



SERVICE BULLETIN

September 21, 2009

Bulletin No: JC-016-09
Supplement Bulletins: C-168-03 and JC-027-07

Applies To: ALL SEPARATE PUMP & WHEEL MOTOR – HYDRAULICALLY DRIVEN UNITS

This re-issued/revised bulletin is necessary because Hydro-Gear published flow specifications that are more comprehensive than their original bulletin (which is included in our past and current bulletin). We also wanted to better illustrate and explain the procedure in response to dealer feedback.

THE REQUIREMENT FOR FLOW TESTING and PRIOR APPROVAL IS STILL INTACT FROM PREVIOUS BULLETINS.

Since the release of bulletin JC-027-07, 75% of wheel motors claims are still being misdiagnosed. This leads to claims not being paid. Trained technicians at both the Distributor level and at Schiller Grounds Care, Inc. are available to help dealers in properly diagnosing and explaining any issue that may occur.

ASSISTANCE: If your shop does not have a flow meter it is imperative one is obtained.

[Sources for the required bi-directional flow meter are as follows:](#)

Encore (part # 593107); order through local Encore supplier.
Lake Monitors (part #BBK6H3AA3625); contact Curt Foreman, 1-800-850-6110 (limited supply).
Great Dane (part #D17019); order through local Great Dane Supplier.
Hydro-Gear (part #70661); order through local Hydro-Gear distribution.

[HIGH PRESSURE FILTER INFO](#) – The high pressure filter is effective in preventing “come-backs” due to system contamination. We do not pay for failures caused by technician error. This filter is also capable of being utilized for many other manufacturers’ hydraulic systems.

[Source for the High Pressure Filter \(part# 2178196\)](#) your Schiller Grounds Care, Inc. distributor.

TESTING: The following is our step by step explanation of flow testing, as well as high pressure filtering. Hydro-Gear’s bulletin on flow testing and acceptable droop levels for the various pumps is at the end of this bulletin.

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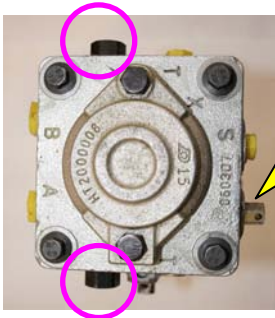
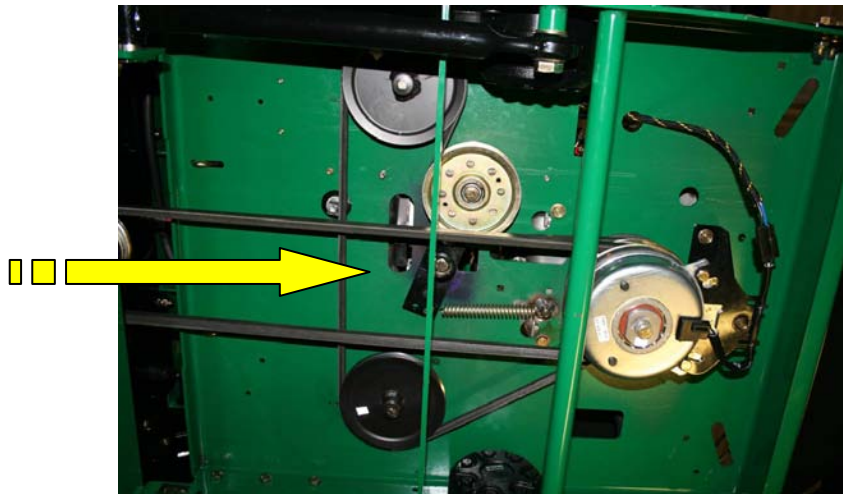
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TESTING PROCEDURE

1. Lift the unit up and secure it so it can't fall down or roll. With the engine still OFF, look under the unit and examine the condition of the pump drive belt and check if the idler arm is sound. This is best done by pulling the spring off the anchor pin and moving the idler arm. It should not be sloppy or resist freely pivoting on pivot pin. ***Oil soaked, chunked/cracked, or glazed belt, stiff/seized idler arm, sloppy idler arm, bad bearings in idler pulley or loose pump pulleys all must be corrected before testing can begin.*** **DO NOT OVER LOOK THIS STEP.** Often this will cure what was thought to be a hydraulic problem.

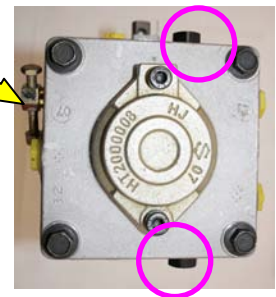
This idler arm must move freely and all pulleys sound. The best thing to do is pull the spring off the anchor post and move the idler arm as well as pulleys.



DUMP VALVES – Normally have a pin or bolt through them, but not always. Look for them directly opposite the high pressure hoses.

Do not confuse them with the Check Valves (you can see the check valves circled in **pink** they are always found in identical looking pairs –sometimes they will have an Allen screw look to them)

DO NOT OPEN THE CHECK VALVES



2. Go topside where the pumps are and make sure Dump Valves are closed. Open them, then close them to be sure they move normally and are not seized (dump valves can seize partially open). If they do not open normally, take a wrench and work them until you can open and shut them simply by the pin/screw through the dump valve. Some pumps do not have a bolt or pin through them. On these you'll notice the dump valve nut is relatively small. This is because the intention is to prevent someone from putting a large wrench that can deliver a lot of leverage and screw up the seat to the valve. **DO NOT GET SUPERMAN ON THESE VALVES**, work them until you are sure they are turning freely **and then close them snug**. If there is a bolt through them just use the bolt - no wrench.

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STATIC TESTING THE WHEEL MOTORS

3. **“STATIC TEST of the WHEEL MOTOR”**. Make sure the Park Brake is off (engine off) and try to rotate the drive wheels by hand. Note: If you jumped ahead and opened any hydraulic lines or failed to close the dump valves this test will not work.

Results you can expect to find and their meaning:

- Wheel turns forward with some resistance but will not turn backwards. This is what you should expect to find as it indicates the wheel motor is fine.
- Wheel turns forward with a clicking but won't turn backwards. Flow test will be needed to be sure if wheel motor gerotor is damaged. (Flow test procedure follows)
- Wheel turns pretty free-in both directions. Not good, high probability the wheel motor is bad.
- Wheel turns very freely in both directions and has a crunchy grinding to it.** This is definitely not good and also is ***not a warranty situation***. This indicates the “Dog-bone” inside the pump has experienced multiple severe shock loads outside of what is considered within the normal operational loads (very quick directional changes on a hard traction surface, trying to wheelie the front end, pulling loads, harsh curb hopping). Normal slow curb climbing is not what we are talking about or quick turns on grass, as grass will not provide the traction to cause such loads. This is only caused by abuse – **the wheel motor is ruined and the pump will be destroyed from the debris that went up the high pressure lines from the pump.**

CLARIFICATION:

To better understand the way this system works, the following needs to be understood. When a PUMP fails, the majority of the time the wheel motor will NOT be affected. AS LONG AS THE PISTON GROUP STAYED IN CONTACT WITH THE END CAP. (This can be determined during the flow test as you will still have some out-put although it will not be the acceptable levels that are considered good for the pump). The wheel motor is typically safe because the trash in the pump goes into the return line and back to the oil tank. Clean oil comes up the supply line to keep the charge pump supplied allowing the pistons to push the oil down the high pressure lines.

If a WHEEL MOTOR goes out due to internal failure, the only scenario that won't take out the pump is the commutator seal wears out. All other scenarios are going to send the debris up the lines into the pistons.

Of equal importance is the need to dispel the misunderstanding that if one side fails it can contaminate the other side. CROSS CONTAMINATION IS NOT POSSIBLE IF THE UNIT HAS NOT BEEN ALTERED. The ONLY way cross contamination can occur is if a mechanic took the lines off the hydraulic tank and reconnected them to the wrong fitting. This *is NOT a warranty situation*.

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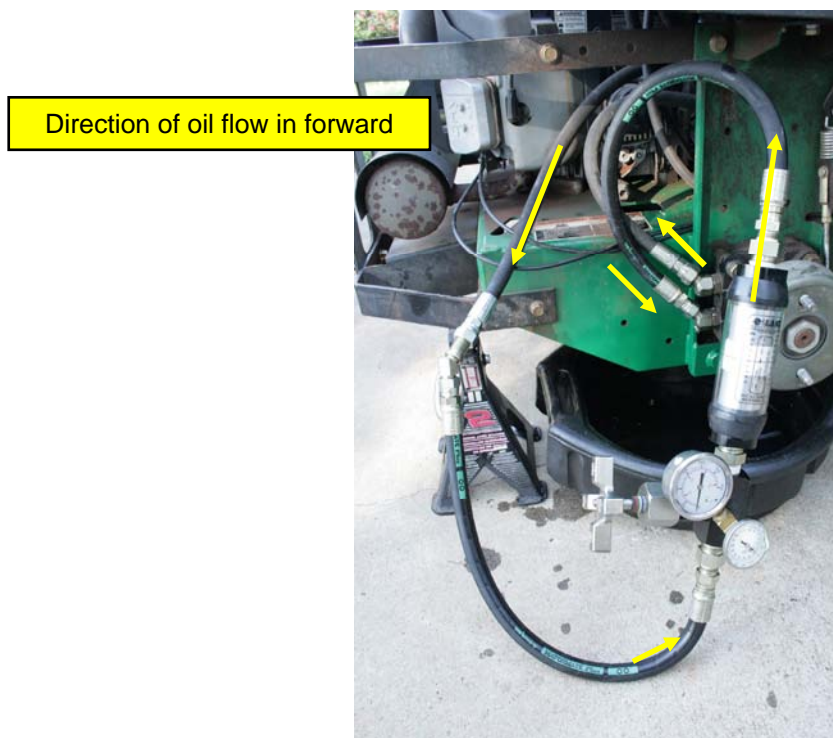


PUMP FLOW TESTING

4. Remove the wheel; put a drain pan under the Wheel Motor.



5. As long as you have a bi-direction meter with dual gauges you can remove either hose at the wheel motor. But if you only have one gauge like the meter shown below, *you will need to know which way the oil is flowing in the forward direction of travel so your gauge will read.* Typically with a single gauge like this, the oil has to flow into the side with the gauge.



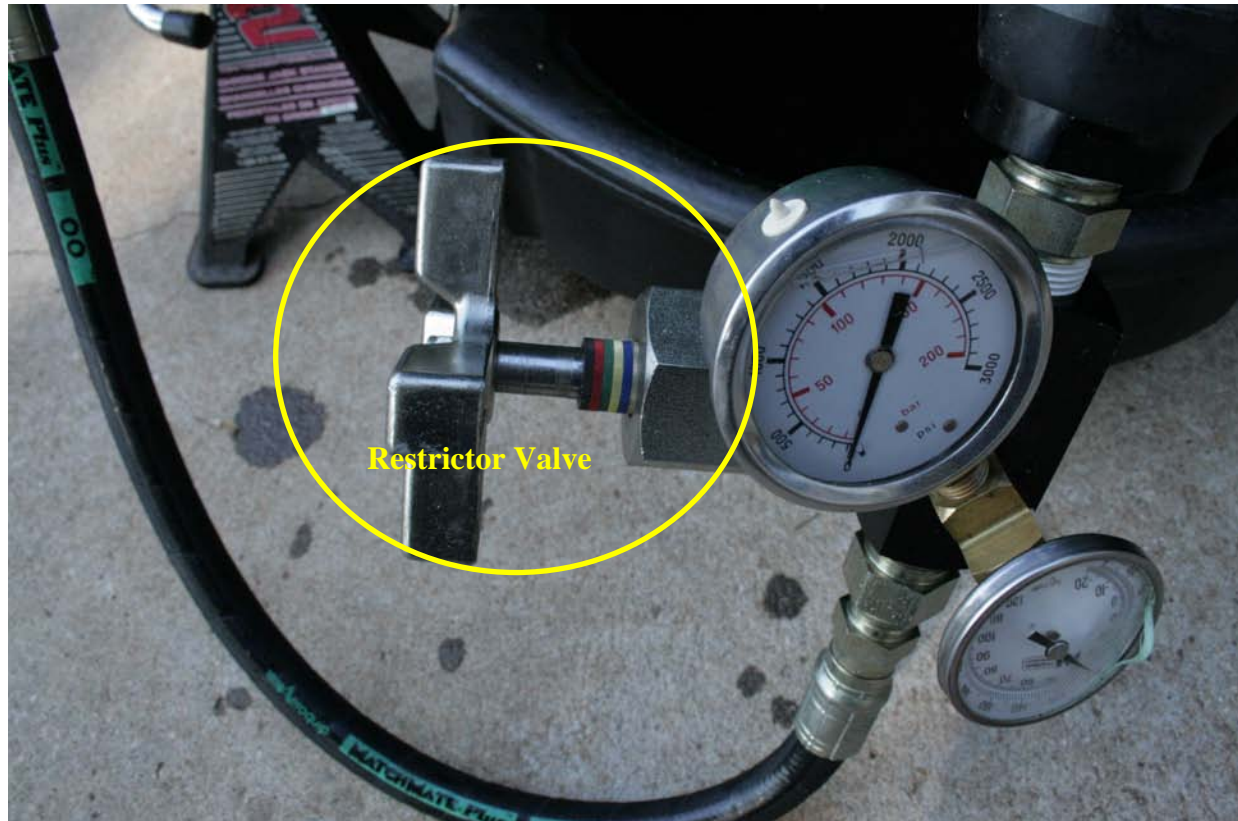
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6. Open the restrictor knob all the way on the flow meter....**AGAIN – MAKE SURE THE RESTRICTOR VALVE IS ALL THE WAY OPEN.** Failure to do this will cause something to fail because there will be no relief for the pressure when you stroke the pump.



7. Put a jumper on the seat switch (or tie down operator presence bail on a walk-behind) and start the engine. Take it up to FULL throttle, and release the parking brake. Slowly stroke the control lever into forward, the wheel hub should be turning. (IF NOT, either you did not do Step 6 or your pump has totally failed)

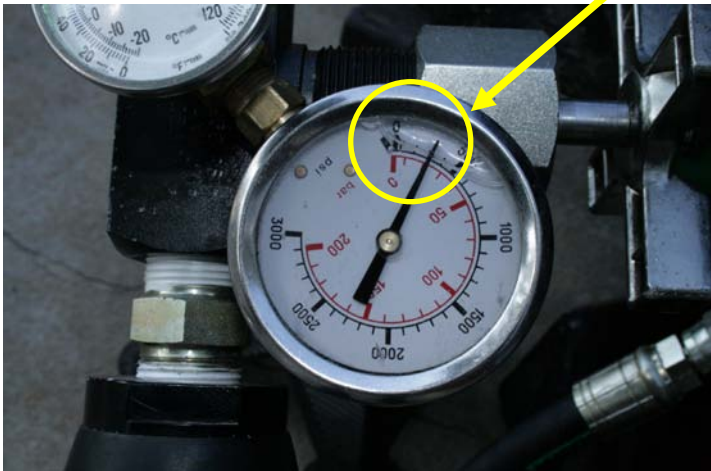
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Hold the control lever at full stroke – full engine RPM. Turn the restrictor valve to approximately 1000-1300 PSI and hold your bare hand on the metal block portion of the flow tester until it gets hot enough that it is uncomfortable to hold. You are now at normal operating temperature to begin the actual testing. Open the Restrictor valve until it drops to 300PSI, Note the GPM.



8. Continue turning the restrictor valve until it reaches 1100 PSI. Note the GPM again.



Take your reading, return the control lever to neutral, throttle back the engine and open the Restrictor Valve all the way in preparation for the wheel motor stall test. DO NOT DISCONNECT THE FLOW METER JUST YET.

9. To determine if your pump is good or bad refer to the Hydro-Gear bulletin that follows for the acceptable flow droop for your specific pump.



WHEEL MOTOR STALL TEST

This is only done on a unit that passed the pump test and is capable of driving but is exhibiting drive problems. (Do the static test for units not capable of moving)

10. Put the wheel back on the unit (flow meter still hooked up and restrictor valve ALL THE WAY OPEN).
11. Remove the jumper that by-passes the seat switch (or untie the bail on a walk-behind), start the unit up, and either have someone follow you holding the flow tester away from the wheel or tie it up so it doesn't drag or get caught in the wheel. Drive over to a wall or some other immovable object to put the front wheels against. **DO NOT TOUCH THE RESTRICTOR VALVE DURING THIS TEST – IT REMAINS WIDE OPEN THROUGHOUT THE TEST.** Mark the wheel in 4 positions (3, 6, 9 and 12 o'clock). Note what mark is on the ground and Full throttle, brake off, and slowly push the control arm forward on the side being tested. Watch the pressure gauge AND the GPM flow. You want to get around 2500-3000 PSI on the pressure gauge while watching the flow. If the surface is smooth concrete you may spin the tire before you get to 3000PSI. That's OK, what you want to watch here is how much oil is passing through the flow tester before you either break traction or reach 2500-3000 PSI. Watch closely because the gauge is not going to move much at all during this test-at least not with a wheel motor that is actually still functional. Rotate the tire so you can perform this test at all 4 places on the tire.
12. **WHEEL MOTER TEST RESULTS.** This test will produce several possible results.
 - a. A finding of .75 GPM flow or less at all 4 test points on the wheel. Your wheel motor is GOOD.
 - b. Several points test less then .75 GPM but one or more points test higher than .75 GPM. This indicates the wheel motor has taken a piece of contamination through it and ruined one or more sections of the gerotor. Wheel motor needs to be replaced.
 - c. Consistent readings at all 4 test points but they are all higher then the permissible .75 GPM allowance for a good wheel motor. The wheel motor still drives but is lacking any real pulling power. This indicates a worn commutator seal. This is an easy fix by installing a rebuilt seal kit. This can be done with the wheel motor still installed in the mower.
13. Shut the unit off, lift back up, remove the wheel, remove the flow tester, reinstall the high pressure lines to the wheel motor, put the wheel back on and remove the jack. Testing is complete.

NORMAL TIME FOR THIS TEST IS 20 MINUTES – Schiller Grounds Care, Inc. will pay 30 minutes per side for units under warranty that require testing.

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PRESSURE FILTERING

(As well as an alternative way to purge the wheel motor without a pressure filter)

The pressure filter, #2178196 (replacement filter 2178196-01), is a great tool for preventing costly come-backs. It is designed to prevent existing contamination from entering after a new component has been installed. It is highly recommended since one failure resulting from not using it will cost more than the filter. While there is a way to get around using a pressure filter to clean out the wheel motor, there is no alternate way short of disassembly to clean out a pump.

The pressure filter is **NOT** Bi-Directional. It has a check valve to prevent any garbage that is already trapped in the filter from coming out of your system if it's inadvertently hooked up wrong. **You must know which way the oil is flowing to hook it up correctly.** It needs to be hooked up so it is in-line BEFORE the new component you just replaced, to prevent contamination from reaching the new component.

Example: You just replaced the pump. Therefore the filter has to be in-line BEFORE the pump, not after it, otherwise if there is any contamination in the wheel motor or hoses it can reach the new pump. It's not as sensitive of an issue if you replaced the wheel motor because of the explanation you see in [blue](#) on page 3 of this bulletin, but it's still a good practice to follow in the event something is in the hoses. Both methods of protecting the pump and the wheel motor will be illustrated here.

1. Lift the unit and block it so it can't move. Remove the wheel; put a drain pan under the wheel motor. Take an air nozzle and blow all debris away from the fittings.



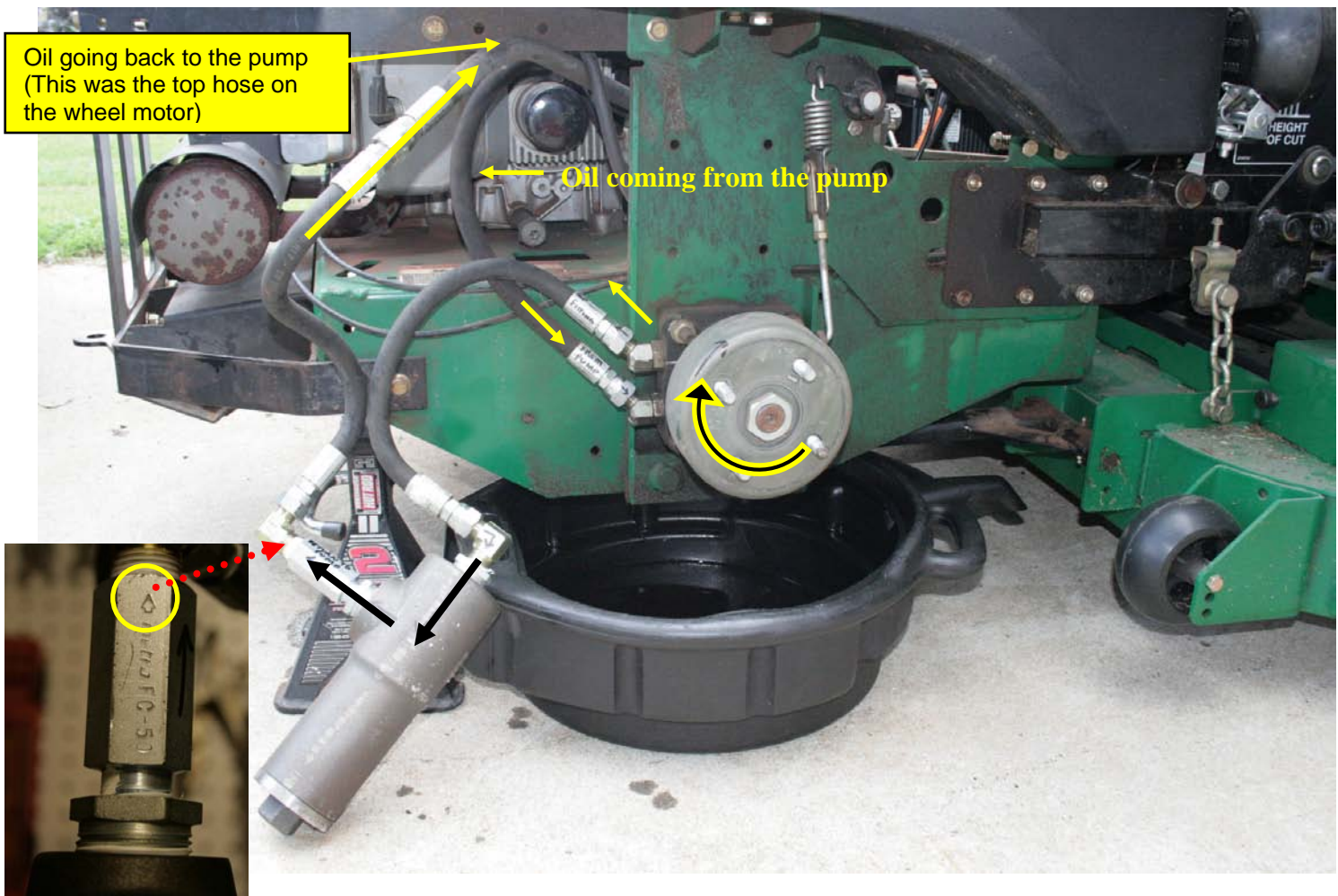
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- a. **An important note**– If you had a catastrophic failure of either the pump or wheel motor, remove the return line hose where it meets the “T” junction going back to the oil tank. This is the hose/nipple **FARTHEST** away from the oil filter. Follow it until it “T”s off to both pumps. The return line coming from the pump that failed is the one we are concerned with. That “T”, will always be the point of accumulation if large debris went down the line after a failure because that’s the point of greatest restriction. **Make sure that junction is cleaned out whether you do pressure filtering or not.**
2. Plumbing in the filter **AFTER NEW PUMP** has been installed – The filter has a directional arrow on the check valve to show which way the oil can flow through it. You need to remember (or refer to this bulletin) that all our units have the oil coming in the bottom line on ride-on units, and in the rear line on walk-behind units (the plumbing is identical on ride-on and walk-behind units, we just turn the wheel motor a quarter turn forward on walk-behinds). Attach the filter as shown below.



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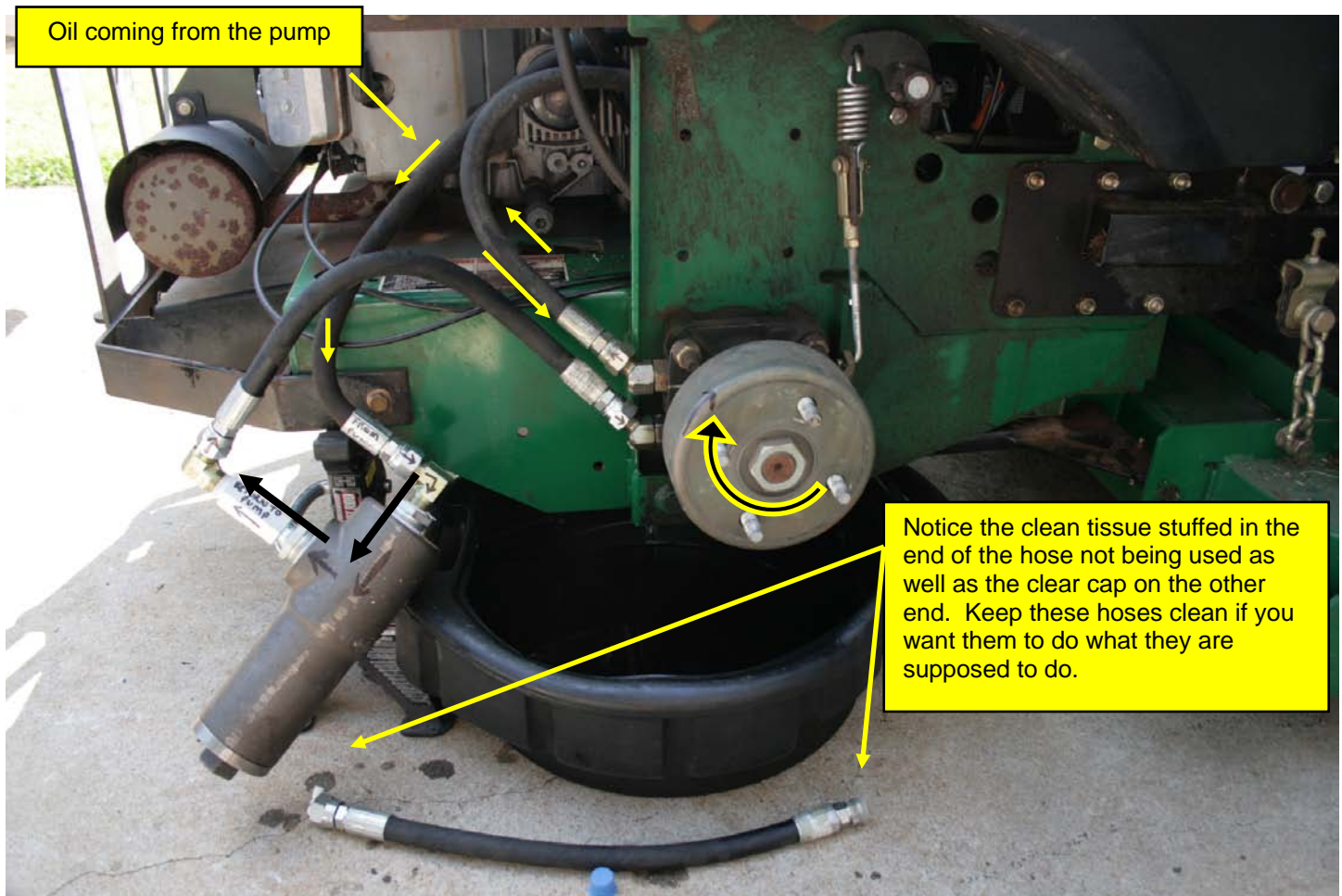
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3. By pass the seat switch (tie down the operator presence bail on a walk-behind), start the motor, **half throttle**, and take the brake off. **SLOWLY** stoke the control lever **FORWARD ONLY – maximum ½ stroke**, and watch for the wheel hub to turn. It should turn almost immediately. (If it doesn't and you hear the hydraulics load up and the hoses flex, and the engine starts to bog, RETURN THE CONTROL LEVER TO NEUTRAL IMMEDIATELY; you have plumbed something wrong. Figure out what you did wrong; correct it before going any further). **LIMIT THE MOVEMENT OF THE CONTROL LEVER TO ½ STROKE. ½ Throttle – ½ stroke – 15 minutes run time.**

You can **NOT** filter in full forward speed. This will cause damage to the pump. Be patient, it takes about 15 minutes of running to clean out one side.

2a. Same as #2 above except this is how to plumb after a **NEW WHEEL MOTOR** is installed:



Notice the difference. The oil coming from the pump has to go through the filter first before it reaches the new wheel motor.

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4. After 15 minutes, shut unit down, remove the filter, and reinstall the hydraulic line from the pump to the wheel motor. Reinstall the wheel, and take down off the jacks. Repair complete. Typical time to perform this task is 30-40 minutes.

Storage Tip

Remove the Male/Female hose and put the protection caps back on the hose. Leave the double female hose attached to the filter and connect one end to each fitting. This prevents oil leaking out and contamination from getting in.



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HOW TO CLEAN A WHEEL MOTOR & HIGH PRESSURE HOSES WITHOUT A HIGH PRESSURE FILTER KIT

1. Prep the unit just as you would to install the high pressure filter.
(Engine stays off for this procedure)
2. There are two ways to install the filter. The easiest and fastest way is if you have two spare high pressure hoses on hand to use. Remove the hoses from the wheel motor (note which port of the wheel motor goes to which port from the pump). At this point if you have spare hoses, connect them to the wheel motor. If you do not have spare hoses, remove the hoses from the pump also, and then reattach them to the wheel motor (you can't just remove them from the pump while leaving them attached to the wheel motor because there are no swivel fittings on the pump end of the hose).
3. Get a clean 1 quart container and fill it with either kerosene or diesel fuel (NOT GASOLINE as it has no lubrication properties, not to mention it's much more volatile). Put the hose connected to the top port of the wheel motor, into a drain pan and put the hose connected to the **lower port into the container of clean diesel fuel**. Turn the wheel **forward** until it sucks up all the diesel fuel and spits it out in the drain pan. It will take a full quart to flush the wheel motor.
4. Now refill the quart container with clean 20W-50 motor oil and turn the wheel forward again until you see oil coming out the hose in the drain pan. This will also take almost a quart.
5. Remove the hoses from the wheel motor; reinstall them correctly to the pump and wheel motor.

You're all done – this typically takes 15-20 minutes. If you're doing this during an install, it adds maybe 5 minutes to the procedure because you'll already have the unit prepped and the hoses off.

Following Hydro-Gear Bulletin

We attached the following Hydro-Gear Bulletin because it is more comprehensive than the previous bulletin issued with specifications for acceptable droop for the various pumps used by Schiller Grounds Care, Inc. Hydro-Gear's bulletin covers flow testing but is generic in nature. The previous information in this bulletin is specifically for Schiller Grounds Care, Inc. products. Therefore, you'll find it easier to use the Hydro-Gear bulletin for specs and our portion for actual testing procedures on our products.

If you have any questions please contact Schiller Grounds Care, Inc. Customer Service Department @ 920-699-2000

This bulletin is relevant to the departments shown below. Please circulate as appropriate.

SERVICE

☒

WARRANTY

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SALES

☐

PARTS

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Description: P Series Flow Test Kit (Part Number 70661)**(Part Number 70661 Supersedes Part Numbers 70511 and BB-76810)**

Purpose: The design purpose of the P Series Flow Test Kit is to allow the customer to isolate the pump from the wheel motor and determine if the pump is acceptable. The following information can be used to install and test the pump by simulating a wheel motor load.

**WARNING**

Certain procedures require the vehicle engine to be operated and the vehicle to be raised off of the ground. To prevent possible injury to the servicing technician and/or bystanders, insure the vehicle is properly secured.

**WARNING**

Do not attempt any adjustments with the engine running. Use extreme caution while working in or around all vehicle linkage! High temperatures can be generated. Follow all safety procedures outlined in the vehicle owner's manual!

INSTALLATION AND TESTING PROCEDURES:

1. Disconnect the system hoses at the wheel motor, or system hoses from the pump and connect the P Series Flow Test Kit. (Special care should be taken to prevent contamination debris from entering pump or wheel motor system ports).

Note: Using the Bi-Directional Flow Test Kit, determination of directional flow is not necessary. The flow meter may be connected in either direction into the forward and reverse high pressure system lines.

CAUTION: Ensure all fittings and hoses are attached securely. This test is being completed on the vehicle's high pressure system lines. Failure to perform this properly could result in bodily injury.

TESTING PROCEDURES:

1. Raise the drive tires off the ground. Block the remaining tires on the ground to prevent accidental vehicle movement.
2. Open the restriction valve all the way.
3. Make certain all external pump directional control stops are removed or backed off on the vehicle linkage to obtain full pump directional control arm travel.
4. Start the engine and engage the drive pulley if necessary.
5. Bring the engine to maximum operating speed.
(This should not exceed 3600 rpm input speed on the PC, PL, PG, PJ and PK Series Pumps)
(This should not exceed 3400 rpm input speed on the PR)
(This should not exceed 2600 rpm input speed when testing the PW)
Engine speed adjustment may be necessary to obtain 2600 rpm.

CAUTION: Damage to the flow meter and/or re-calibration may result from testing at input speeds that exceed 2600 rpm on the PW and 3400 rpm on the PR Pumps.

6. With the directional control lever (on the vehicle) for the pump being tested, move the control arm in full forward motion. (It may be necessary to lock the control arm into full forward position to prevent false readings).
7. Operate without any load for approximately 30 seconds to 1 minute. This allows the system oil temperature to rise.

Note: Raising the system oil temperature will make a difference in the readings you receive. It has been determined that to complete this test accurately, the oil temperature must be near system operating temperatures. Suggested temperature range is 160°- 210°F (71.1° - 98.9°C).

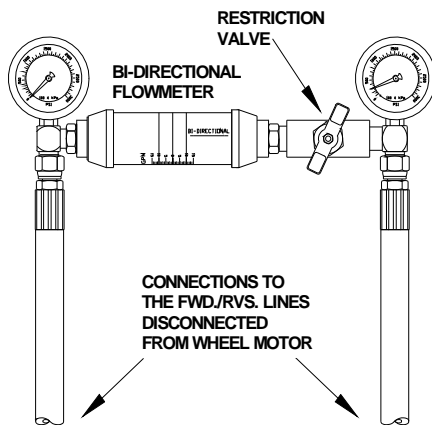
8. On the PC, PG, PJ, PK, PL, PR and PW, tighten the flow meter restriction valve until the gauge reads 300 psi (21bar). Record the flow reading on the Bi-Directional Flow Meter.
9. Increase the pressure to 1100 PSI (76 bar) for all models (PC, PG, PJ, PK, PL, PR and PW). Record the flow reading on the Bi-Directional Flow Meter.

10. The **acceptable gpm “flow droop” or (difference)** is:

PC	1.0 gpm (3.7 l/min)	Schiller Grounds Care does not use this pump
PG/PL	1.5 gpm (5.6 l/min)	10CC units - (includes BDP-10 pumps)
PJ/PK	2.0 gpm (7.6 l/min)	12CC units
PR	2.5 gpm (9.4 l/min)	16CC units
PW	2.5 gpm (9.4 l/min)	(includes BDP-21 pumps)

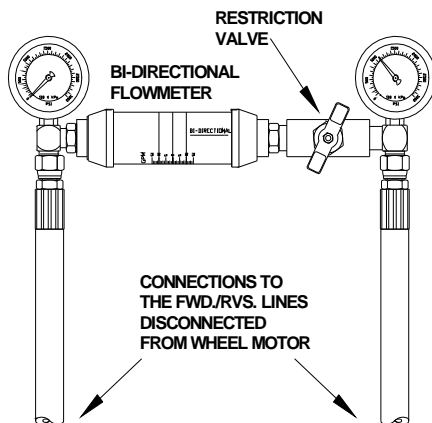
If the difference exceeds these values the pump would not be operating efficiently and should be repaired or replaced.

TEST EXAMPLE: PG/PL



300 psi (21 bar) reading

7 gpm (26 l/min) (1st reading)



1100 psi (76 bar) reading

3 gpm (11 l/min) (2nd reading)

(PG/PL)

300 psi (21 bar) reading

7 gpm (26 l/min) (1st reading)

1100 psi (76 bar) reading

- 3 gpm (11 l/min) (2nd reading)

4 gpm (15 l/min) (the difference)

Subtract the 1st reading from the 2nd.
(In this example, 4 gpm difference would indicate further pump examination).