SETUP, ADJUSTMENTS AND CALIBRATIONS

MULTIQUIP®

WHITEMAN SERIES

MODEL HTX6H, STX6H

HYDRAULIC RIDE-ON TROWEL

(HATZ 4H50TIC DIESEL ENGINE)

Revision #1 (9/7/17)

Discount Equipment

THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

PN: 42990

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HTX6H/STX6H Trowel

MACHINE INFORMATION AND MAINTENANCE LOG

Technician_____ **Date:**_____

Machine Information			
MODEL		LH Motor Serial No.	
Machine Serial No.		RH Motor Serial No.	
Engine Serial No.		Program ID	
Pump Serial No.		Program Version	

Machine Setup and Calibration Information				
Hydraulic Pressure Settings *(Hydraulic Oil Temperature Below 125 °F)*		***Calibration***	Point 1	Point 2
Charge Pressure (psi)		Foot Pedal		
Pitch Pressure (psi)		Stroke Sensor		
Steering Pressure (psi)		Pitch Sensors		
Blade Speed		Travel (LH)		
Left (rpm)		Travel (RH)		
Right (rpm)		Stops (LH)		
		Stops (RH)		

Inspection				
Fuel Levels	✓	***Leak Checks***		✓
Engine Oil		Engine		
Coolant		Coolant		
Hydraulic Oil		Hydraulics		
Mechanical	✓	***Functional Checks***		✓
Grease Points		Hour Meter		
Stabilizer Rings		Seat Switch		
Hydraulics		***Drift Test***		
Retardant Spray System		Travel (Start/Stop)		
Electrical	✓	Initial Height (LH/RH)		
Cooling Fan		Final Height (LH/RH)		
Switches				
Lights and Indicators				

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

SAFETY MESSAGES

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

SAFETY SYMBOLS

DANGER

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

WARNING

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

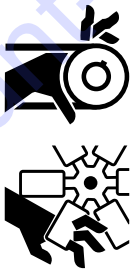
CAUTION

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

NOTICE

Addresses practices not related to personal injury.

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

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

DECALS

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

GENERAL SAFETY

⚠ CAUTION

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

- Avoid wearing jewelry or loose fitting clothes that may snag on the controls or moving parts as this can cause serious injury.
- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when under medication.

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

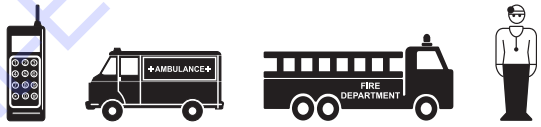
- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.
- No one other than the operator is to be in the working area when the equipment is in operation.
- **DO NOT** use the equipment for any purpose other than its intended purposes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

NOTICE

- This equipment should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.
- **NEVER** use accessories or attachments that are not recommended by Multiquip for this equipment. Damage to the equipment and/or injury to user may result.
- **ALWAYS** know the location of the nearest **fire extinguisher.**

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

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



TROWEL SAFETY

⚠ DANGER

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

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.

TRANSPORTING SAFETY

CAUTION

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

- Ride-on trowels are very heavy and awkward to move around. Use proper heavy lifting procedures and **DO NOT** attempt to lift the trowel by the guard rings.
- **NEVER** lift trowel with the operator on the machine.

NOTICE

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

  Lifting straps can be routed over the tie-down strap location, allowing a forklift or crane to lift the trowel up onto and off of a slab of concrete. Two straps should have a minimum of 2,700 pounds (1,225 kg) total 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.
- Use adequate lifting cable (wire or rope) of sufficient strength.
- **DO NOT** lift machine to unnecessary heights.
- **ALWAYS** tie down equipment during transport by securing the equipment with straps. Inspect straps to make sure they are not frayed or damaged.

TOWING SAFETY

⚠ CAUTION

- Check with your local county or state safety towing regulations, in addition to meeting ***Department of Transportation (DOT) Safety Towing Regulations,*** before towing your trowel.

- In order to reduce the possibility of an accident while transporting the trowel on public roads, **ALWAYS** make sure the trailer that supports the trowel and the towing vehicle are mechanically sound and in good operating condition.
- **ALWAYS** shutdown engine before transporting
- Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer "gross vehicle weight rating."
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both towing vehicle and trailer. Check trailer information, or tire side wall for recommended tire pressure. Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with a **safety chain.**
- **ALWAYS** properly attach trailer's safety chains to towing vehicle.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake and trailer lights are connected and working properly.
- DOT Requirements include the following:
  - Connect and test electric brake operation.
  - Secure portable power cables in cable tray with tie wraps.
- The maximum speed for highway towing is 55 MPH unless posted otherwise. Recommended off-road towing is not to exceed 15 MPH or less depending on type of terrain.
- Avoid sudden stops and starts. This can cause skidding, or jack-knifing. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns to prevent rolling.
- Trailer should be adjusted to a level position at all times when towing.
- Raise and lock trailer wheel stand in up position when towing.
- Place ***chock blocks*** underneath wheel to prevent rolling while parked.
- Place support blocks underneath the trailer's bumper to prevent tipping while parked.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.

ENVIRONMENTAL SAFETY/DECOMMISSIONING

NOTICE

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

- **DO NOT** pour waste or oil directly onto the ground, down a drain or into any water source.
- Contact your country's Department of Public Works or recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this equipment.

- When the life cycle of this equipment is over, remove battery and bring to appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the trowel frame and all other metal parts be sent to a recycling center.

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

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

EMISSIONS INFORMATION (DIESEL)

NOTICE

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

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

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

The specialized tools listed in Table 1 are required to maintain and service the HTX6H/STX6H ride-on trowel. Fleet technicians and servicing dealers must have these tools for efficient unit setup and component calibration.

Table 1. Setup, Calibration, and Diagnostic Tools

TOOL		DESCRIPTION	PART NO.	QTY
Tool Kit		Includes all tools listed below.	32061	1
CAN Gateway Cable/Canbus Jumper		Required to interface to the trowel MCU. Required for foot pedal calibration, pitch sync calibration, stroke cylinder calibration, engine fault code reading, diagnostics, etc.	22882/ 22881	1
Gauge Tool (3.25”)		Used in calibrating one of the two blade pitch set points as part of the synchronization process.	32044	2
Gauge Tool (2.25”)		Used in calibrating one of the two blade pitch set points as part of the synchronization process.	32000	2
Set Up Jumper		Used to place the engine at full speed for component calibration and to simultaneously disable both the stroke follower and cold start mode.	42538	1
Pedal Wrench		Used to help set the foot pedal sensor. It is also used for setting the Zero Pitch Cylinder Stops by using the thickness of the wrench.	32020	1
Service Tool (3 to 9 pin)		Required to interface to the Hatz ECU	42948	1

NOTICE

The following machine information should be recorded on Machine Information and Maintenance Log for unit service tracking and for filing any warranty claims.

MODEL

1. Enter appropriate model:
   - HTX6H — for 6-blade HTX6H
   - STX6H - for 6-blade STX6H

SERIAL NUMBER

1. **Engine Serial Number** — as shown on serial tag located on engine (Figure 1). See Figure 2 for serial tag.

Figure 1. Engine Serial Tag Location

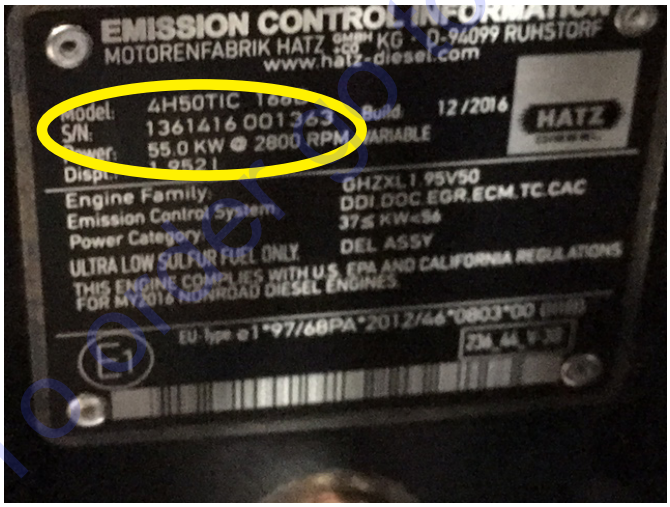


Figure 2. Engine Serial Tag

2. **Pump Serial Number** — located on sticker on pump (Figure 3). Lower number is the serial number.

Figure 3. Pump Serial Number Location

3. **Motor Serial Number** — located on sticker on top of hydraulic motors (Figure 4).

NOTICE

If lot number is listed instead of the serial number, record lot number.

Figure 4. Motor Serial Number Location

NOTICE

These general procedures will be referenced in other sections throughout the manual.

SETUP JUMPER INSTALLATION

NOTICE

Machine must be secured prior to installation. Installing setup jumper will:

- Disable Cold Start
- Increase Engine RPM to Full operating RPM
- Disable Stroke Follower

1. Remove plug (P/N: 42440) from J5 of main harness (4-pin connector in right rear corner of electrical panel under the seat).
2. Install Setup Jumper (P/N: 42538 on J5).

REMOVE SETUP JUMPER (If installed).

1. Remove Setup Jumper (P/N: 42538) from J5 of main harness.
2. Reinstall Plug (P/N: 42440) on J5 of main harness.

Table 2. Disable and Re-enable Options

DISABLE (If Setup Jumper is not installed)	**Cold Start**	1. Open service tool.
		2. Click “machine setup” button on main page.
		3. Click “Cold Start” button under Setup Menu.
		4. Click check box next to Disabled.
		5. Press Download Button.
	Stroke Follower	1. Open service tool.
		2. Click “machine setup” button on main page.
		3. Click “Stroke Cont.” button under Setup Menu.
		4. Click button “Disable Stroke Follower”.
RE-ENABLE (If disabled via service tool)	**Cold Start**	1. Open service tool.
		2. Click “machine setup” button on main page.
		3. Click “Cold Start” button under Setup Menu.
		4. Uncheck box next to Disable.
		5. Press Download Button.
	Stroke Follower	1. Open service tool.
		2. Click “machine setup” button on main page.
		3. Click “Stroke Cont.” button under Setup Menu.
		4. Click button “Enable Stroke Follower”.

FLUID FILL AND CHECK

Hydraulic Oil Check

1. To check the hydraulic oil level, place the trowel on a secure flat surface with the engine stopped.
2. Visually inspect the hydraulic oil expansion tank (Figure 5). For normal operation the fluid level should be visible when the filler cap is removed.

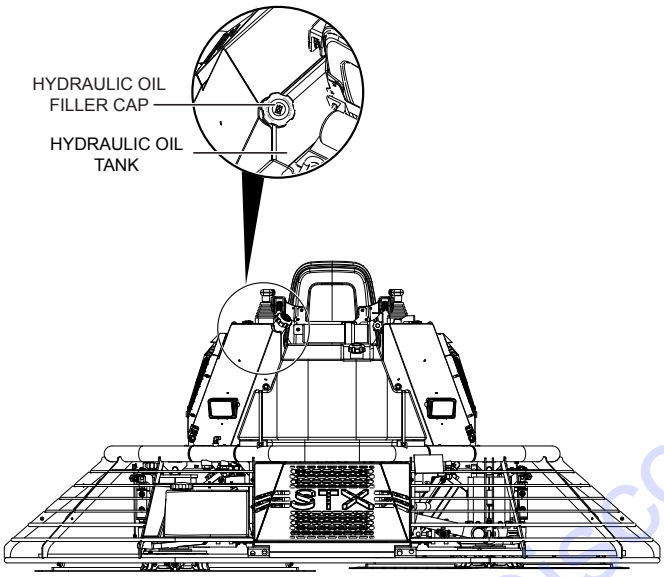


Figure 5. Hydraulic Oil Expansion Tank

3. If the hydraulic oil level is low, fill with Parker Duraclean™ ISO 46 anti-wear type hydraulic oil to the recommended operating level (8 gallons/30 liters).

Engine Oil

1. When checking or adding oil, place the machine so the engine is level.
2. Pull the engine oil dipstick from its holder (Figure 6).

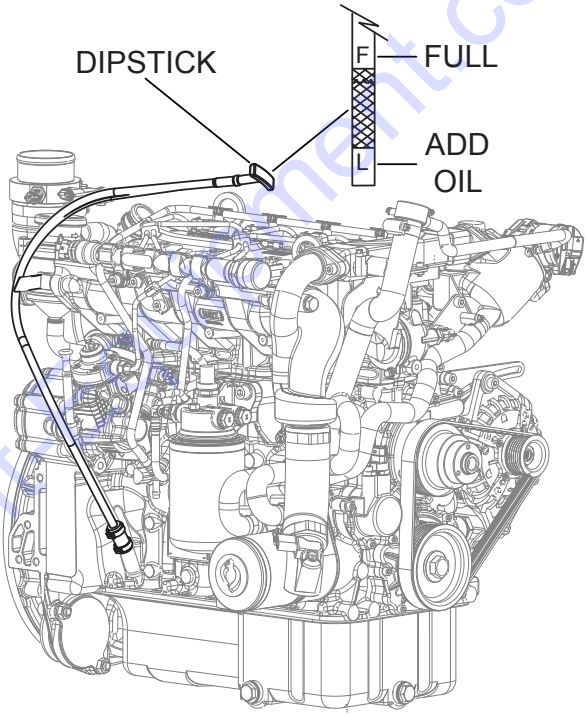


Figure 6. Adding Engine Oil

3. Determine if engine oil is low. Oil should be between the upper limit and lower limit (add oil) lines.
4. If oil is below the "**Add Engine Oil**" line add oil up to upper limit on the dipstick. Allow enough time for any added oil to make its way to the oil pan before rechecking.

⚠ CAUTION

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

Engine Coolant

1. Verify that the radiator drain cock is closed.
2. Remove radiator cap.
3. Open the clam shell to access the coolant sight glass (Figure 8).
4. Pour engine coolant (Dexcool or long life coolant only) slowly into the radiator (Figure 7) until it is at full level as seen through sight glass.

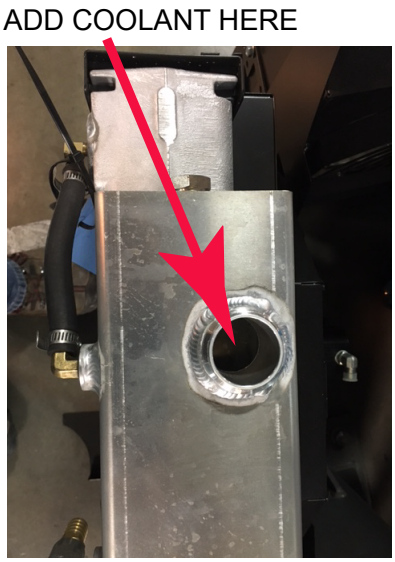


Figure 7. Adding Engine Coolant

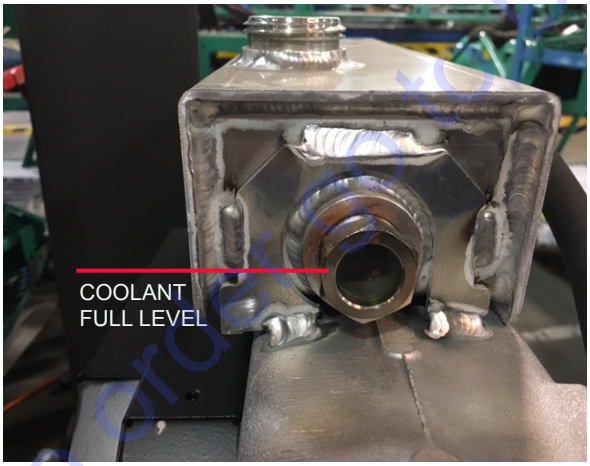


Figure 8. Coolant Level

5. Place a vacuum pump over the engine coolant filler port to remove any excess air.
6. Refill the radiator until it is full again.
7. Reinstall radiator cap.

WHITEMAN SERVICE TOOL (WST) INSTALLATION

NOTICE

Make sure that the Sauer Danfoss Plus +1 Software is already installed before proceeding with the Whiteman Service Tool (WST) installation.

1. Dowload the application specific Whiteman Service Tool (WST) file from the Whiteman Service Tool Page on the Discount-equipment website:

   http://www.discount-equipment.com

   If you need assistance, contact Discount-equipment.

2. Also obtain software license key by completing the request form available on the Multiquip service website. The software license key will be sent to you as an attachment to an e-mail.

3. Extract the files from the downloaded service tool and save them to your desktop. Do not change the names of the files.

4. Locate and verify that the latest version of the WST application file (42645RevX.p1d) was saved to your desktop.

NOTICE

X indicates application version letter.

5. Double-click on the 42645RevX.p1d icon on your desktop. One of the screens shown in Figure 9 will appear. Click "Cancel".

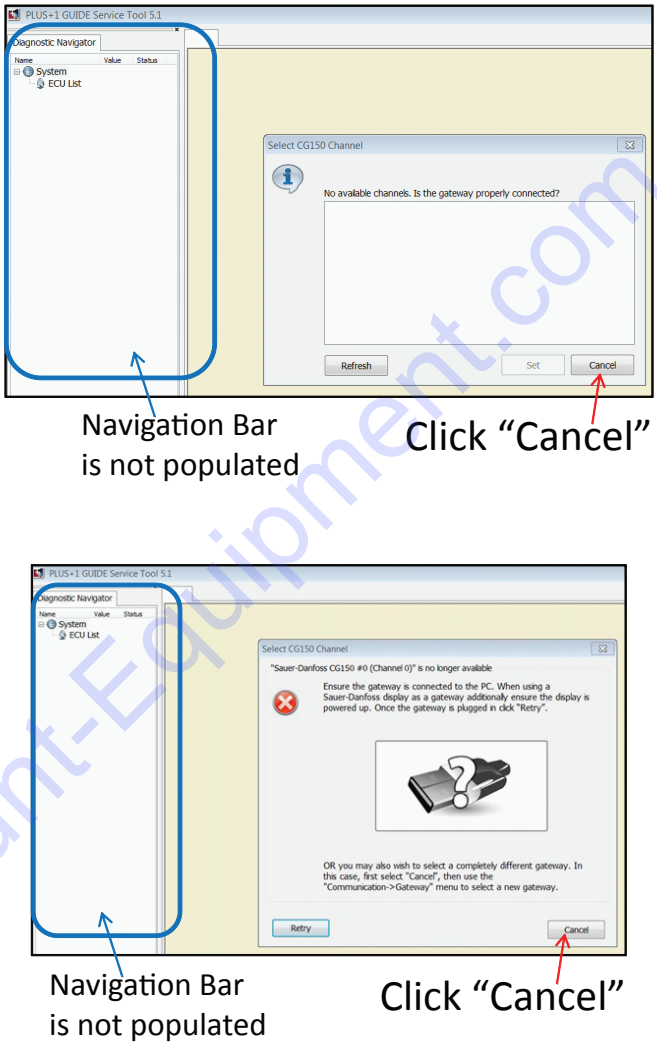


Figure 9. WST Navigation Bar (Not Populated)

6. Click "Cancel" again when the new screen (Figure 10) comes up.

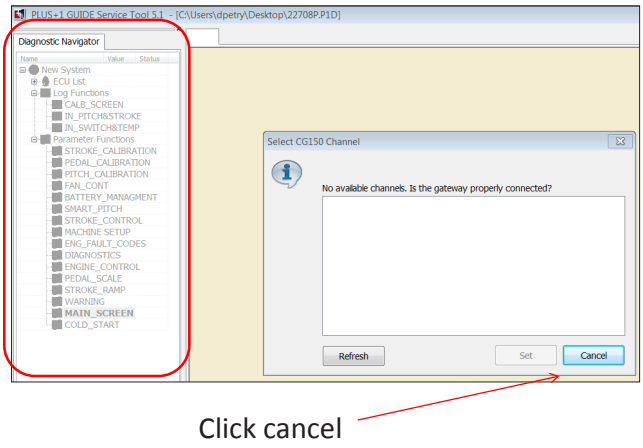


Figure 10. WST Navigation Bar (Populated)

7. The new screen will have both navigation and tool bars active (Figure 11.)

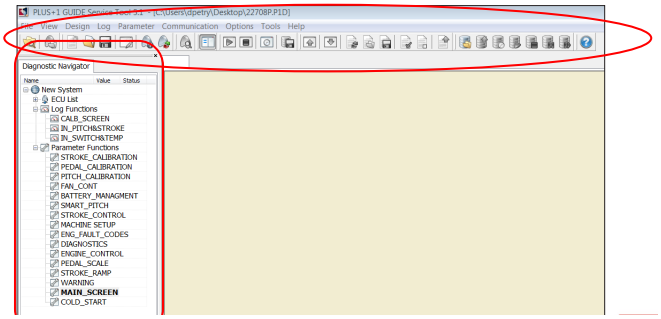


Figure 11. WST Tool Bar

8. Click on "Tools". On the drop-down menu, click on "License Manager" (Figure 12).

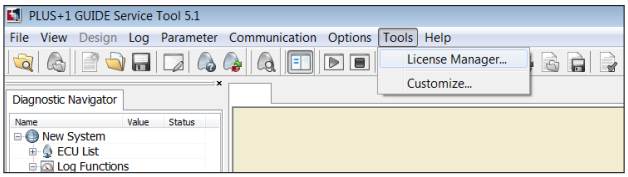


Figure 12. WST License Manager

9. Input the license key obtained from Multiquip (Figure 13) and click "OK".

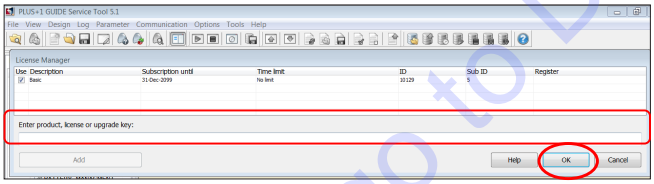


Figure 13. Entering License Key

CONNECTION PROCEDURE

NOTICE

Make sure that the Sauer Danfoss Plus Software and Whiteman Service Tool (WST) are installed before proceeding with the connection procedure.

1. Plug the CAN Gateway cable to the trowel at the service port (Figure 14). Do not connect laptop at this time.

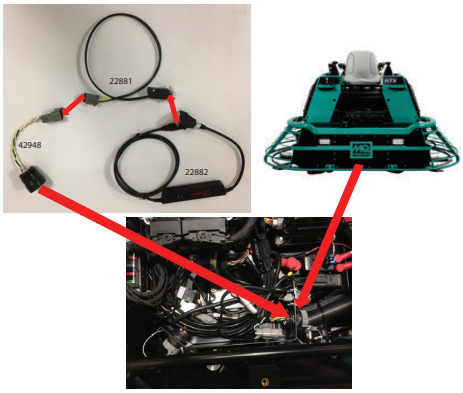


Figure 14. CAN Gateway Cable to Service Port

2. On the trowel, turn the ignition key to the ON position (Figure 15). This will turn on the MCU. It is not necessary to crank or turn on the engine.

Figure 15. Ignition Key ON

3. Connect the USB connector of the CAN Gateway cable to the USB port of the laptop (Figure 16).

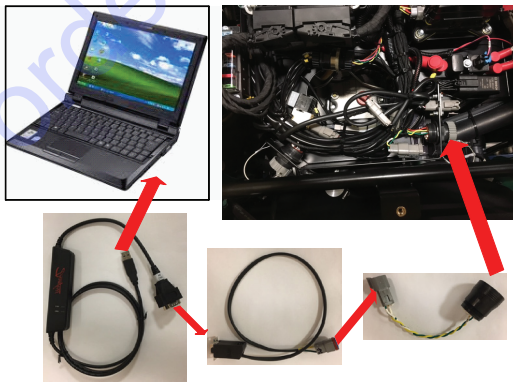


Figure 16. Connecting the Laptop

4. When the CAN Gateway cable is connected to the laptop for the first time, it is necessary to install the CAN driver software. The installation screen will appear (Figure 17). Click "Next" to install the software automatically (default).

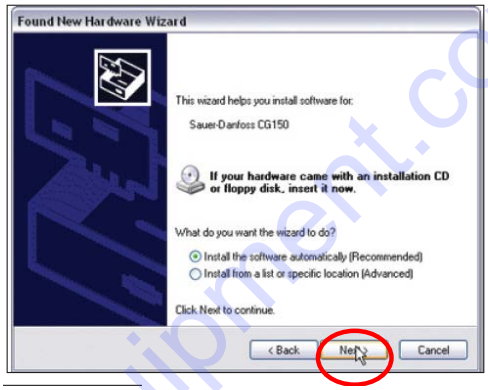


Figure 17. CAN Driver Installation

5. Click "Finish" on the next screen (Figure 18) to complete installation.

Figure 18. CAN Driver Installation Complete

6. On the Service Tool software on your laptop, the main screen should show Software info loaded from trowel MCU and the Machine Status box shows lamps lit (Figure 19).

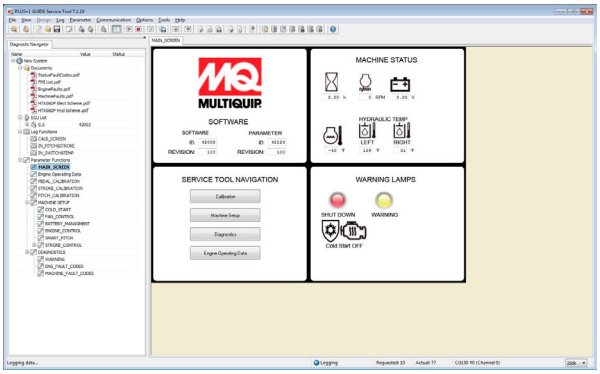


Figure 19. Service Tool Main Screen

FILE DOWNLOAD PROCEDURE

1. Make sure laptop and machine are connected. See Connection Procedure section.
2. Turn key on machine to RUN position but **DO NOT** start machine.
3. Open the service tool software (42645RevX.p1d) on your laptop.
4. On the service tool main screen (Figure 19), click "Machine Setup" button (Figure 20).

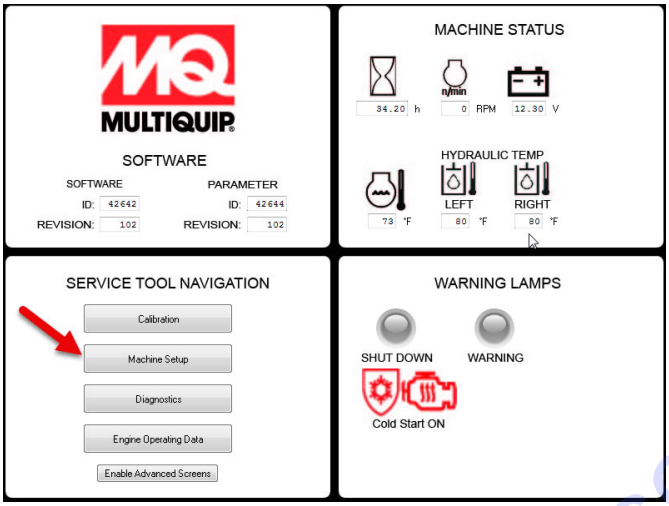


Figure 20. Machine Setup Screen

5. Click "Download Software to MCU" button (Figure 21).

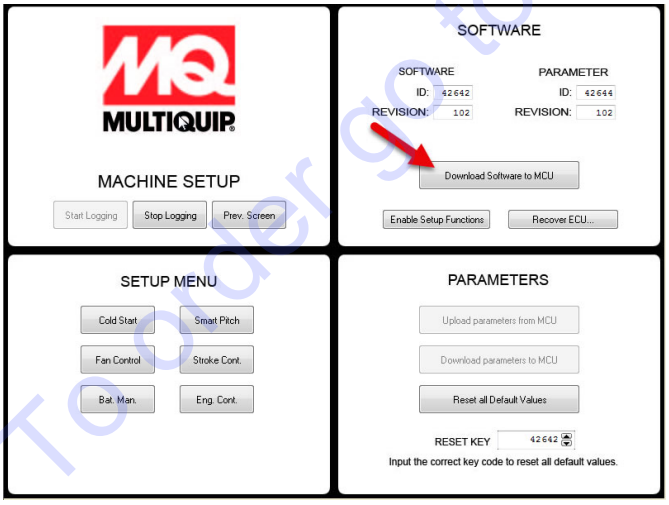


Figure 21. Download Software to MCU Screen

6. Select file 42642_*.LHX file (* represents current revision of file) and click open (Figure 22).

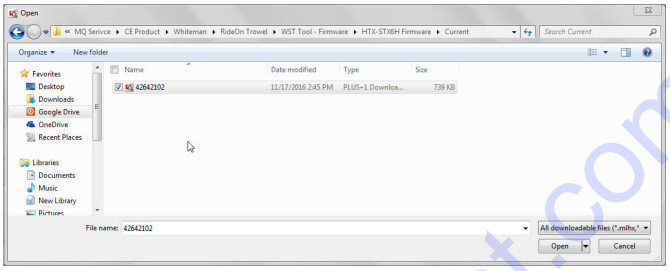


Figure 22. Select File 42642_ Screen

7. Click "Next" then "Start Download" button (Figure 23).

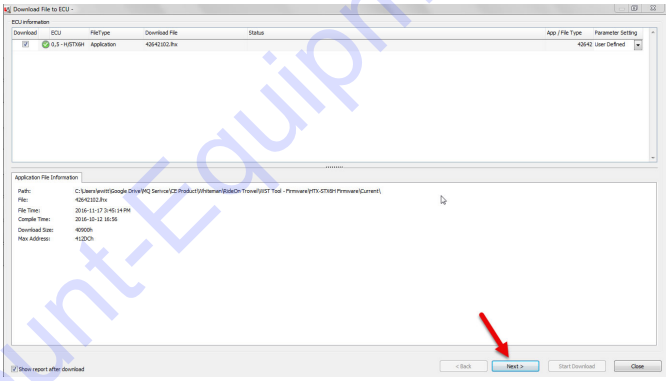


Figure 23. Start Download Screen

8. Verify that the dowload was successful and click "Close" button (Figure 24).

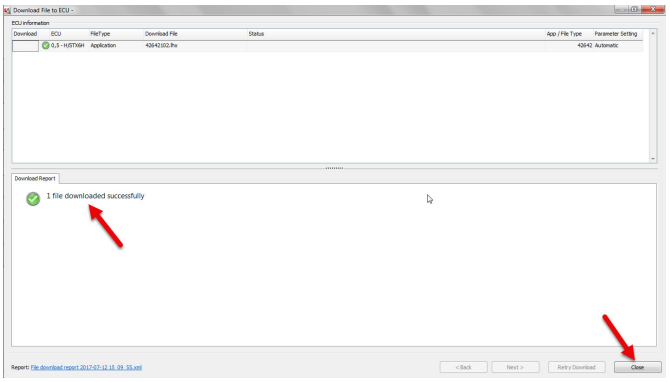


Figure 24. Download Successful Screen

9. Record program ID and version on Machine Information and Maintenance Log on the front of this manual.
10. Turn machine power off for at least 10 seconds prior to proceeding with machine setup.

PARAMETER FILE TRANSFER

1. Turn key to RUN position but **DO NOT** start machine.
2. Click on "Stop Logging" button (Figure 25).

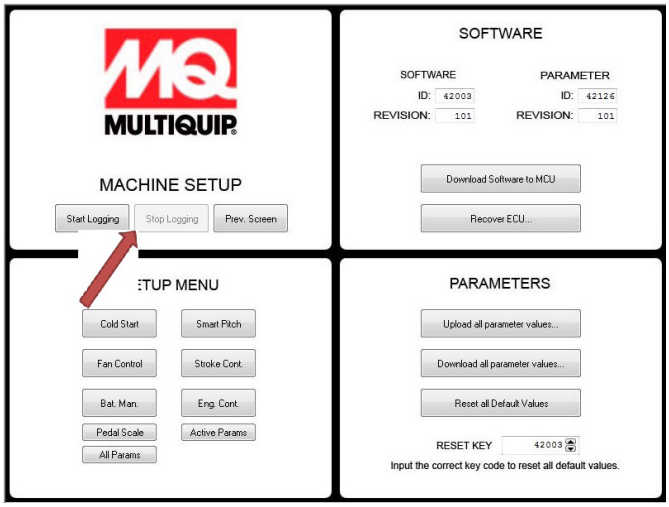


Figure 25. Stop Logging Screen

3. Click "Download all parameter values" button (Figure 26).

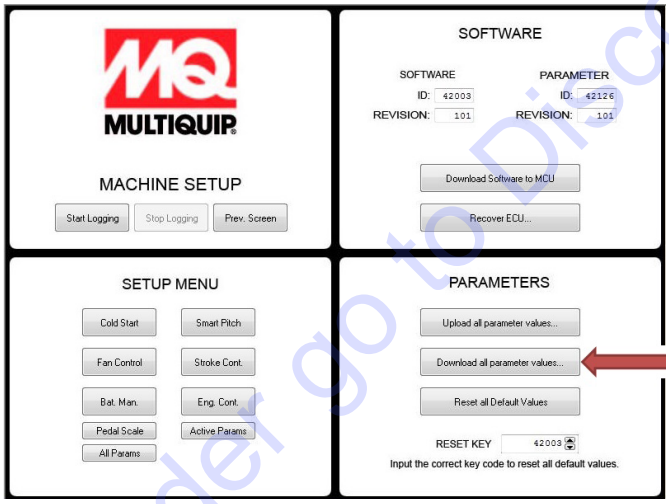


Figure 26. Download all Parameter Values Screen

4. Select 426431__*.p1t file for HTX6H and select 426441__*.p1t for STX6H and select open.
5. Turn machine power off for at least 10 seconds prior to proceeding with machine setup.

CALIBRATE FOOT PEDAL

1. Turn key to ON position but **DO NOT** start machine.
2. Click “CALIBRATION” button on machine setup page.
3. Click “PEDAL CALIBRATION SCREEN” button in "PEDAL SENSOR" frame (Figure 27).

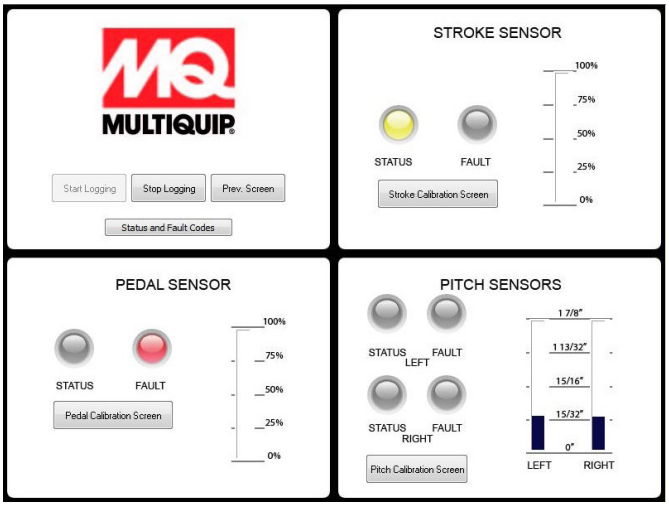


Figure 27. Calibration Button

> ***NOTICE***
>
> Prior to calibration of the foot pedal sensor, ensure the mechanical movement is not restricted. It should smoothly depress to the hard stop and smoothly return to full released position.

Calibration

1. Set sensor zero position default:
   a. Ensure that foot pedal is fully released.
   b. Read % SENSOR VOLTAGE for both sensors 1 and 2.
   c. Round % Sensor Voltage values to nearest percent and enter in RELEASED defaults for sensors 1 and 2.
   d. Press "Download" button to update value in MCU.
2. Set sensor full position default:
   a. Fully depress pedal.
   b. Read % SENSOR VOLTAGE for both sensors 1 and 2 (Figure 28).
   c. Round % Sensor Voltage values to nearest percent and enter in DEPRESSED defaults for sensors 1 and 2.
   d. Press "Download button" to update value in MCU.

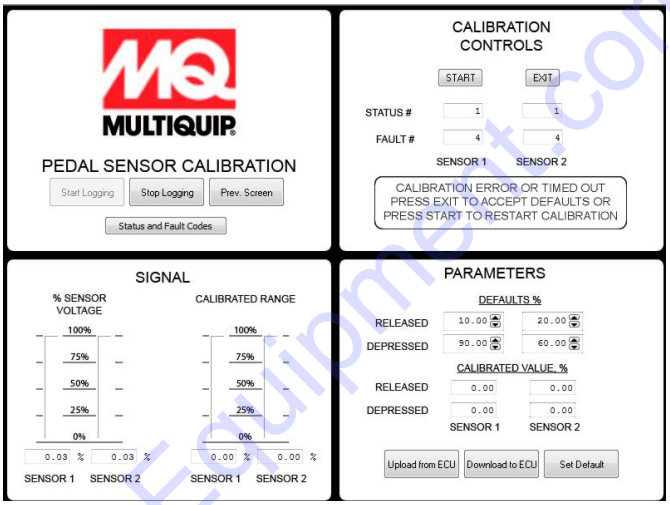


Figure 28. Start Pedal Sensor Calibration

3. Press “START” button to begin calibration and follow prompts.
4. Once calibrated, move pedal thru range, ensuring both calibrated signals move from 0 to 100% together.
5. Record Calibration Values on Machine Information and Maintenance Log.

SECONDARY HYDRAULIC FILL PROCEDURES

> ***NOTICE***
>
> Once the oil heats up, any oil expansion will go up the overflow hose and into the fluid expansion tank.
>
> Removing the oil fill cap, once the fluid is at operating temperature, will cause fluid loss as the expansion will cause oil to spill out.

1. Elevate machine so blades are no longer contacting floor.
2. Start the unit and run the engine.
3. Check level and fill as needed so oil is visible in expansion tank (1/4-1/2 full) (Figure 5).
4. Cycle pitch and steering for 5 minutes to bleed air from the system until fluid coming out bypass hose is free of air bubbles.

5. Turn off machine and lower.
6. Reinstall hydraulic reservoir cap.

MACHINE PRESSURE ADJUSTMENT

NOTICE

All pressures to be adjusted with machine at full engine RPM.

To adjust pressures, cold start must be disabled through the Whiteman Service Tool (WST) or using the set-up jumper.

Pitch Pressure Check

1. Disable cold start.
2. Install a 500 PSI range pressure gauge to Charge or Pitch pressure test port (Figure 29).

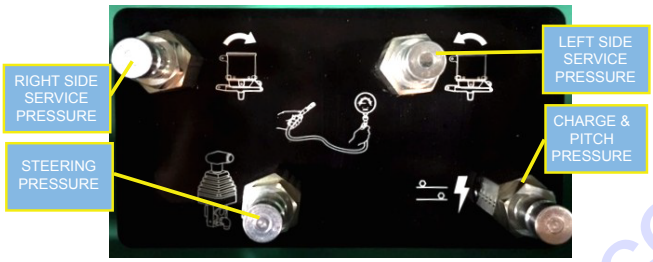


Figure 29. Pressure Test Ports Location

3. Start machine and increase engine rpm to full operating RPM.
4. Activate left pitch switch.
5. Flatten blades (bottom out the pitch cylinders).
6. Continue to hold down pitch switch and measure pressure. If pressure is within range (1850 PSI to 2000 PSI), no adjustment is required. If pressure in not within range, proceed to Pitch Pressure Adjustment section.
7. If no adjustment is required, record pressure on Machine Information and Maintenance Log.
8. Return engine rpm to idle.
9. Turn off machine and remove gauge.

Pitch Pressure Adjustment

1. Disable cold start.

1. Increase engine rpm to full operating RPM.
2. Loosen 3/4" jam nut on pitch relief valve (Figure 30).

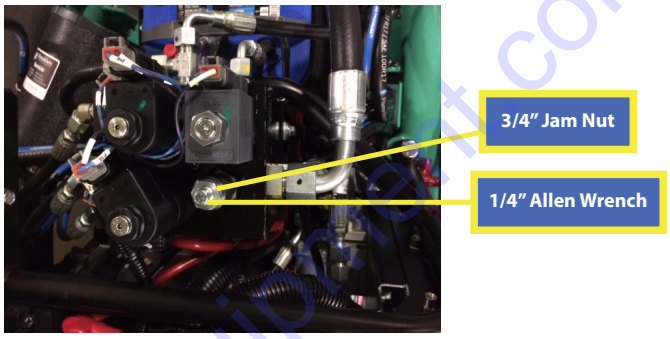


Figure 30. Pitch Pressure Adjustment

3. Using a 1/4" allen wrench, adjust the small hex nut within the larger hex jam nut.
4. Tighten 3/4" jam nut.
5. Check the pressure as described earlier (see Pitch Pressure Check section).
6. If pressure requires further adjustment, repeat steps 2 through 4 until pressure check reads 1850 ± 50 PSI.
7. Record pressure on Machine Information and Maintenance Log.
8. Return machine engine rpm to idle.
9. Turn off machine and remove gauge.

Steering Pressure Adjustment

1. Disable cold start.
2. Install a 300 or 600 PSI gauge on steering pressure port (Figure 29).
3. Start machine.
4. Increase engine rpm to full operating RPM.
5. Loosen 3/4" jam nut on steering valve (Figure 31).

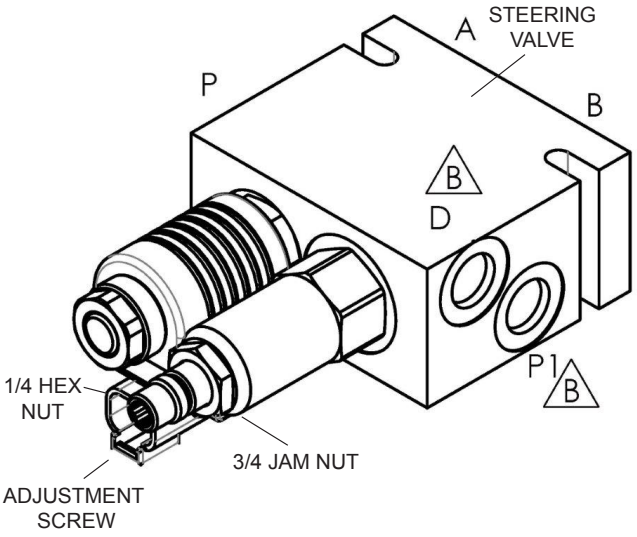


Figure 31. Steering Pressure Adjustment

6. Using a 1/4" allen wrench, adjust the small hex nut within the larger hex jam nut.
7. Adjust to proper steering pressure:

   260 psi ± 10 psi (HTX6H)
   290 psi ± 10 psi (STX6H)
8. Retighten jam nut.
9. Return engine to idle.
10. Turn off machine and remove gauge.
11. Record Pressure on Machine Information and Maintenance Log.

⚠ CAUTION

Machine movement will occur during this step. Ensure machine is secure or operator is present in seat. All guards should be in place. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

Adjust Zero Stroke Position

1. Start machine.
2. Ensure trowel is running at idle with no stroke. On a cold trowel, the unit will go into cold start mode and not be at idle. To place the trowel at idle speed, disable cold start with the WST.
3. Elevate machine so blades are no longer contacting floor. Make sure to follow proper lifting procedures. Refer to Lifting Safety Information section.
4. Ensure blades are not rotating. If rotating, continue to next step and adjust per instructions. Otherwise, set trowel on ground and verify jam nut (Item D, Figure 32) is tight then continue to next section (Right Side Trowel Speed Adjustment).

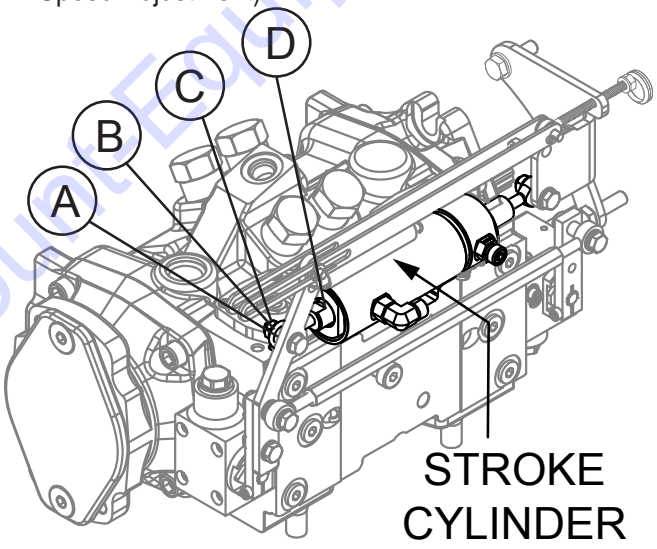


Figure 32. Zero Stroke Position Adjustment

5. Lower trowel and shut off.
6. Loosen jam nut (Item D, Figure 32).
7. Remove retaining screw (Item C, Figure 32). The spacer (Item A, Figure 32) will also come off.
8. Turn rod end (Item B, Figure 32) in, shortening overall length of cylinder assembly.
9. Reinstall retaining screw (Item C, Figure 32) and spacer (Item A, Figure 32). Apply blue loctite to make sure screw will not come off.
10. Tighten jam nut (Item D, Figure 32).
11. Restart machine and repeat steps 2 thru 8 as necessary, until blades no longer spin.

Left Side Trowel Speed Adjustment

NOTICE

Stroke sensor must be recalibrated after trowel speed adjustment for proper machine operation.

1. Install setup jumper or disable stroke follower.
2. Start machine, on bare floor and pitch until blade tips are about ½" off the ground.
3. Fully depress pedal and measure Left Side Trowel Speed.
4. Adjust speed limit screw and tighten jam nut (Figure 33).

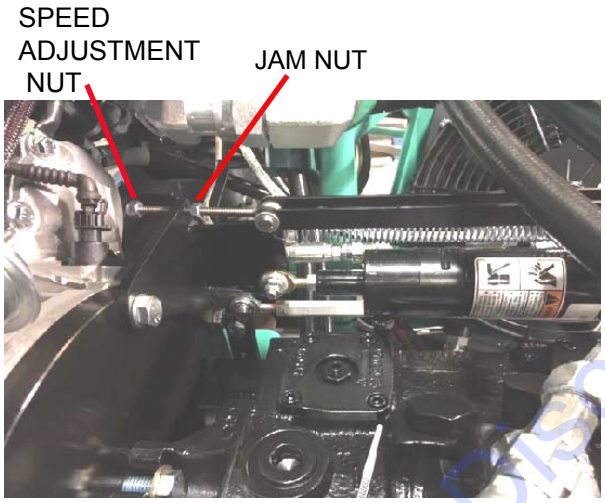


Figure 33. Left Side Trowel Speed Adjustment

5. Re-measure speed, repeating steps 2 and 3 until Left Side Trowel Speed is correct:

   160 ± 3 RPM (HTX6H)

   130 ± 3 RPM (STX6H)

6. Record L.H. speed on Machine Information and Maintenance Log in machine setup area.

Right Side Trowel Speed Adjustment

NOTICE

Stroke sensor must be recalibrated after trowel speed adjustment for proper machine operation.

The trowel speeds should be adjusted on a dry concrete floor with the blades pitched slightly (tips about 1/2" off ground).

1. Verify setup jumper is installed or stroke follower is disabled.
2. Fully depress pedal, measure Left Side and Right Side Trowel Speed.
3. Adjust trowel arm connecting rod on the pump actuating lever and tighten jam nuts (Figure 34).

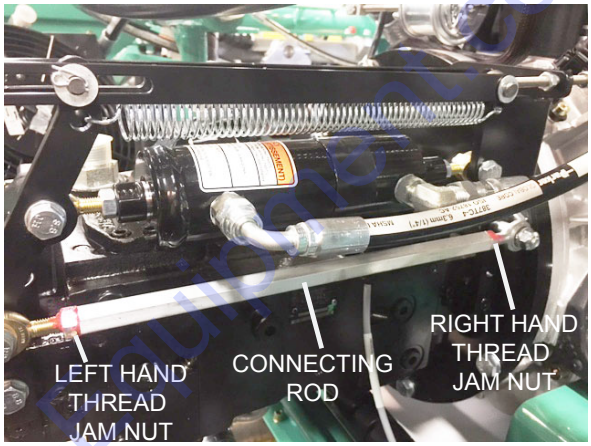


Figure 34. Right Side Trowel Speed Adjustment

4. Re-measure speed and repeat steps 2 and 3 until Left Side and Right side are within 1 RPM of each other.
5. Record R.H. speed on Machine Information and Maintenance Log in Machine Setup section.
6. Remove setup jumper or re-enable stroke follower.

Calibrate Stroke Sensor

⚠ CAUTION

Machine movement will occur during this step. Ensure machine is secure or operator is present in seat. All guards should be in place. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

1. Turn machine off for at least 10 seconds.
2. Restart machine.
3. Install Setup Jumper or disable Stroke Follower.
4. Click "Calibration" button on machine setup page.

5. Click “Calibration” button in STROKE SENSOR section (Figure 35).

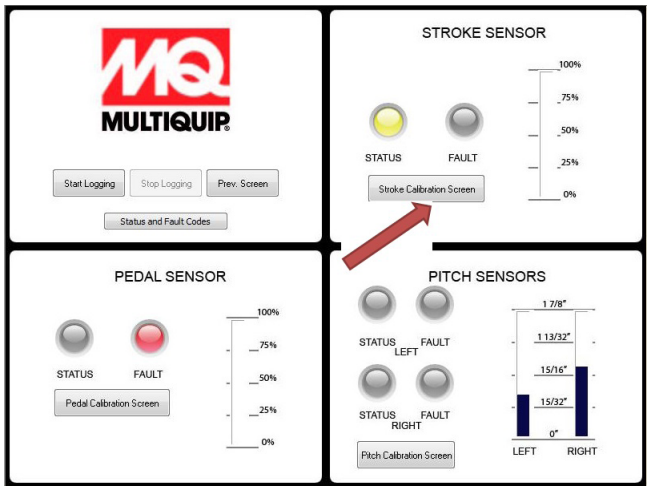


Figure 35. Calibrate Stroke Sensor

6. Set Sensor zero position default:
   a. Ensure foot pedal is fully released.
   b. Read % Sensor Voltage (Figure 36).

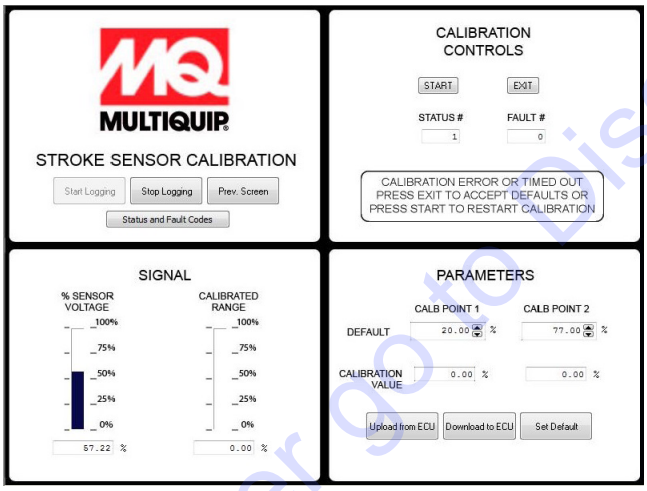


Figure 36. Start Stroke Sensor Calibration

   c. Round value to nearest percent and enter in CALB POINT 1 DEFAULT.
   d. Press "Download to ECU" button to update value .

7. Set Sensor full position default:
   a. Have an operator fully depress pedal and hold at full blade speed.
   b. Read % Sensor Voltage.
   c. Round value to nearest percent and enter in CALB POINT 2 DEFAULT.
   d. Press "Download to ECU" button to update value .

8. The operator must be on the unit to drive and stroke the cylinder. Have a second person press the “START” button and indicate to the operator what the prompts are on the screen. The unit will be run from no stroke to fully stroked during this calibration.

9. After calibration sequence is completed, click "EXIT".

10. Once calibrated, the second person must move pedal thru range and the operator ensures stroke follows and calibrated signal moves from 0 to 100%.

PITCH SETUP

Prior to pitch setup, check and make sure that the following are in excellent condition to ensure eventual proper blade pitch synchronization and proper blade flatness.

- Blade condition - check for no excessive wear, new blades preferred
- Trowel arm bushings
- Pitch bolt adjustment for flatness
- Pitch bolt head for excessive wear
- Wear plate
- Thrust plate bearing and bushing - must lubricate
- Yoke for excessive wear

⚠ CAUTION

Machine movement will occur during this step. Ensure machine is secure or operator is present in seat. All guards should be in place. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

Flatten Blades

1. Adjust blade pitch adjustment bolts as necessary to ensure machine operates smoothly (Figure 37).

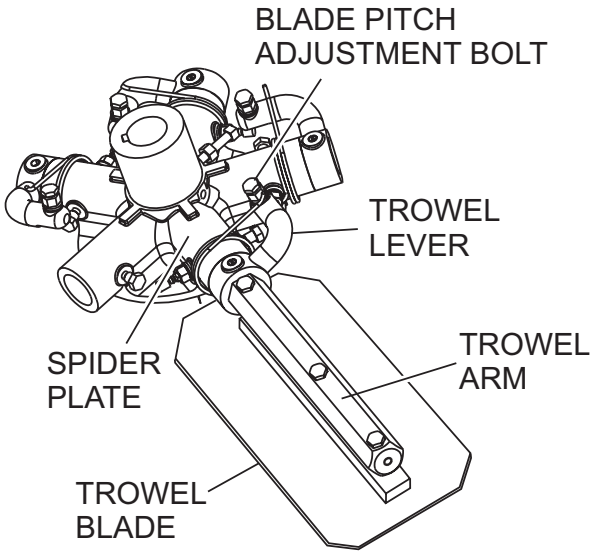


Figure 37. Blade Pitch Adjustment

Measure Blade Leading Edge Height

1. Fully pitch machine by pressing and holding Twin pitch up button until pitch cylinders fully extended.
2. Choose a blade on both LH and RH Rotor. Using Gauge P/N 32044, measure height of raised leading edge ensuring it is 2.00" ±.060" (Figure 38). If the blade slides under the first step but not the next, it is within limits.

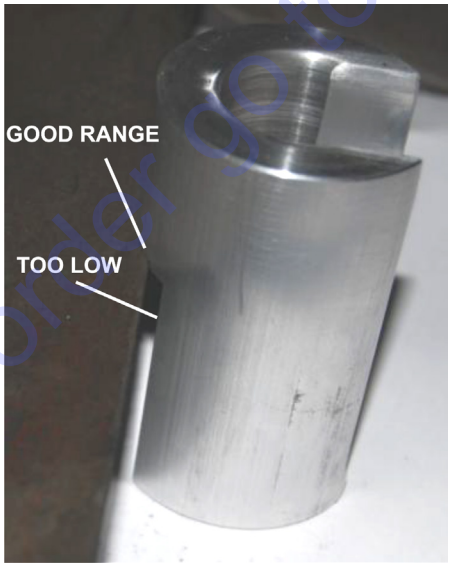


Figure 38. Measuring Leading Edge Height

Leading Edge Height Adjustment

1. If leading edge height is within limits (2.000" ± .060") for left and right side, then no adjustment is needed. Otherwise, proceed to next step for adjustment.
2. Flatten blades (bottom out the pitch cylinders).
3. Remove clevis pin (Item E, Figure 39). Loosen jam nuts (Item C, Figure 39) and adjust clevis (Item D, Figure 39) to cylinder (Item A, Figure 39) position, to raise or lower pitch as required.

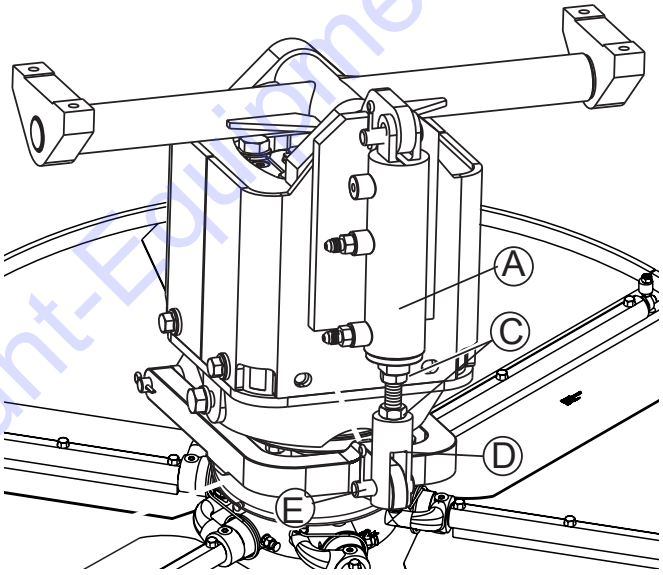


Figure 39. Blade Leading Edge Height Adjustment

4. Tighten jam nuts (Item C, Figure 39) and reinstall clevis pin (Item E, Figure 39).
5. Re-measure as per instructions in "Measure Blade Leading Edge Height" section.
6. Repeat steps 2 thru 5 until Left and Right leading edge height are within limits.

Set Zero Pitch Cylinder Stops

1. Flatten blades (bottom out the pitch cylinders).
2. Turn machine off.
3. Remove clevis pin (Item E, Figure 40) from pitch cylinder allowing yoke (Item B, Figure 40) to rest on thrust collar.

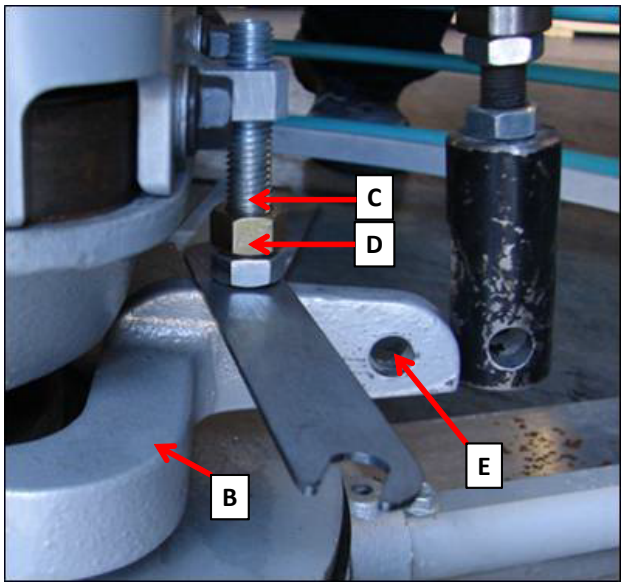


Figure 40. Zero Pitch Adjustment

4. Loosen jam nut (Item C, Figure 40) with ¾" wrench.
5. Set distance between head of stop (Item D, Figure 40) and yoke (Item B, Figure 40) to .075" (14 gauge steel, Gauge #32020).
6. Loctite and tighten jam nut (Item C, Figure 40).
7. Reinstall clevis pin (Item E, Figure 40) between pitch cylinder and yoke.

Pitch Sensor Calibration

CAUTION

Machine movement will occur during this step. All guards should be in place. Keep fingers, hands, hair, and clothing away from all moving parts to prevent injury.

NOTICE

Pitch mode switch must be in the manual position.

1. Turn machine off for at least 10 seconds and then restart machine.
2. Click "Calibration" button on machine setup page.
3. Click "Calibration" button in Pitch Sensors section (Figure 41).

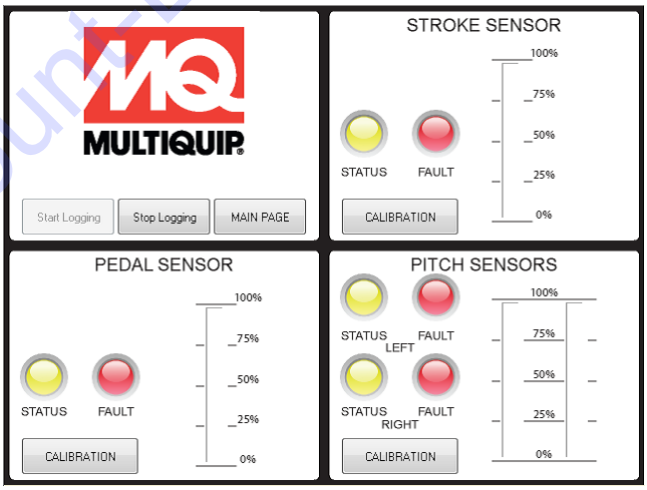


Figure 41. Pitch Sensor Calibration

4. Press "zero" button (Figure 43) to begin calibration.
5. Set Calibration Point 1.
   a. Click on "Hard Ext." button to fully extend pitch cylinders.
   b. Install 3.25" Gauge (P/N 32044) over both Left and Right Cylinders as shown in Figure 42.

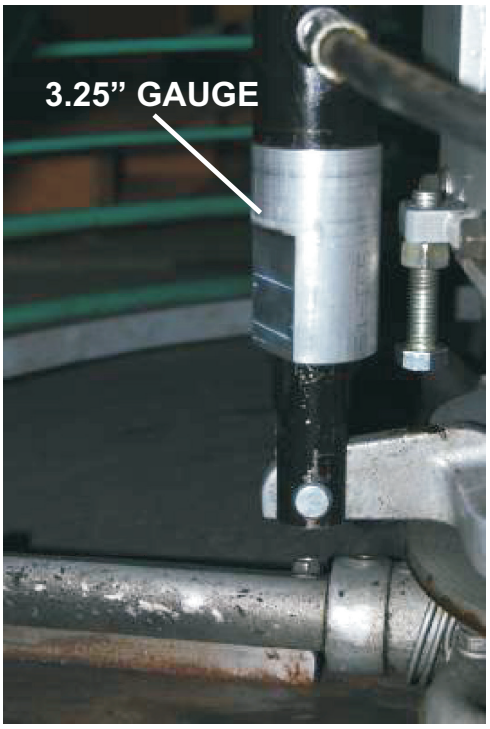


Figure 42. Gauge Installation

c. Click on "Hard Ret." button to retract cylinder onto gauge.

d. Verify gauge is tight between cylinder body and clevis.

e. Press “Set T1” button (Figure 43).

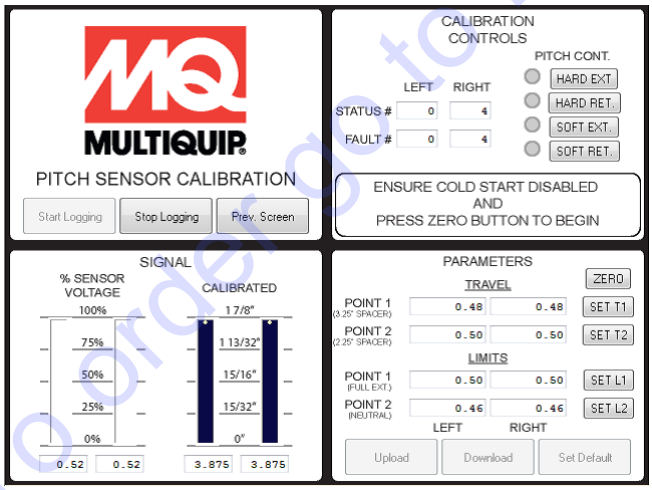


Figure 43. Start Pitch Sensor Calibration

f. Record values on Machine Information and Maintenance Log in Machine Setup section.

g. Click on "Hard Ext." Button to fully extend pitch cylinders.

h. Remove gauge.

6. Set Calibration Point 2.

   a. Install 2.25” Gauge P/N 32000 over both Left and Right Cylinders as shown in Figure 42.

   b. Click on "Hard Ret." Button to retract cylinder onto gauge.

   c. Verify gauge is tight between cylinder body and clevis.

   d. Click on “Set T2” Button.

   e. Record values on Machine Information and Maintenance Log in Machine Setup section.

   f. Click on "Hard Ext." Button to fully extend pitch cylinders.

   g. Remove gauge.

7. Set Calibration Point 3.

   a. Ensure "Hard Ext." is active and pitch cylinders are fully extended.

   b. Click on “Set L1” button.

   c. Record values on Machine Information and Maintenance Log in Machine Setup section.

8. Set Calibration Point 4.

   a. Click on "Hard Ret." Button to fully retract cylinders, ensure yoke is against zero pitch stop.

   b. Click on "Soft Ext." button, and wait until yoke is pressing against thrust collar. Engine speed must be at low idle to avoid moving the thrust collar.

   c. Click on “Set L2” button.

   d. Record values on Machine Information and Maintenance Log in Machine Setup section.

9. Once calibrated, move pitch thru range ensuring calibrated signal moves from 0 to 100%.

10. Turn machine off for 10 seconds.

FLUID LEVELS

Record the following fluid levels on Machine Information and Maintenance Log in Inspection section. Refer to Fluid Fill and Check section for procedure.

- Engine Oil
- Engine Coolant
- Hydraulic Oil

MECHANICAL

1. **Grease Points** — Ensure that the following Grease Points are greased, wiped down and capped:
   - Thrust Collar
   - Fingers
2. **Stabilizer Rings**
   a. Verify at least 1 thread is visible below lower bolt on all heim joints (Figure 44).

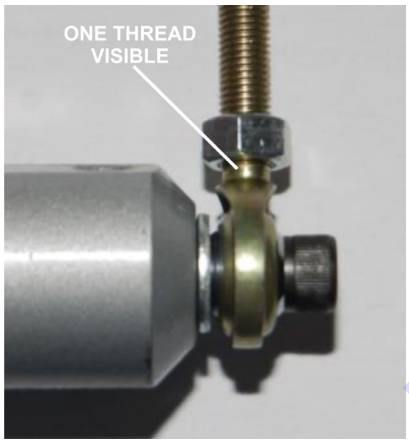


Figure 44. Visible Thread

   b. Verify heim joint is centered, and not rotated, when bolted on Figure 45).

CORRECT INCORRECT

Figure 45. Heim Joint Orientation

3. **Hydraulics**
   - Spot check paint marks on fittings.
   - Ensure that there are no leaks.
4. **Retardant Spray System**
   - Fill with water and perform operational check.
   - Verify no leaks.
5. **Electrical (Cooling Fan)**
   - Verify fan cycles on when key is turned on (will remain on for 10s).
   - Verify air flow direction is inward.
6. **Lights**
   - Verify operation of all 6 machine lights.
7. **Switches**
   - Verify proper operation of all switches.
8. **Indicators**
   - Turn the ignition key clockwise to the ON position. The system indicator lights, including the red and amber LEDS on the diagnostic display will turn on for 10s to verify functions.
   - Pitch Mode Light
   - Cruise Control Light
   - Cold Start Light
   - Glow Plugs Light
9. **Aesthetics**
   - Paint Quality
     - No bare spots
     - No scratches
   - Decals
     - Readable
     - Not torn or scratched

STATIC BLADE PITCH DRIFT TEST

1. Switch smart pitch switch to off position.
2. Bring machine up to temperature. This will be indicated by “Cold Start” lamp turning off.
3. Choose one blade from each spider and mark with small X to identify.
4. Using the Twin pitch button, cycle the blades from flat to full pitch 8 times leaving the blades in the full pitch position on the eighth cycle.
5. Turn the engine off, and record time and tip height on Machine Information and Maintenance Log.
6. Leave for a 3-hour test period then re-measure tip height. Record height and time on Machine Information and Maintenance Log.
7. Compare the two measurements. Drift exceeding 3/16” in three hours is unacceptable.

Refer to Figure 46 for location on fuse panel.

Table 3. Fuses			
Fuse Number	**Fuse Rating, Amps**	**Connector Pin #**	**Description**
1	25	1F	RH Hyd Cooler Fan
2	25	1H	CAC Cooler Fan
3	10	1C	Foot Platform Lights
4	10	1D	Left Lights
5	10	1B	Right Lights
6	15	2C	Accessory Power Port
7	10	2D	Spray Pumps
8	25	1A	LH Hyd Cooler Fan
9	5	1E	Seat Switch
10	5	1G	Left Hand Switches
11	10	2B	Ignition Switched Power for Engine ECU, Fuse Box Signal and Machine Power Relays
12	10	2A	Service Tool Power: 9 pin OBD connector
13	20	2E	Fused MCU controller
14	10	2F	Right Hand Switches
15	20	2G	Open
16	10	2H	Fuse Box Communication Power

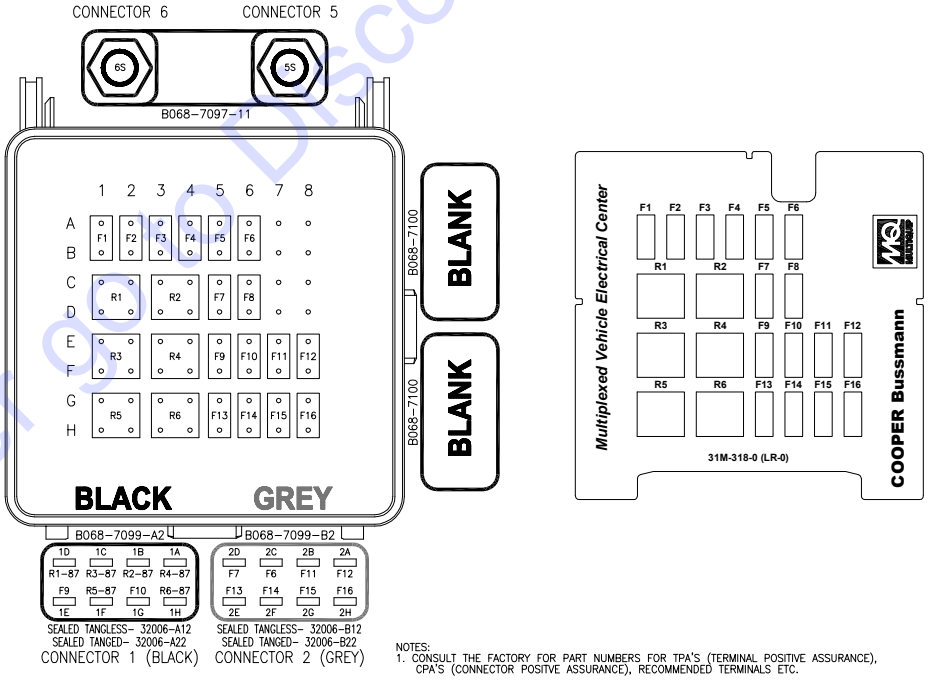


Figure 46. Fuse Location

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