

LEAD PUMP

OPERATING INSTRUCTIONS



General Operation

1. Place machine in desired location. Ensure machine is on stable ground. If machine is not equipped with downriggers, ensure ground is level. Place with careful consideration of users, passersby, and the surrounding environment.
2. Hook up inlet and outlet hoses. Use proper clamps. Ensure seals, coupling, clamp, and hookup are all in safe working condition. Ensure adequate fit to pump unit.
 - a. Only use couplers and clamps that are specifically designed and manufactured for the type of connection you are making.
 - b. Always orient pins, keys, or bolts in a downward position to ensure that if the lock fails or nut falls off, the bolt or pin will remain engaged.
 - c. If using adapters, give considerations to the increased force that is created on the pumping system by increasing the distance from the pump to the connection. Do not use 90° adapters on the outflow of the pump. This hampers flow, and causes dangerous forces on the outflow of the pump.

Tip: Always tighten the collar bolts of your coupler end when hooking up a hose to a pump. This not only ensures that the hose is secure for the high pressures created at the pump, but it is the easiest time to check your hose connection, since it is elevated, bolts are accessible, and hose is at working level. NEVER tighten a coupler collar when liquid is flowing through the hose.

3. Prior to powering the machine on, perform a complete inspection. Check all fluid levels and condition. Look for signs of leaks, cracks, and other defects that may cause issues during operation. Inspect electrical and hydraulic connections. Ensure that all safety devices, caps, and plugs are in proper position. Ensure that all people and objects are clear of moving parts and in a safe position for the machine to be operated.
4. Once machine is in a safe position to operate, turn on the master power.

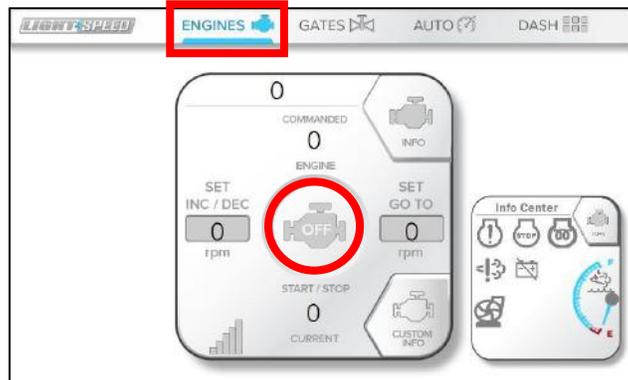
****The following instructions only include basic steps to operate your machine. For a complete guide to the control system, consult the control system manual.****

5. On the main control panel, wait for the electronics to completely boot up to the main screen.
6. Visually note the position of all gates in the piping system.

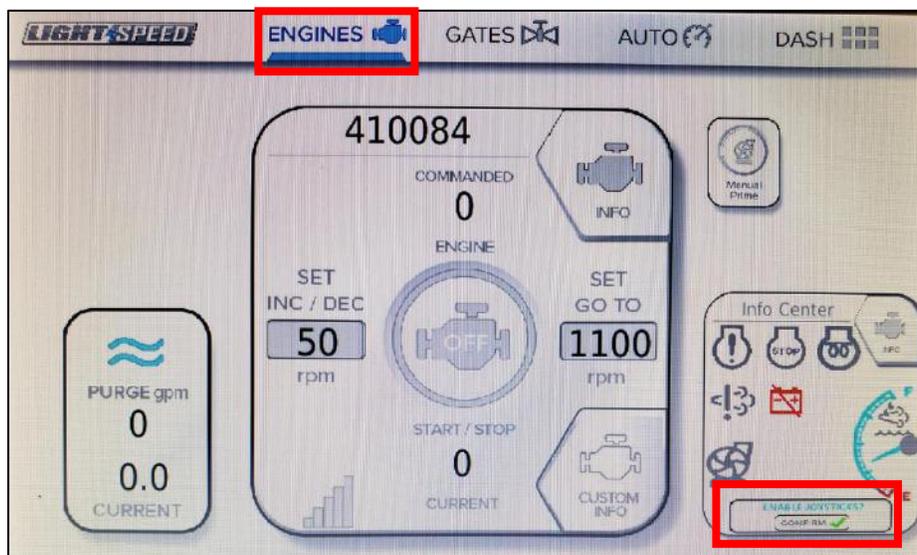
Tip: Upon starting a pump unit with a bypass, always open the outlet gate. If fluid is trapped in the pump from its previous use, and the machine is run for extended periods with a partially full pump and a closed outlet gate, mechanical seal failure can occur.

7. To start the machine, navigate to the 'Engine' tab at the top of the screen by using the touchscreen interface. ****Note: The engine must be started or turned off from the 'Engine' tab. This action cannot be performed from the 'Dash' tab.****
8. Touch the icon of the engine block in the center of the screen to start the engine.

9. Set your RPM inc/dec increments by tapping the box on the left-hand side of the screen and keying in the amount you would like your RPM to increase and decrease by. Also set your 'Go To' RPM value if desired. These can only be set from the 'Engines' tab.



10. Once the engine has started, tap the Enable Joysticks button to allow control of the hydraulics using the joystick box. If there is a red X, joysticks are active. A green check means they are inactive. If the joysticks are not used for two minutes, they will automatically turn off.



11. Once joysticks are enabled on the control panel, the hydraulic functions of the unit can be controlled using the joysticks. Hydraulic controls commanded from within the control panel itself, such as opening or closing gates, are always active.



12. Ensure outlet gate is open so any latent liquid in the pump can discharge into the hose.
13. Using the joysticks, stabilize the machine using the downriggers. Lower each individually until they make contact with the ground. Once all are in contact with the ground, activate two at a time to level the machine (both rear to bring up the rear of the machine, both driver to bring up the driver side, etc.)
14. Ensure gates are in proper position for the intended use. Typical gate positions are as follows:
 - a. While Pumping
 - i. Outlet Gate Open
 - ii. Inlet Gate Open
 - iii. Bypass Gate Closed
 - iv. Pig Gate Closed
 - b. While shooting a pig from another location through this pump
 - i. ***When shooting a pig through a booster pump, the pump unit should be powered off to prevent damage to the mechanical seal after the pig has passed.***
 - ii. Outlet Gate Closed
 - iii. Inlet Gate Open
 - iv. Bypass Gate Open
 - v. Pig Gate Closed
 - c. While shooting a pig from this pump (see instructions for shooting a pig elsewhere in this manual)
 - i. Outlet Gate Closed
 - ii. Inlet Gate Closed
 - iii. Bypass Gate Closed
 - iv. Pig Gate Open
 - v. **When shooting a pig from this pump, be sure to turn the engine off after the pig has left. Running the pump for extended periods with the gates closed can cause damage to the pump**

Some units are equipped with a hydrostatic pump to control a feeder pump. If using this option, please also read the section of operating a hydrostatic feeder pump.

15. Once gates are in proper pumping position, the machine is ready to move liquid.

Safety Note – As liquid is filling the line, air is pushed out ahead of the liquid. Stay clear of the pump unit and hose as liquid approaches. Air being pushed out of the hose can cause kinks, rolls, jumping hose, and erratic movement. If you are ever near hose filled with air that is acting in this manner, move as far away as possible as quickly as possible, as the force of these kinks coming out can cause the hose to jump or slide up to 100’.

16. Once flow is to the tractor, and all air is evacuated from the hose, begin to monitor the inlet pressure of the pump from the control panel ‘Dash’ tab or remotely from the Lightspeed dashboard.
17. Begin to increase engine speed at the first pump in line, typically the lead pump, and working your way out toward the field or the end of the line.
18. Increase engine speed at the pump once the inlet pressure becomes high enough that you can do so without inlet pressure dropping too low. In a typical situation, inlet pressure would grow to 40 psi, and then engine speed would be increased by 100 RPM.
19. Repeat these steps, while not allowing inlet pressure to drop too low, until you are near your desired flow rate and/or pressures. Then decrease the increment of your engine speed adjustment to 50 or 25 RPM and continue to adjust the performance of your pump until you have achieved your desired settings.

Tip: Typically, it is best to keep inlet pressure above 30 psi when pumping to ensure that damage is not done to the pump. Too low of inlet pressure at higher engine speeds can cause pump failure. You cannot have too much inlet pressure.

20. Continue to monitor all pressures and parameters of your machine throughout pumping.

Auto Throttle

Pressure Protections – Always-on protection for your pump and your entire system based upon user specified settings

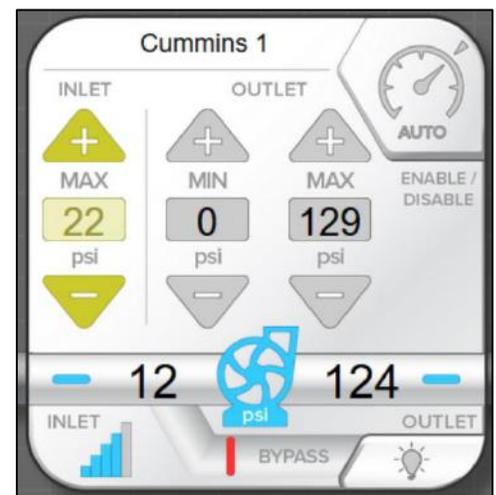
Automatic Throttle – Allows your pump unit to automatically adjust RPM to react to changing pressure conditions based upon user specified parameters

Key Notes:

1. Pressure Protections is always active
2. Settings are parallel: panel and dashboard are always the same number
3. You can turn on/off automatic throttle mode anytime and it will make smooth transitions in and out of that mode.
4. Setting up outlet min can be tricky, but with understanding is a helpful tool
5. Pump will not throttle unless measured outlet pressure is below the outlet max setting
6. Each time auto is turned on, then off, the outlet min setting will be reset to 0. This requires the operator to reset the value.
7. While in automatic throttle mode, you can make small adjustments to inlet max (target) from the dash page with the green “+” and “-“ buttons
8. Make sure that for any changes in hose or pump placement, the system is brought up to speed manually and that the settings are set based on what is actually going on. There is NO one size fits all setting for pressures. We typically see the outlet pressure maximums get set for hose operating pressure or set for a particular feed into a sensitive area. You must understand that you get the hose system operating at the pressures and flow rates you desire before selecting an inlet pressure.
9. Make sure to leave 5 PSI between measured outlet pressure and outlet pressure maximum to keep pump from hunting when running in automatic throttle mode
10. When setting the outlet minimum of a given pump, a good rule of thumb is to subtract the outlet pressure of the pump you are setting from the inlet pressure of the next pump in line, then subtract another 10 PSI. This will ensure that if the clamp on the next pump blows off, the system is able to catch it and make the appropriate adjustments. Reminder!!! You must get your system up to speed at least once before making these parameter adjustments. Changing pump position or mainline hose changes will affect performance so run the system up to speed manually first, set up parameters, then turn on the automatic throttle if you desire.

Pressure Protections

1. Pressure protections is always on; watching the outlet pressure only to be sure it stays within the bounds of the outlet min/max settings. In the example above, Auto is not enabled, but there is an outlet pressure max setting programmed and the outlet pressure min setting is set to 0.
 - a. In this example, the engine speed is controlled manually both up or down based on the increase/decrease, idle, or go to buttons on the dash page. The outlet pressure being measured on the pump is less than that of the max pressure so normal throttle operation can be expected.
 - b. If the measured pressure was to reach 129 PSI, the pump will no longer respond to throttle up commands as the pump has reached the maximum desired outlet pressure. The operator must lower downstream restriction on this pump, or increase the maximum outlet pressure setting in order to continue to throttle up.



- c. If the measured pressure was to go above 129 PSI, the pump will still prohibit any increase of engine speed, but will also slowly and gently slow the engine speed down until the outlet pressure is back at or below the 129 PSI setting. The speed at which AutoThrottle slows the engine back is based on how far over pressure the pump is compared to the outlet max setting. The operator may throttle down or idle the unit, but may not increase speed unless the measured pressure is less than max
- d. An example of the protection would be if the pump above was feeding another booster downstream. The booster downstream is placed on the opposite side of a very sensitive area and the unit suddenly stops. After a small period of time, the Cummins 1 pump begins to see the pressure rising on the outlet of the pump and begins to throttle down the engine appropriately to make sure it does not go above 129 PSI. This protects the hose system from overpressure as well as protecting the operators from creating an issue in the sensitive area. In a normal situation, this may not be immediately recognized by the operators of the system and Lightspeed has made the appropriate adjustments to protect against failure.
 - i. Also, important to note in this example, but if this was the middle booster of a three pump setup, the lead pump would also begin to throttle back because Cummins 1 has slowed down placing an additional restriction in the hose system. In this scenario Lightspeed has automatically throttled down the entire system for the operator and prevented overpressure in multiple locations.
- e. If the overpressure occurs and the engine throttles back appropriately, the operator must use the increase or go to button to try bring the engine speed back to where they feel it should be. Without Automatic throttle on, there is no possibility for the pump to automatically speed the engine up.
- f. If the overpressure continues to occur and the engine is brought all the way back to a speed of 900 rpm, it will trip a warning on the display and on the dashboard by highlighting the outlet pressure yellow and lockout any request to increase engine speed. This can be cleared on the control panel using the clear errors button or from the panel or Lightspeed dashboard by turning Automatic Throttle on then off again.
- g. In this example, the minimum outlet pressure can be seen as set to 0 or disabled. If this value in the above example was to be set to anything other than 0, let's say 120 PSI, then the low outlet pressure protection will be enabled.
- h. Low pressure protection is used to send the pump to idle or 900 RPM in the event that the measured pressure was above the setting, we stated 120, and then for any reason dropped below that 120 PSI setting. Reasons could be: a decreased flow rate coming to the pump because of an issue or throttle down adjustment with a pump up stream, a loss of restriction on the outlet of the pump caused by a hose break or rupture, or as simple as the operator throttling the engine down causing the outlet pressure to drop below the setting. Any of these scenarios will cause the engine to return to idle. Using this feature creates a very tight operating window for the system.
- i. The Pressure Protections feature can be mostly disabled by setting the outlet minimum to 0 and the outlet maximum to 250 PSI. This does limit the maximum operating pressure of the pump to 250PSI.

Automatic Throttle

1. Automatic throttle is a feature that uses Pressure Protections, but has the added feature of automatically adjusting the throttle up or down based on inlet pressure conditions. This feature is on when the auto button is highlighted in blue.
2. In the example above, we still have our outlet maximum set to 129 PSI, our outlet minimum is disabled, and our inlet max (target) is set to 22.
 - a. Automatic throttle works by comparing the difference between the measured inlet pressure and the inlet max (target) setting. In this case, if we were to leave the settings as they are and just turn on the automatic throttle by pressing the auto button, the engine would begin to slow

down. It slows down because the operator has programmed the controls to maintain a 22 PSI inlet pressure, and in order to do that, it must throttle down to create some restriction to achieve the 22 PSI inlet max (target) setting.

If we were to put a number into the inlet max (target) to a value of 5 PSI, for discussion, we would see the pump begin to speed up because the operator programmed the controls to maintain 5 PSI on the inlet so it must throttle up to lower the pressure.

3. Automatic throttle would operate as stated until pressure protections are met.
 - a. If the automatic throttle was throttling up to meet our 5 PSI inlet max (target) we discussed setting, it would continue to do so until the outlet pressure reached 129 PSI. Because pressure protections are always running, it will not allow the throttle to increase any further until the outlet pressure max is either increased or the restriction on the outlet of the pump is lowered.
 - i. It is not recommended to allow the pump to continuously run up against the outlet pressure maximum in automatic throttle mode. This can cause oscillations in velocity in the hose system and fluctuating/varying flows and consequently pressures.
 - b. If automatic throttle was running on our 5 PSI inlet max (target) and making normal adjustments as usual, and the pump begins to throttle down because inlet pressure is dropping. Based on the settings above it would continue down to the lowest setting of 900 RPM and wait for the inlet pressure rise and begin throttling up again.
 - c. If the outlet min setting had been set to something other than 0, and automatic throttle was decreasing the engine speed to keep our 5 PSI inlet max (target) setting, and the outlet pressure fell below the programmed outlet min setting, the engine would be immediately sent to idle because of Pressure Protections and the outlet pressure would be highlighted yellow.
 - i. This error can be cleared by pressing the resume button on the dashboard or turning automatic throttle off

Shutting Down the Line

All tier 4 engines should be allowed to cool down to prevent damage to the aftertreatment system. Be sure to idle your pump for a minimum of 5 minutes after it has been working before powering it off.

All tier 4 engines need to purge the DEF lines before turning off the key switch. After turning the engine off, leave the master power on for a minimum of 3 minutes before cutting electrical power to the unit.

1. Decrease engine speed, starting with the lead pump, and working out toward the end of the line. If controlling remotely from Lightspeed, you can also use the 'idle all' command at the bottom of the screen to idle all pumps in line at the same time.
2. As you are slowly working engine speeds down for all pumps in line, be sure not to violate low inlet pressure or high outlet pressure guidelines.
3. Once all pumps are at idle, close the gate of your lead pump (which gate depends upon your lead pump setup) to stop flow through the line.
4. Once flow has stopped, follow the section related to shooting a pig.
5. After line is clear and all pressure is relieved from the line through the applicator tractor, ensure the coupling and machine pipework are completely free of air pressure per the section related to shooting the pig.
6. After air is clear, open all gate valves on the pump. Then carefully open all ball valves on the pipework to ensure no air is trapped.
7. Carefully disconnect the hoses from the pump, and drag them back away from the unit.

Tip: When disconnecting and moving hoses to prepare to clean up after a pump, do not fold the ends of the hose over on themselves. This will trap air and make it more difficult for hose to be rolled onto the hose cart.

8. Close the ball valves, the pig shooter gate, and the bypass gate on the pipework.
9. Start the pump and allow it to run for approximately 30 seconds to purge any liquid from the pump.
10. Raise the downriggers on the unit and prepare for transport.
11. Turn off the pump unit by navigating to the Engine tab on the control panel and pushing the icon of the engine block in the center of the screen.
12. Do not turn off the master power for at least 3 minutes after powering the engine off to allow the DEF system to purge its hoses.
13. Turn off the master power.

Setting a Hydraulic Boom

1. Prior to operating the boom, ensure that all downriggers/outriggers are completely set on solid ground and unit is stable. If necessary, use blocking on soft ground to be sure to achieve stability under the load of the boom. Always keep the boom close to the ground during movements to decrease the risk of instability in the pump unit.
2. Booms are intended to be operated on the side of the pump unit on which they are mounted. Do not cross the boom over the top of the unit to use on the other side, as this may cause damage to hoses and wires feeding the boom.
3. Never stand under the boom when it is being operated or is raised off the ground, as falling debris or hydraulic or mechanical failure could cause serious injury or death.
4. The hydraulic boom can be set either using the joystick panel on the unit, or by using the remote control that comes with the unit. To activate the joystick panel, see appropriate section in the General Operation section above.

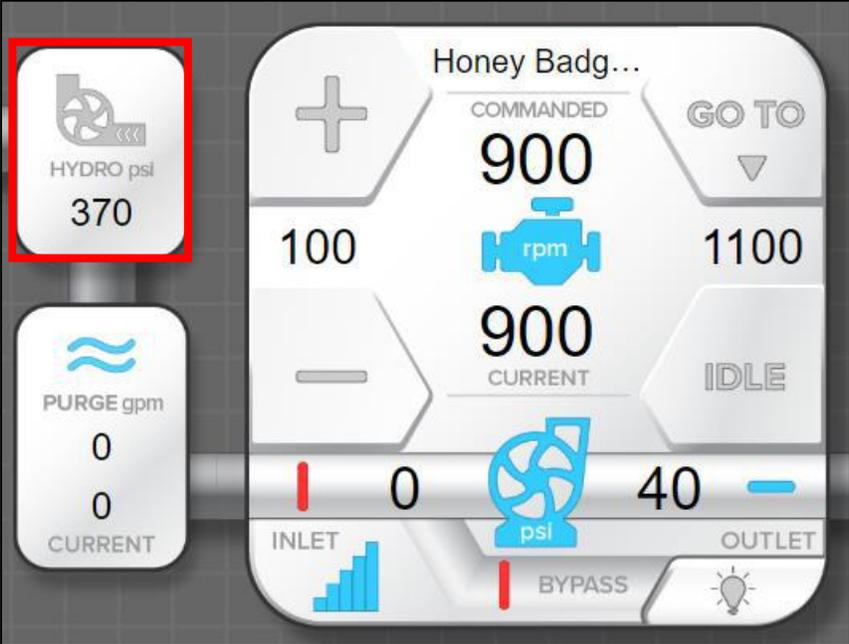


5. To operate the remote control, ensure that that all toggles are in the neutral position.
6. With all toggles in neutral, press the e-stop (if not already pressed in). Move any toggle to prepare the remote, causing the upper right light on the remote to flash, then rotate and release the e-stop. Once the remote is connected and communicating, both upper right and upper left lights on the remote should illuminate to indicate communication.
7. The trigger on the remote is pressure sensitive to control flow to the commanded function. Carefully move the desired toggle into position, and then slowly apply pressure to the trigger to activate the functions. DO NOT fully depress the trigger, and then activate a toggle, as this can cause erratic movement of the boom. Always toggle first, then ease into the trigger.
8. Prior to raising the boom, ensure that the nozzle and gate sides are clear of the cradle, and that when the boom is raised straight up, the nozzle or gate sides will not interfere with the cradle. Rotate the nozzle if necessary. During transport, the hydraulic motor controlling this function may have settled, causing possible interference.
9. Begin by raising Boom 3 to raise the boom stick and release the pressure from the cradle.
10. Next raise Boom 1 to elevate the main section of the boom until the boom is completely clear of the cradle.
11. Next use the Boom Rotate command to rotate the boom away from the unit.
12. Once completely clear of the unit, lower Boom 3 close to the ground.
13. Once the boom is in a safe position, use a combination of all boom stick functions and Boom Rotate to orient the feeder pump over the pump out.
14. In necessary, rotate the agitation nozzle to the proper orientation, so that if activated, liquid does not impact the pit wall or a column, and create splashing that may drive off dangerous gas into the air.
15. Before putting the boom in the pit, ensure that the agitation nozzle is closed.
16. Using a combination of all boom functions, carefully lower the boom into the pit until it sits gently on the pit floor.
17. If using the joystick box to set the boom, these functions are also pressure sensitive.
18. Once the pump unit and the boom are set, de-activate the joystick box in the same manner you activated it, and press the e-stop on the remote. This will prevent any movement in the boom during operation.

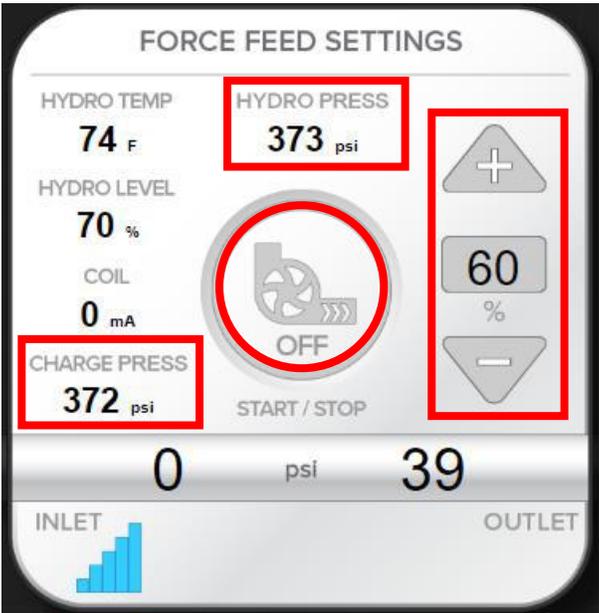
Operating a Hydrostatic Feeder Pump

1. Do not let lead pump idle prior to operating
2. Follow procedures in the General Operation section to set pump and hook up lay flat hose.
3. If operating a secondary feeder attachment, hook up hoses from the pump unit to the feeder apparatus. Hoses consist of two high pressure large hoses and one smaller case drain hose. Ensure that all quick connect ends are very clean prior to hookup. Even small amounts of contamination in a hydrostat system can cause system failure.
4. If equipped with a hydrostatic switch block to divert flow either to the lead pump boom or to a connected feeder pump, ensure that the key switch is in the proper position. Key switch in the 'off' position, or rotated counterclockwise, will divert flow to the boom on the lead pump. Key switch in the 'on' position, or rotated clockwise, will divert flow to the secondary hookup for the attachment. When the attachment hookup is powered on, the red light near the key should be illuminated. When flow is to the boom, the red light should be off.
5. Once key switch is in the desired position, remove the key from the switch to prevent vibration from rotating the switch.
6. Once all hoses are hooked up and unit is ready to pump, follow General Operation section to start unit.

- 7. Charge pressure should remain above 200 psi at all times. If charge pressure is not above 200 psi, power engine off and call your Puck dealer or representative. The charge pressure indicator is shown in a diagram below, under the force feed settings.
- 8. After starting unit, activate hydrostat system at a low level to ensure oil is circulating through the system. If the pump unit is allowed to run for a period of time without circulating oil, the oil in the pump unit may become hot while the oil in the attachment remains cool. Then once hot oil from the pump unit is sent to the attachment, the rapid change in oil temperature can cause failure due to thermal shock.
- 9. If you are not ready to pump to the field, close the gate on the pump unit to prevent cycling of the hydrostat at low flow from sending liquid to the field. If equipped with an inlet gate, close the inlet gate. If not, close the outlet gate.
- 10. Navigate to the Force Feed Settings page by tapping the HYDRO psi button to the left of the pumps.



- 11. Set the selector to 10% using the toggle on the right



12. Turn the hydrostat on by pushing the pump icon in the middle of the screen.
13. Monitor the difference between the CHARGE PRESS and HYDRO PRESS. If they are the same, the hydrostat loop is not flowing. If HYDRO PRESS is higher, oil is flowing. Manually adjust the hydrostat % on the right so that HYDRO PRESS is about 100 psi greater than CHARGE PRESS so that the oil in the system can heat up at a constant rate until you are ready to send flow to the field
14. Once you are ready to send flow to the field, follow the General Operating instructions. Open gates and throttle pump as necessary, but rather than achieving inlet pressure using RPM at the lead pump, you will use the hydrostat % setting on the right to increase inlet pressure.
15. When commanded to an idle, the hydrostat system remains engaged to keep the system charged.
16. When disengaging the hydrostat, the loss of pressure can cause liquid to flow back through the pump and cause significant cavitation and vibration.
17. When shooting the pig from a lead pump, use the following steps:
 - a. Bring the unit to an idle, leaving the hydrostat engaged.
 - b. Close the outlet gate on the lead pump.
 - c. Shoot the pig using the steps indicated in the appropriate section of this manual
 - d. Turn the engine off
 - e. Navigate to Force Feed Settings page and set the force feed to off ***If this is not done, the hydrostat will re-engage when started the next time, unless master power has been turned off.***
 - f. Finish instructions indicated in the 'General Operation' section.
18. Prior to unhooking the feeder apparatus hydraulic hoses, navigate to the Force Feed Setting page and wait for the CHARGE PRESS indicator to drop below 10psi, preferably to zero. Periodically activate the Hydrostat Pressure Relief valve located on the pump unit behind the plate where the high-pressure hoses hook up. This will ensure that pressure is not left in the system that may cause injury when unhooking, or difficulty hooking hoses back up next time.
19. Install transport relief block back on the feeder attachment immediately after unhooking the hoses. This allows the unit to drain oil as the unit cools and the hydraulic pipes contract ***Failure to do so can cause catastrophic damage to the hydrostatic motor on the attachment.***

Priming a Lead Pump

1. Some Puck pump units are equipped with a vacuum pump to prime the main pump.
2. When using a priming system, the system must be air tight to achieve a good prime.
3. On the inlet side of your pump, install the Bauer end to accept the suction hose, hook up the suction hose, and place it in the body of liquid.
4. If not installed, install the primer cap on the cleanout, and hook up the vacuum hoses. When installing the primer cap, liberally grease all the O-rings to prevent the flow of air through the seal. Once the cap is installed, pump grease into the zerk on the female cleanout to fill the void between the O-rings with grease (does not apply when using a Bauer style hookup).
5. Follow the General Operation instructions to prepare the unit for pumping.
6. Close all gates except any gate that may be between the primer cap and the suction hose.
7. When ready to pump to the field, activate the priming pump by either pressing the 'manual prime' button on the Lightspeed screen, or activate the proper joystick.
8. Hold the primer on until liquid reaches the pump and outlet pressure builds.
9. Release the primer, and ensure that outlet pressure is maintained.
10. Open the main gate to send flow to the field when ready.

Troubleshooting a Priming System

1. ENSURE ENGINE AND MASTER SWITCH ARE OFF BEFORE CHECKING THE INLET OF THE PUMP!!
2. If you are not able to prime at all, this generally indicates an issue with the priming system on the pump itself.
 - a. Remove the primer cap, activate the primer, and put the float ball up to the seal to see if you are getting suction to the primer cap. Float ball should hold tight to the seal and cause a noticeable change in tone of the vacuum pump. If not, check the following:
 - i. Vacuum pump is exhausting air out the outlet side
 - ii. Moisture traps are drained
 - iii. All lids are tight and sealed
 - iv. All vacuum hoses connections are tight and hose is free of cracks or holes
 - v. Ball valves and check valves are in the correct position and operating correctly
 - b. If you get good suction to the primer cap but cannot prime, check the following:
 - i. All gates on the unit, except for any gates between the primer cap and the suction hose, are closed and completely sealed. Worn out gate seals can lead to inability to prime.
 - ii. An obstruction in the suction hose
3. If you can prime, but lose prime during pumping, this generally means one of the following:
 - a. Air is flowing backward through the priming system and into the primer cap
 - i. Remove the check valve (approximately 8" long brass valve with banjo fittings) and clean it up. Ensure that the seal surfaces are clean, the ball can move properly, and the spring pushes it against the seal face. Be sure to re-install with the arrow pointing toward the vacuum pump.
 - ii. Check the hose between the check valve and the primer cap, ensure there are no cracks or leaks, and that all seals are tight.
 - iii. Check the primer cap itself that all seals are tight.
 - iv. Check the secondary moisture trap to ensure all seals are tight and there are no air leaks.
 - b. There is a partial inlet obstruction causing inlet flow to not be able to keep up with the pump
 - i. ENSURE ENGINE AND MASTER SWITCH ARE OFF BEFORE CHECKING THE INLET OF THE PUMP!!
 - ii. Wearing leather gloves, carefully check inlet of the pump through the cleanout the verify there is no buildup. Use care, pump parts can be very sharp.
 - iii. Check the end of the suction hose. Pick it up and move it to a new location to ensure you aren't sucking up the same piece of debris over and over.

Cleaning the Line

Warning! Stay Clear of Machine When Operating



- When operating air compressor, stay a minimum of 20 feet away from all hoses.
- Stand behind air compressor, or get back into vehicle.
- DO NOT stand on, lift, or touch hoses while cleaning the line with air.

Air Pressure Is Extremely Dangerous

Air pressure is erratic and unpredictable. If a line were to rupture, shut off air compressor only if it is safe to do so.

Stay back out of the way until the air bleeds off completely. NEVER touch a hose with air pressure in it. This could result in death or serious injury.

1. Idle pump down
2. Ensure that all the line pressure has been relieved from the system
 - a. Carefully crack the ball valve on the pig shooter cap to ensure pressure is not present
3. Remove clamp on pig shooter cap, and remove cap
4. Insert Pig into Tube and replace cap and clamp
5. Attach air hose to Pig Shooter and Air Compressor
6. Insert Safety Clips on the Air Hose Fittings



7. Consult air compressor manual for proper operation instructions
 - a. Turn on air compressor
8. Open Pig Shooter Gate on Pump
9. Open Ball Valve on Pig Shooter
10. Open Ball Valve on Compressor



After Line is Cleaned

1. Close ball valve at air compressor
2. Allow all air pressure to fully exhaust through application tractor. **DO NOT** attempt to exhaust air at any other point in the line, **INCLUDING** at pig shooter location.
3. Once air is completely relieved from **ENTIRE** hose **AND** piping system, close ball valve on pig shooter.
4. Remove air compressor hose from pig shooter cap.
5. Ensure **ALL** outlets on piping system are properly capped.
6. Open **ALL** in-line gates in piping system.
7. Carefully open ball valve on pig shooter to ensure that **ALL** air is relieved, and **NO** pressure is trapped in separate cavities within the piping.
8. **BEFORE** removing clamps, spin and slide cap or hose in and out within clamp to ensure latent pressure is not holding it tight to clamp.
9. **ONLY** after ensuring that **EVERY** piece of the pipe and hose system is free of pressure should hoses or caps be removed.

Transporting the Pump Cart

Follow the state and local laws concerning the transportation of agricultural equipment on public roadways.

Never travel at speeds that exceed 35 miles per hour or at speeds that could make the lead pump unstable and potentially roll.

Check that the tire pressure is correct before moving the trailer. Ensure tires are adjusted to manufacturer's recommendations before transporting the trailer.

Always make sure the machine is secured to avoid injury or damage. Check that the hoses are secured into their traveling position and will not drag.

Check that the safety pins, safety bar, and safety chains are secure.

Be sure to check tow vehicles' manual for its Gross Vehicle Weight Rating (GVWR) to ensure its ability to transport trailer PRIOR to transporting. Always use a tow vehicle with safely rated towing capacities before transporting trailer.

Revision History

Revision Number	Date	Equipment Line	Comments
1	5/10/2019	Lead Pumps	Initial