUARD)

FRONT PANEL (RIGHT) (VANGUARD)

NO	PART NO	PART NAME	QTY.	REMARKS
9	0948	WASHER, FLAT, 1/4 SAE	8	
11	10019	NUT, NYLOC 10-32	10	
12	10024	NUT, NYLOC 1/4-20	6	
18	10958	SWITCH, IGNITION (W/KEYS)	1	
18A	11078	KEY, IGNITION SWITCH	1	
19	11029	CHOKE CABLE ASSY	1	
20	11098	CIRCUIT BREAKER, 40A, 12V	1	
38A	11836	PANEL, FRONT RIGHT	1	
49	19301	TERMINAL STRIP, 10 POLE	1	
51	2203	WASHER, FLAT, #10	6	
52	2673	CIRCUIT BREAKER, 30A, 12V	1	
56	4514	SCREW, HHC 1/4-20 X 5/8	2	
57	4682	LIGHT SWITCH	1	
58	5065 B	SCREW, RHM 10-32 X 1/2	6	
63	8381	BOOT, LIGHT SWITCH	1	
64	11792	ACCESSORY SOLENOID	1	

HTH — FRONT PANEL (RIGHT) (KUBOTA)

DETAIL A



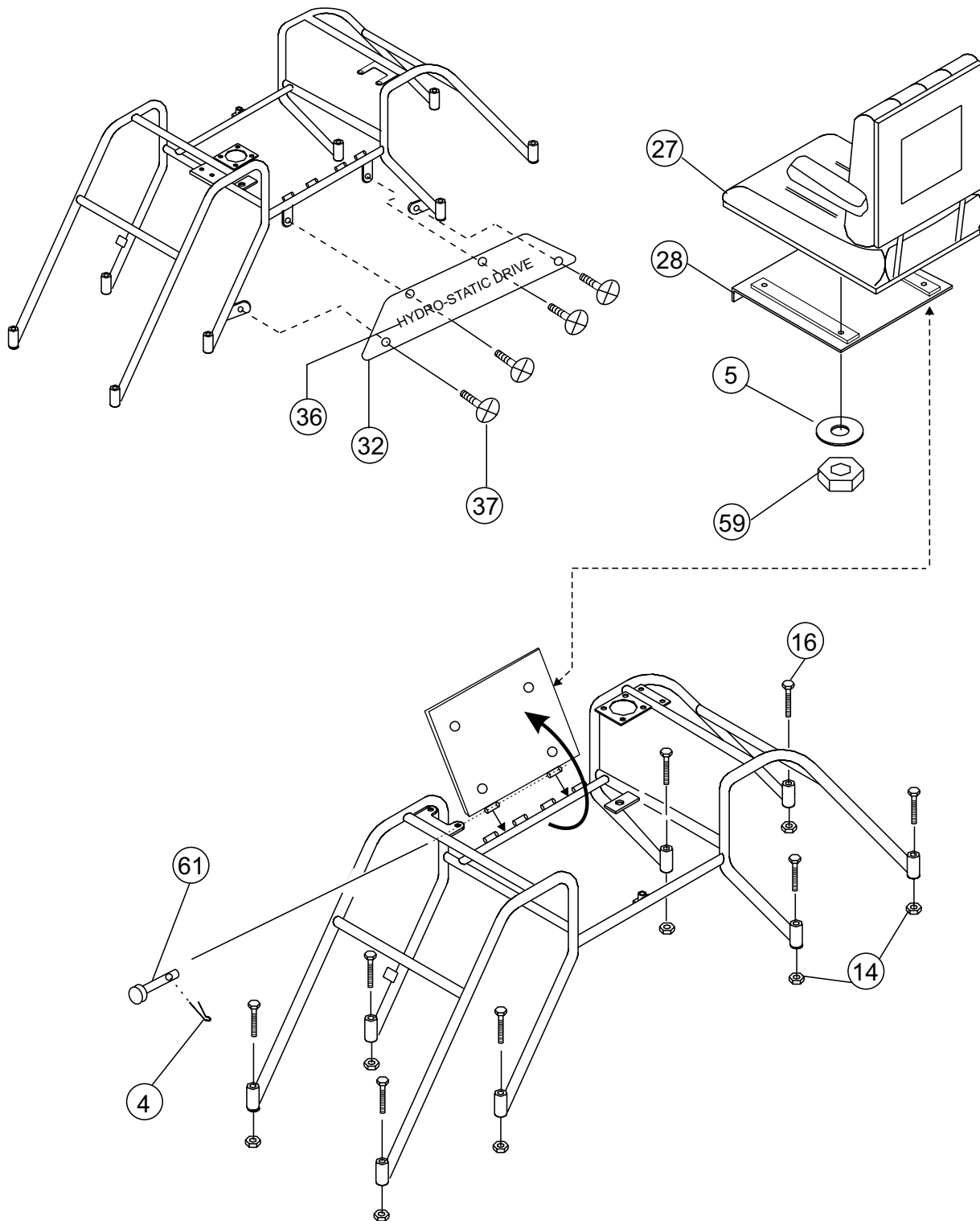
KUBOTA ONLY

HTH — FRONT PANEL (RIGHT) (KUBOTA)

FRONT PANEL (RIGHT) (KUBOTA)

NO	PART NO	PART NAME	QTY.	REMARKS
9	0948	WASHER, FLAT, 1/4 SAE	8	
12	10024	NUT, NYLOC 1/4-20	6	
18	11924	SWITCH, IGNITION (W/KEYS)	1	
18A	12627	UNIVERSAL KEY SET	1	
19	11029	CABLE, CHOKE (25 KOH PENDING)	1	
20	11098	CIRCUIT BREAKER, 40A, 12V	1	
38	11673	PANEL, FRONT RIGHT	1	
51	2203	WASHER, FLAT, #10	6	
53	2923	GROMMET, 7/16 ID, 1/16 X 9/16GRV	1	
56	4514	SCREW, HHC 1/4-20 X 5/8	2	
57	4682	LIGHT SWITCH	1	
63	8381	BOOT, LIGHT SWITCH	1	
64	11792	ACCESORY SOLENOID	1	

SEAT AND FRAME

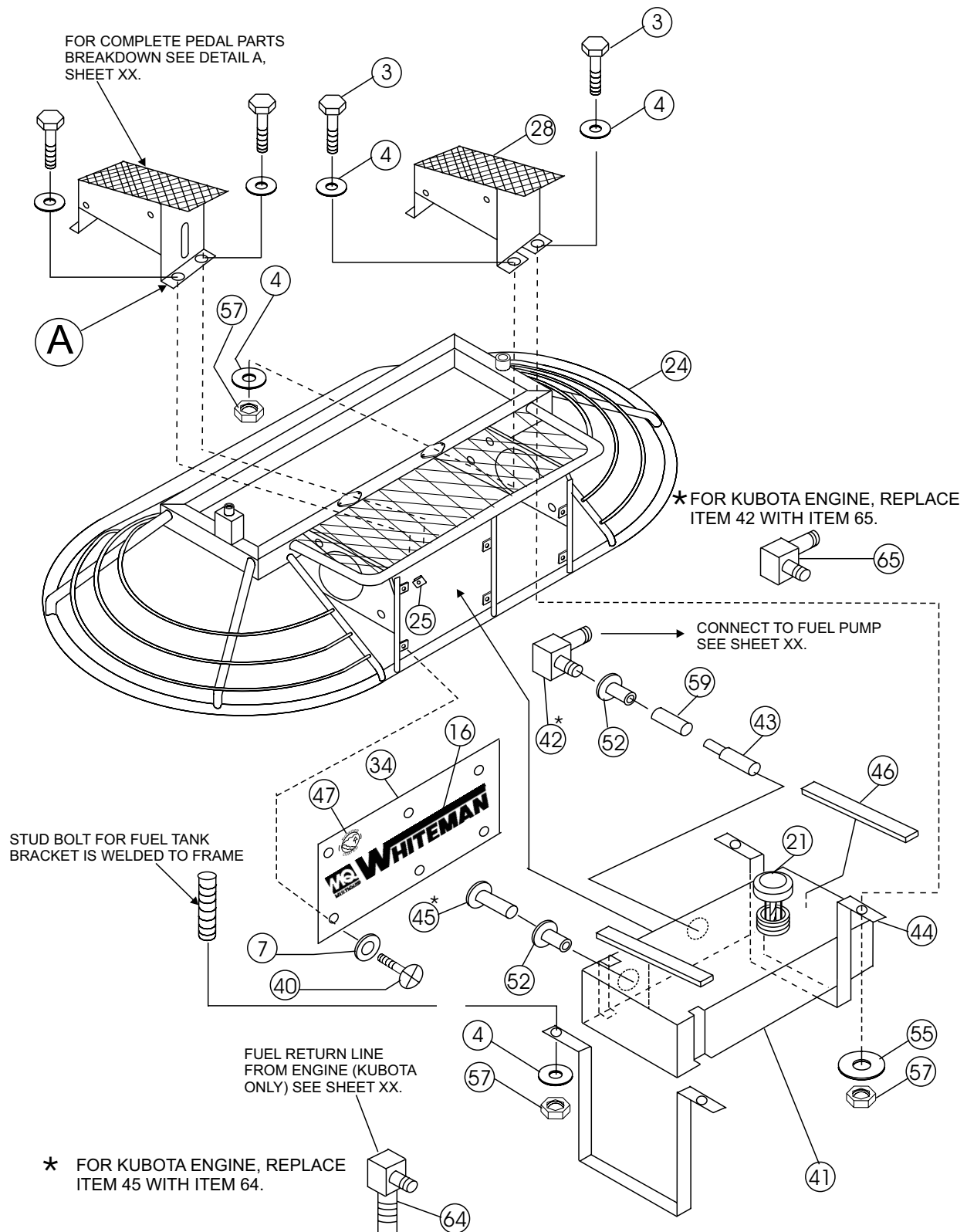


SEAT AND FRAME

NO	PART NO	PART NAME	QTY.	REMARKS
4	0183	PIN, COTTER 1/8 X 1 1/4	2	
5	0300	WASHER, FLAT, 5/16 SAE	10	
14	10176	NUT, NYLOC 1/2-13	8	
16	8087	SCREW	8	
25	11575	FRAME, SEAT W/A	1	
27	11632	SEAT W/ARMS	1	
28	11660	PLATE, SEAT W/A	1	
32	11674	PANEL, FRONT CENTER	1	
36	11760	DECAL, FRONT PANEL "HYD-S DRV"	1	
37	11819	SCREW, HHC 1/4-20 X 3/4 W/WASH	28	
59	5283	NUT, NYLOC 5/16-18	8	
61	8081	PIN, CLEVIS 1/2 X 2 3/4	2	

HTH — FRAME AND FUEL TANK

FRAME AND FUEL TANK

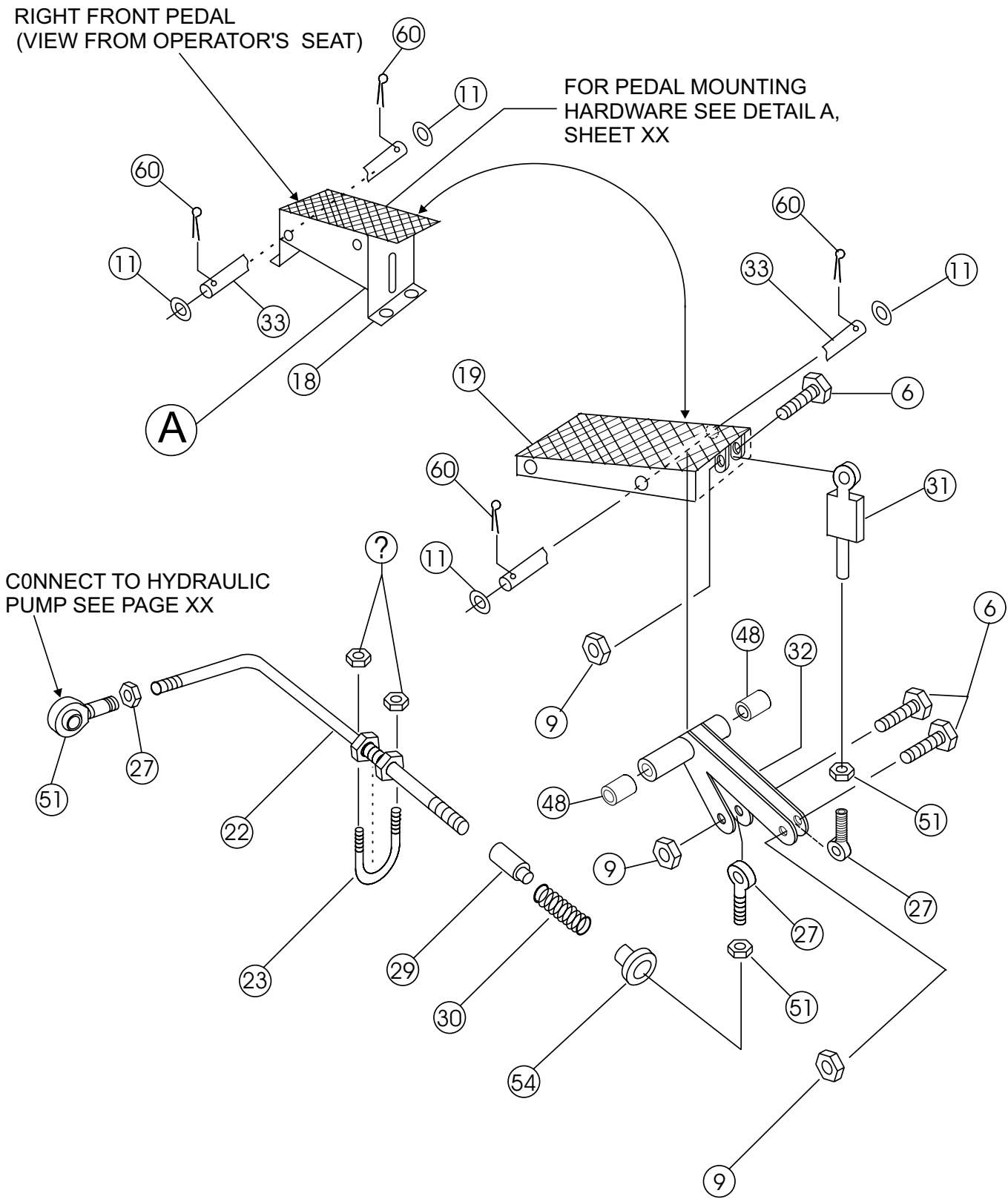


HTH — FRAME AND FUEL TANK

FRAME AND FUEL TANK

NO	PART NO	PART NAME	QTY.	REMARKS
3	0202	SCREW, HHC 5/16 – 18 X 1	2	
4	0300 B	WASHER, FLAT, 5/16 SAE	10	
7	0948	WASHER, FLAT, 1/4 SAE	6	
16	10818	DECAL, MQ WHITEMAN, 23 – 1/2"	1	
21	11418	FUEL CAP/GAUGE (105")	1	
24	11500	FRAME, COMPLETE	1	
25	11534	NUT, "U" TYPE. 1/4-20	28	
28	11628	FOOT REST, LEFT	1	
34	11678	PANEL, FRONT	1	
40	11819	SCREW, HHC 1/4 – 20 X 3/4 W/WASH	6	
41	11922	TANK, 12 GALLON FUEL POLYETHEL	1	
42	12007	FITTING, 90° 4 BARB – FUEL	1	VANGUARD ONLY
43	12010	SCREEN, FILTER	1	
44	12021	BRACKET, FUEL TANK SUPPORT	2	
45	12024	FITTING, PLUG, FUEL, BARB	1	VANGUARD ONLY
46	12025	SPACER, FUEL TANK	2	
47	13118	DECAL, "POWDER COATED"	1	
52	19633	BUSHING, RUBBER FUEL	2	
55	3233	WASHER, FENDER, 15 OD X 3/8 ID	4	
57	5283	NUT, NYLOC 5/16 – 18	6	
59	60058	HOSE, 1/4 X 3/8 PVC FUEL YELLOW	1	
64	12006	FITTING, 90° 03 BARB – FUEL	1	KUBOTA ONLY
65	12023	FITTING, 90° 05 BARB – FUEL	1	KUBOTA ONLY

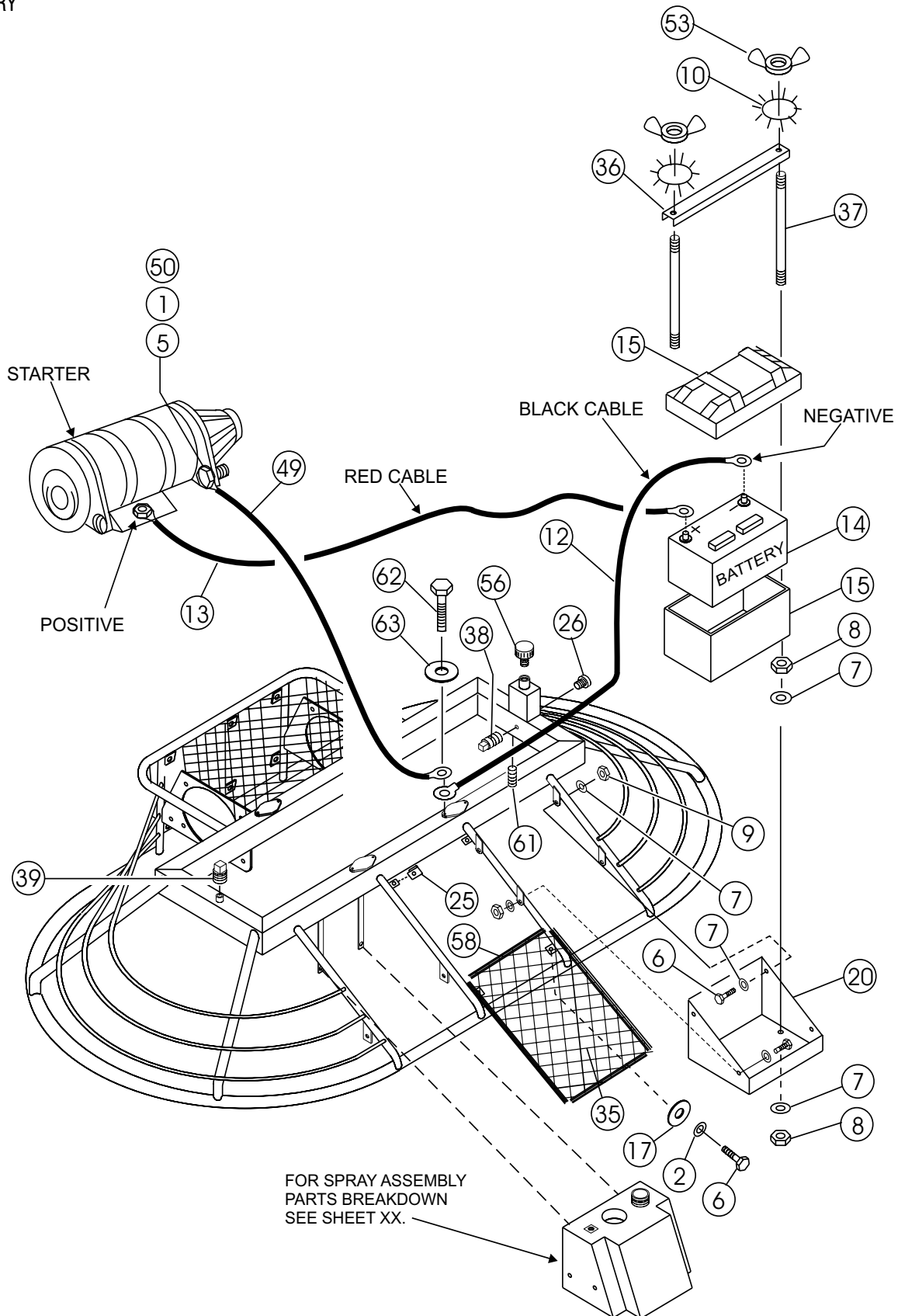
FOOT PEDALS



FOOT PEDALS

NO	PART NO	PART NAME	QTY.	REMARKS
6	0730	SCREW, HHC 1/4 – 20 X 1	11	
9	10024	NUT, NYLOC 1/4 – 20	9	
11	10136	WASHER, FLAT, 3/8 SAE	4	
18	11199	BASE, SPEED CONTROL PEDAL W/A	1	
19	11228	ACCELERATOR PEDAL W/A	1	
22	11491	CABLE, THROTTLE ASSY	1	
23	11492	U-BOLT, CABLE	1	
27	11611	ROD END, 1/4 – 28 FEMALE RH	3	
29	11638	ADAPTOR, SPEED CONTROL SPRING	1	
30	11641	SPRING, THROTTLE	1	
31	11643	ROD END, 1/4 – 28 MALE RH	1	
32	11656	ROCKER, SPEED CONTROL W/A	1	
33	11677	PIN, SPEED CONTROL LEVER	2	
48	1484	BUSHING, BRONZE	2	
51	19378	NUT, HEX JAM 1/4 – 28	3	
54	2755	ADAPTOR, THROTTLE RET SPRING	1	
60	6014 B	PIN, COTTER 3/32 X 1	4	

BATTERY



BATTERY

NO	PART NO	PART NAME	QTY.	REMARKS
1	0161 C	WASHER, LOCK, 5/16 MED	1	
2	0181 B	WASHER, LOCK, 1/4 MED	4	
5	0479	WASHER, EXT SHKP, 3/8 PLTD	1	
6	0730	SCREW, HHC 1/4 – 20 X 1	11	
7	0948	WASHER, FLAT, 1/4 SAE	16	
8	0949	NUT, HEX FINISH 1/4 – 20	4	
9	10024	NUT, NYLOC 1/4 – 20	9	
10	10031	WASHER, EXT SHKP, 1/4	2	
12	10313	CABLE, NEG BATTERY BLACK 20"	1	
13	10314	CABLE, POS BATTERY RED 31"	1	
14	10315	BATTERY, 12V WET GROUP 22 SRT	1	
15	10318	BATTERY BOX, GROUP 24	1	
17	10930	WASHER, FENDER, 1/4 X 1 1/4	4	
20	11362	BATTERY FRAME BOX	1	
25	11534	NUT, "U" TYPE, 1/4 – 20	10	
26	11584	SIGHT GLASS, 3/4" MALE PIPE	1	
35	11680	COVER, REAR MAIN FRAME	1	
36	11692	BRACKET, BATTERY BOX HOLD DOWN	1	
37	11693	BOLT, BATTERY BRKT	2	
38	11793	FITTING, PLUG 3/4 MP SQ HEAD	1	
39	11805	FITTING, PLUG SQ HEAD 1 MP	1	
49	1597	CABLE, ASM, BLK (NEG) 165"	1	
50	1605	SCREW, HHC M8 – 125 X 25 MM	1	
53	2509	NUT, WING 1/4 – 20 PLATED	2	
56	3353	CAP, FILLER/BREATHER	1	
58	60052	TRIM EDGE, 3/16	4	
61	911329	FITTING, PLUG 3/8 MP MAGNET	1	
62	11691	SCREW, HHCS 3/8 – 24 X 3/4	3	
63	0166 A	LOCK WASHER, 3/8"	3	

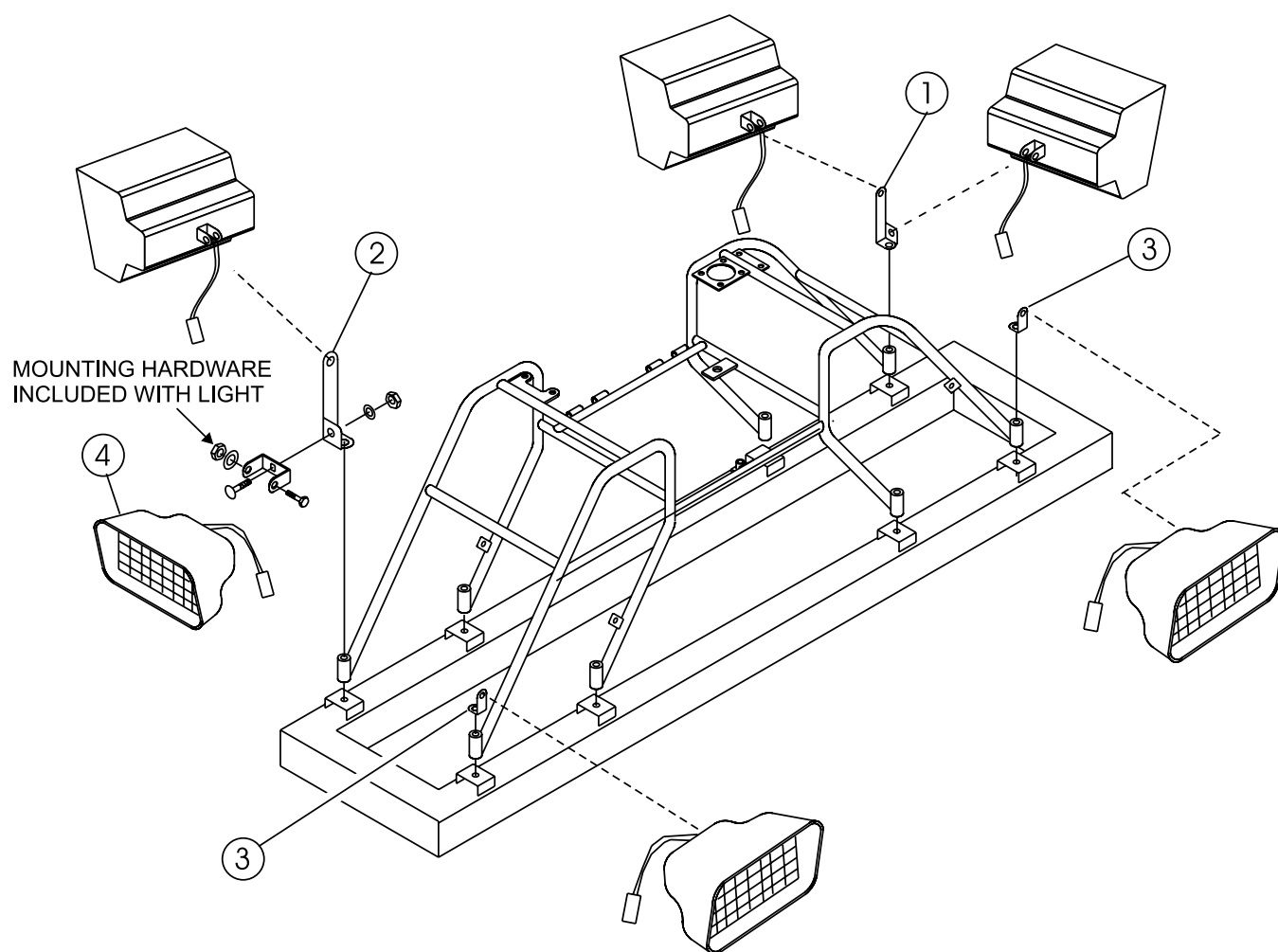
SPRAY ASSY



SPRAY ASSY

NO	PART NO	PART NAME	QTY.	REMARKS
1	0131 A	SCREW, HHC 1/4-20 X 3/4	5	
2	0181 B	WASHER, LOCK, 1/4 MED	5	
3	0202	SCREW, HHC 5/16-18 X 1	2	
4	0300 B	WASHER, FLAT, 5/16 SAE	4	
5	0948	WASHER, FLAT, 1/4 SAE	6	
6	10021	PUMP, SPRAY KIT	1	INCLS ITEM W/ *
7	10022	FITTING, PLASTIC 6 BARB – 4 BARB	1	
8	11222	MOUNT, SPRAY NOZZLE, W/NEW STR	1	
9	12008	FITTING, 90 6 BARB – 4 BARB FUEL	1	
10	12009	SCREEN, FILTER DAPCO 11604	1	
11	12036	TANK, RETARDANT 5 GALLON	1	
12	19633	BUSING, RUBBER FUEL DAPCO 10672	2	
13	19661	VALVE, FUEL DRAIN DAPCO 11478	1	
14*	2108	CAP, SPRAY TANK	1	
15	2816	COVER, SPRAY MOTOR	1	
16	2898	WASHER, BONDED NEOPRENE 1 X 1/2	1	
17*	2912	FITTING, 90 4 BARB –1/4 FP	1	
18	2915	WIRE ASSY, PUMP	1	
19	2918	CLAMP, HOSE, 475 - 536 ID	4	
20	2930	CLAMP, HOSE, 360 - 410 ID	2	
21	3233	WASHER, FENDER, 15 OD X 3/8 ID	2	
22	392292	NOZZLE, SPRAY	1	
23	5283	NUT, NYLOC 5/16-18	2	
24	60001	HOSE, 25 ID X 375 OD TYGON	4	
25	60002	HOSE, 375 ID X 5 OD TYGON	1	
26	60058	HOSE, 1/4 X 3/8 PVC FUEL YELLOW	?	
27	8128	CLAMP, HOSE SUPPORT, 5/16"	1	

LIGHT ASSY

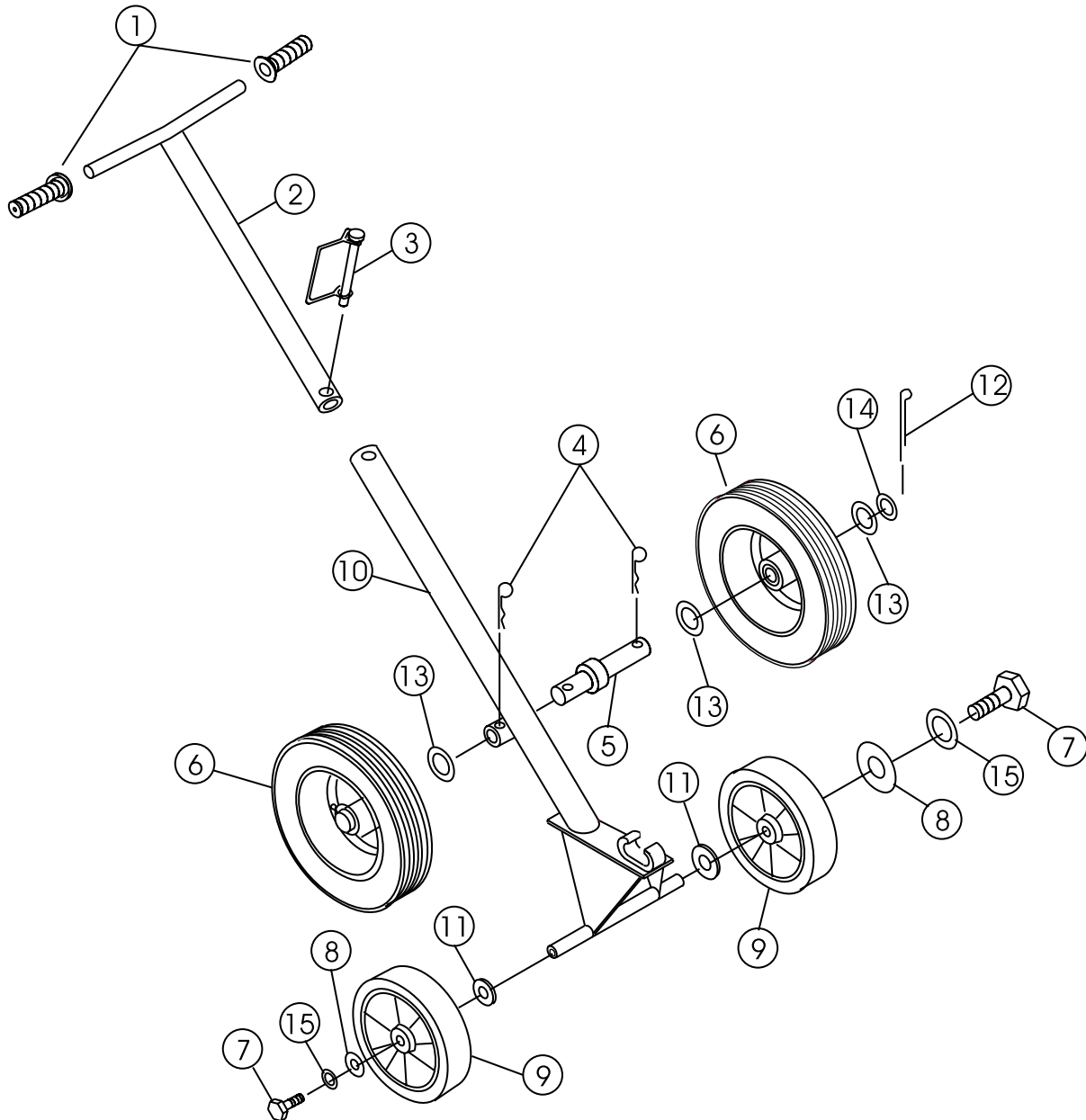


LIGHT ASSY

NO	PART NO	PART NAME	QTY.	REMARKS
1	11741	BRACKET, LIGHT W/A RIGHT SIDE	1	
2	11742	BRACKET, LIGHT W/A LEFT SIDE	1	
3	12355	BRACKET, LIGHT	2	
4	2896	LIGHT ASSY	6	

HTH — E-Z MOVER AND LIFT HANDLE

E-Z MOVER AND LIFT HANDLE



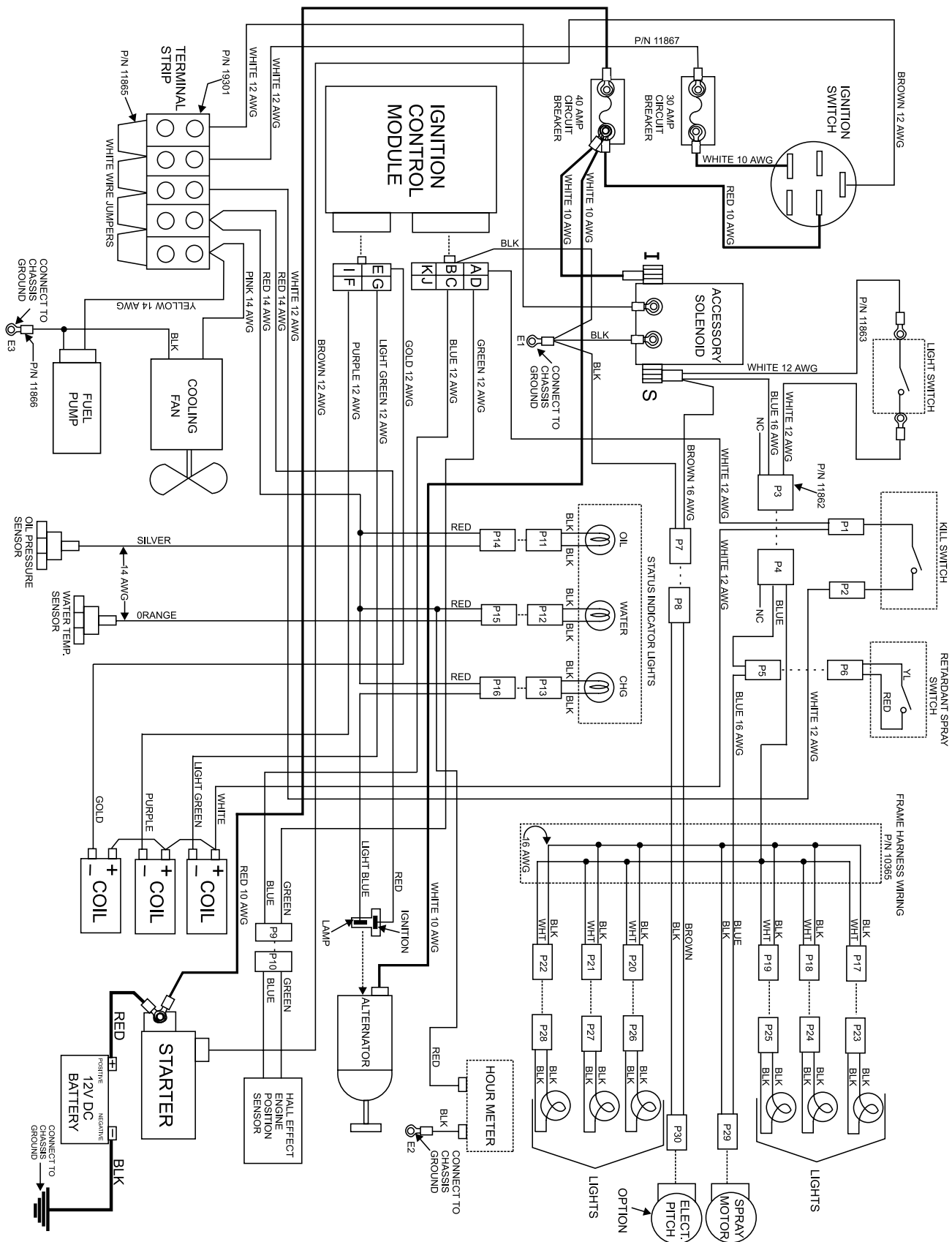
HTH — E-Z MOVER AND LIFT HANDLE

E-Z MOVER AND LIFT HANDLE

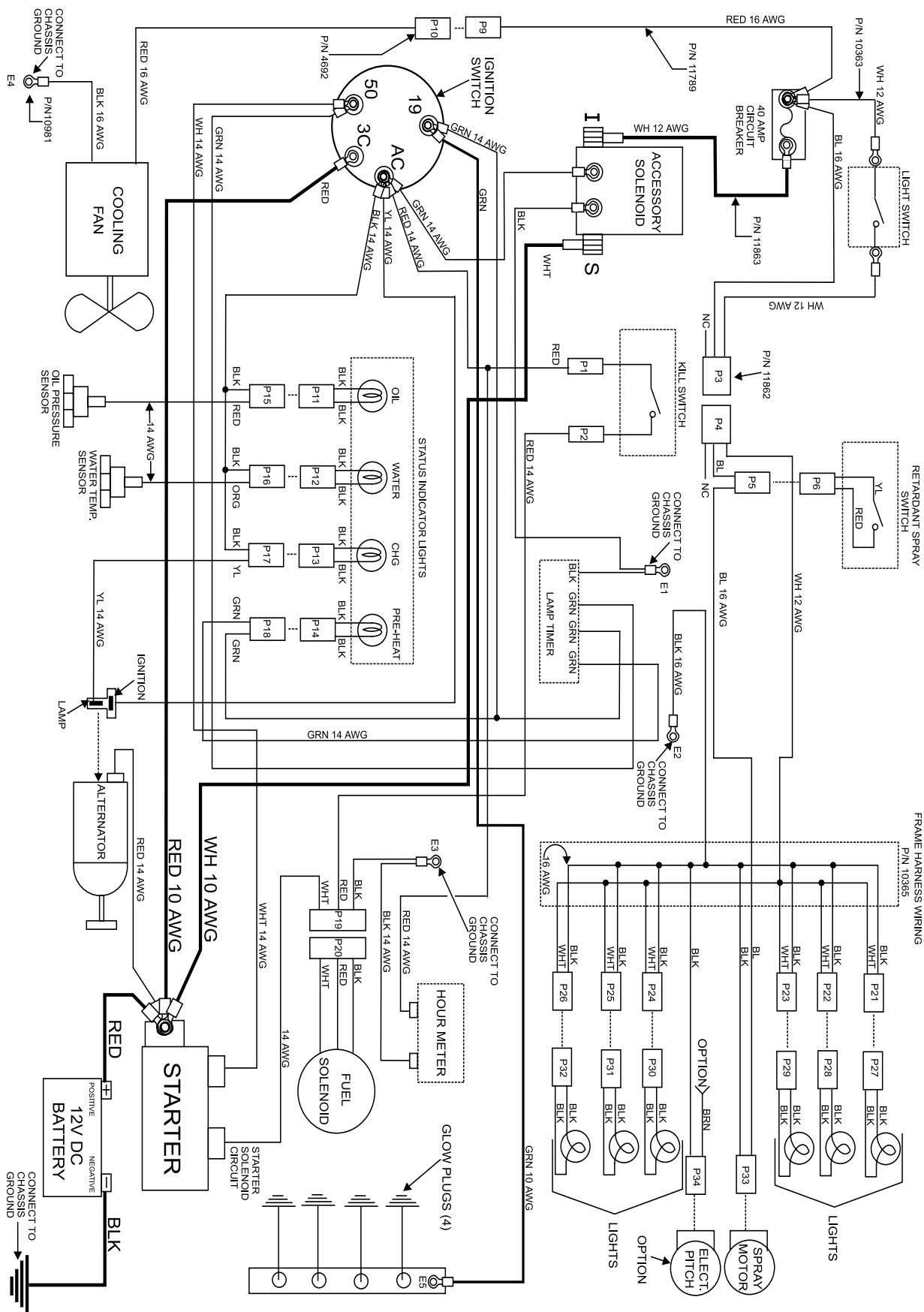
NO	PART NO	PART NAME	QTY.	REMARKS
1	0189	HAND GRIP	2	
2	2336	UPPER HANDLE	1	
3	1869	SNAP PIN	1	
4	7170	CLIP	2	
5	11684	DOLLY AXLE	1	
6	10440	WHEEL & TIRE	2	
7	0655	SCREW, HHCS 5/16-18 x 3/4"	2	
8	0300B	FLAT WASHER 5/16"	2	
9	2364	WHEEL	2	
10	10445	FRAME	1	
11	4684	FLAT WASHER 5/8"	2	
12	0183	COTTER PIN	2	
13	10446	FLAT WASHER 3/4"	2	
14	8151	FLAT WASHER 3/4" SAE	2	
15	0161C	LOCK WASHER 5/16"	2	

EMR-2 E-Z MOVER ASSY — PURCHASE THROUGH MQ UNIT SALES DEPT.

HTH — WIRING DIAGRAM (VANGUARD)



HTH — WIRING DIAGRAM (KUBOTA)



TERMS AND CONDITIONS OF SALE — PARTS

PAYMENT TERMS

Terms of payment for parts are net 30 days.

FREIGHT POLICY

All parts orders will be shipped collect or prepaid with the charges added to the invoice. All shipments are F.O.B. point of origin. Multiquip's responsibility ceases when a signed manifest has been obtained from the carrier, and any claim for shortage or damage must be settled between the consignee and the carrier.

MINIMUM ORDER

The minimum charge for orders from Multiquip is \$15.00 net. Customers will be asked for instructions regarding handling of orders not meeting this requirement.

RETURNED GOODS POLICY

Return shipments will be accepted and credit will be allowed, subject to the following provisions:

1. A Returned Material Authorization must be approved by Multiquip prior to shipment.
2. To obtain a Return Material Authorization, a list must be provided to Multiquip Parts Sales that defines item numbers, quantities, and descriptions of the items to be returned.
 - a. The parts numbers and descriptions must match the current parts price list.
 - b. The list must be typed or computer generated.
 - c. The list must state the reason(s) for the return.
 - d. The list must reference the sales order(s) or invoice(s) under which the items were originally purchased.
 - e. The list must include the name and phone number of the person requesting the RMA.
3. A copy of the Return Material Authorization must accompany the return shipment.
4. Freight is at the sender's expense. All parts must be returned freight prepaid to Multiquip's designated receiving point.

5. Parts must be in new and resalable condition, in the original Multiquip package (if any), and with Multiquip part numbers clearly marked.
6. The following items are not returnable:
 - a. Obsolete parts. (If an item is in the price book and shows as being replaced by another item, it is obsolete.)
 - b. Any parts with a limited shelf life (such as gaskets, seals, "O" rings, and other rubber parts) that were purchased more than six months prior to the return date.
 - c. Any line item with an extended dealer net price of less than \$5.00.
 - d. Special order items.
 - e. Electrical components.
 - f. Paint, chemicals, and lubricants.
 - g. Decals and paper products.
 - h. Items purchased in kits.
7. The sender will be notified of any material received that is not acceptable.
8. Such material will be held for five working days from notification, pending instructions. If a reply is not received within five days, the material will be returned to the sender at his expense.
9. Credit on returned parts will be issued at dealer net price at time of the original purchase, less a 15% restocking charge.
10. In cases where an item is accepted, for which the original purchase document can not be determined, the price will be based on the list price that was effective twelve months prior to the RMA date.
11. Credit issued will be applied to future purchases only.

PRICING AND REBATES

Prices are subject to change without prior notice. Price changes are effective on a specific date and all orders received on or after that date will be billed at the revised price. Rebates for price declines and added charges for price increases will not be made for stock on hand at the time of any price change.

Multiquip reserves the right to quote and sell direct to Government agencies, and to Original Equipment Manufacturer accounts who use our products as integral parts of their own products.

SPECIAL EXPEDITING SERVICE

A \$35.00 surcharge will be added to the invoice for special handling including bus shipments, insured parcel post or in cases where Multiquip must personally deliver the parts to the carrier.

LIMITATIONS OF SELLER'S LIABILITY

Multiquip shall not be liable hereunder for damages in excess of the purchase price of the item with respect to which damages are claimed, and in no event shall Multiquip be liable for loss of profit or good will or for any other special, consequential or incidental damages.

LIMITATION OF WARRANTIES

No warranties, express or implied, are made in connection with the sale of parts or trade accessories nor as to any engine not manufactured by Multiquip. Such warranties made in connection with the sale of new, complete units are made exclusively by a statement of warranty packaged with such units, and Multiquip neither assumes nor authorizes any person to assume for it any other obligation or liability whatever in connection with the sale of its products. Apart from such written statement of warranty, there are no warranties, express, implied or statutory, which extend beyond the description of the products on the face hereof.

Effective: February 22, 2006

[illegible]

OPERATION AND PARTS 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. Tel. (800) 421-1244
Carson, CA 90746 Fax (800) 537-3927
Contact: mq@multiquip.com

Service Department

800-421-1244 Fax: 310-537-4259
310-537-3700

Technical Assistance

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

MQ Parts Department

800-427-1244 Fax: 800-672-7877
310-537-3700 Fax: 310-637-3284

Warranty Department

800-421-1244 Fax: 310-537-1173
310-537-3700

MEXICO

MQ Cipsa

Carr. Fed. Mexico-Puebla KM 126.5 Tel: (52) 222-225-9900
Momoxpan, Cholula, Puebla 72760 Mexico Fax: (52) 222-285-0420
Contact: pmastretta@cipsa.com.mx

CANADA

Multiquip

4110 Industriel Boul. Tel: (450) 625-2244
Laval, Quebec, Canada H7L 6V3 Tel: (877) 963-4411
Contact: jmartin@multiquip.com Fax: (450) 625-8664

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Dukinfield, Cheshire SK16 4UJ
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