# Customer Service Bulletin
# Commercial Business Group

## Sand Pro® Series

**Date: April 11, 2003**

| Model/Serial Range: | Model Number: | Serial Numbers: |
|---|---|---|
| | 08884 | 70101-230000168 |
| | 08885 | 70101-230000391 |
| | 08886 | 80101-230000230 |

**Subject: Slow or No Lifting of the Rahn Groomer Attachment .**

Due to the design of the Rahn Groomer, some Sand Pro units may not adequately lift the attachment. Slow or no lifting may be experienced which is a result of the attachments overhung load and minimal traction unit lift relief settings.

If this situation is experienced, the traction unit implement relief pressure setting should be checked. Implement relief pressure can be increased to a maximum of 1000 psi (6895 Kpa) using shims from Shim Pack Kit (25-2470).

**IMPORTANT:** Several pages of the Sand Pro Service Manual (form 98957SL) have recently been revised. These pages contain important information on hydraulic test procedures and relief valve locations, which are relevant to this bulletin. A copy of the revised Service Manual pages (pages 4-19 to 4-27, rev A) is included with this bulletin, or can be downloaded at www.toro.com.

Contact your local authorized Toro Commercial Products Distributor for additional assistance if needed.

# Testing

The most effective method for isolating problems in the hydraulic system is by using hydraulic test equipment such as pressure gauges and flow meters in the circuits during various operational checks (See the Special Tools section in this Chapter).

**Before Performing Hydraulic Tests**

**IMPORTANT: All obvious areas such as oil supply, filter, binding linkages, loose fasteners, or improper adjustments must be checked before assuming that a hydraulic component is the source of the problem.**

**Precautions for Hydraulic Testing**

**CAUTION**

**Failure to use gauges with recommended pressure (psi) rating as listed in test procedures could result in damage to the gauge and possible personal injury from leaking hot oil.**

**All testing should be performed by two (2) people. One person should be in the seat to operate the machine, and the other should read and record test results.**

**CAUTION**

**Operate all hydraulic controls to relieve system pressure and avoid injury from pressurized hydraulic oil. Controls must be operated with the ignition switch in OFF. Remove key from the ignition switch.**

**WARNING**

**Before disconnecting or performing any work on the hydraulic system, all pressure in the system must be relieved. Stop engine; Lower or support attachments.**

**WARNING**

**Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under high pressure. Do not use hands to search for leaks; use paper or cardboard. Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin and cause serious injury. If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result from such an injury.**

1. Clean machine thoroughly before disconnecting or disassembling any hydraulic components. Always keep in mind the need for cleanliness when working on hydraulic equipment. Contamination will cause excessive wear of components.

2. Put metal caps or plugs on any hydraulic lines left open or exposed during testing or removal of components.

3. The engine must be in good operating condition. Use a phototac when performing a hydraulic test. Engine speed can affect the accuracy of the tester readings.

4. The inlet and the outlet hoses must be properly connected and not reversed (tester with pressure and flow capabilities) to prevent damage to the hydraulic tester or components.

5. When using tester with pressure and flow capabilities, open load valve completely in the hydraulic tester to minimize the possibility of damaging components.

6. Install fittings finger tight and far enough to make sure that they are not cross–threaded before tightening them with a wrench.

7. Position tester hoses to prevent **rotating** machine parts from contacting and damaging the hoses or tester.

8. Check oil level in the tank. After connecting test equipment, make sure tank is full.

9. Check the traction pedal linkage for improper adjustment, binding or broken parts.

10. All hydraulic tests should be made with the hydraulic oil at normal operating temperature.

## TEST NO. 1: Traction Pump Flow (P1)

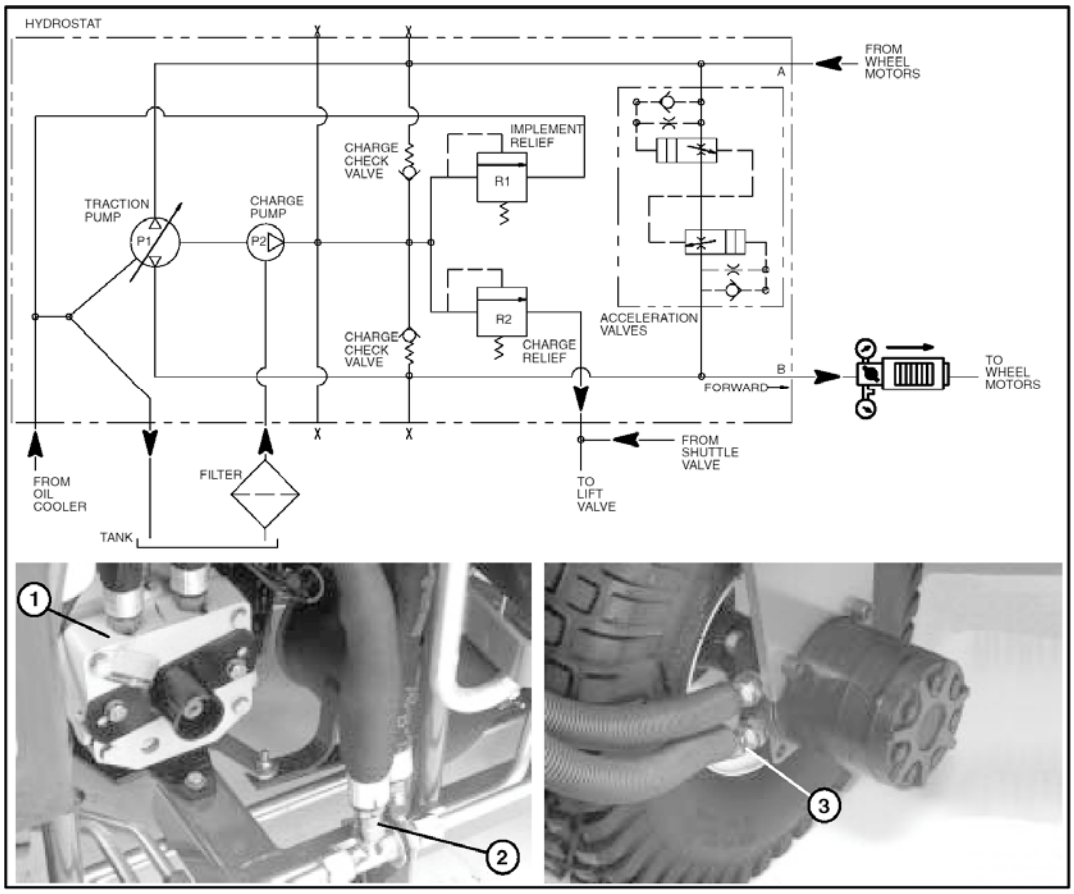


Figure 12

1. Hydrostat (SP 2020/3020)
2. Forward header (SP 2020/3020)
3. Wheel motor connector (SP 5020)

**Procedure for Traction Pump Flow (P1) (Fig.12):**

1. Make sure hydraulic oil is at normal operating temperature by operating the machine for approximately 10 minutes.

2. Make sure machine is parked on a level surface with attachments removed. Make sure engine is off.

3. Read Precautions for Hydraulic Testing.

4. Make sure that traction pedal is adjusted to the neutral and forward positions (see Adjust Traction Pedal for Neutral and Forward).

**WARNING**

**Before jacking up the machine, review and follow Jacking Instructions in Chapter 1 – Safety.**

1. Jack up machine as follows to allow the drive wheels to spin freely and to allow hydraulic flow through the traction circuit:

   A. On the **SP 2020**, jack up both rear wheels. Support machine with blocks or jack stands so that both rear wheels are off the ground.

   B. On the **SP 3020** and **SP 5020**, jack up both rear wheels and the front wheel. Support machine with blocks or jack stands so that all three wheels are off the ground.

2. Disconnect hydraulic connections to install hydraulic tester (flow meter).

   A. On the **SP 2020/3020**, disconnect left hose at the forward header.

   B. On the **SP 5020**, disconnect bottom hose at the front wheel motor.

3. Install hydraulic tester (flow meter). **Make sure the flow control valve is fully open.**

   A. On the **SP 2020/3020**, make sure the flow arrow points out of the hydrostat and into the forward header.

   B. On the **SP 5020**, make sure the flow arrow points from the hose and into the bottom port of the front wheel motor.

4. After installing hydraulic tester, start engine and run at idle speed. Check for hydraulic leakage and correct before proceeding with test.

5. Operate engine at full speed **(3150 ± 50 RPM)**.

**CAUTION**

**Use extreme caution when taking gauge readings. The tires off the ground will be spinning.**

6. Slowly push traction pedal into the fully forward position.

7. Slowly close flow control valve on tester until pressure gauge on the hydraulic tester reads **1700 PSI**. As flow control valve is being closed, engine speed will decrease to approximately **2200 RPM** (verify engine speed with a phototac).

8. Observe flow gauge. Tester reading should be minimum flow of **7.5 GPM (28.4 LPM)**. Record test results.

9. Release traction pedal, open flow control valve on tester, and turn off machine.

10. If **1700 PSI (tester pressure)**, **2200 RPM (engine speed)**, or **7.5 GPM flow** cannot be achieved, consider the following:

   A. The traction pedal and traction speed may need adjustment (see Adjust Traction Pedal for Neutral and Forward).

   B. If the engine speed drops excessively (below 2200 RPM) as the traction pump load is applied, engine performance should be evaluated (see Chapter 3 – Briggs & Stratton Vanguard Engines).

   C. If engine speed does not drop and pressure and flow specifications are not met, the hydrostat needs to be repaired or replaced as necessary.

11. If specifications are met and traction circuit problem exists, check wheel motor efficiency (see TEST NO. 4: Wheel Motor Efficiency in this section).

12. If testing is complete, lower wheels to the ground. Remove hydraulic tester and reconnect hydraulic hose.

13. Make sure hydraulic tank is full (see Check Hydraulic System Fluid).

## TEST NO. 2: Charge Relief Valve (R2) and Implement Relief Valve (R1) Pressure

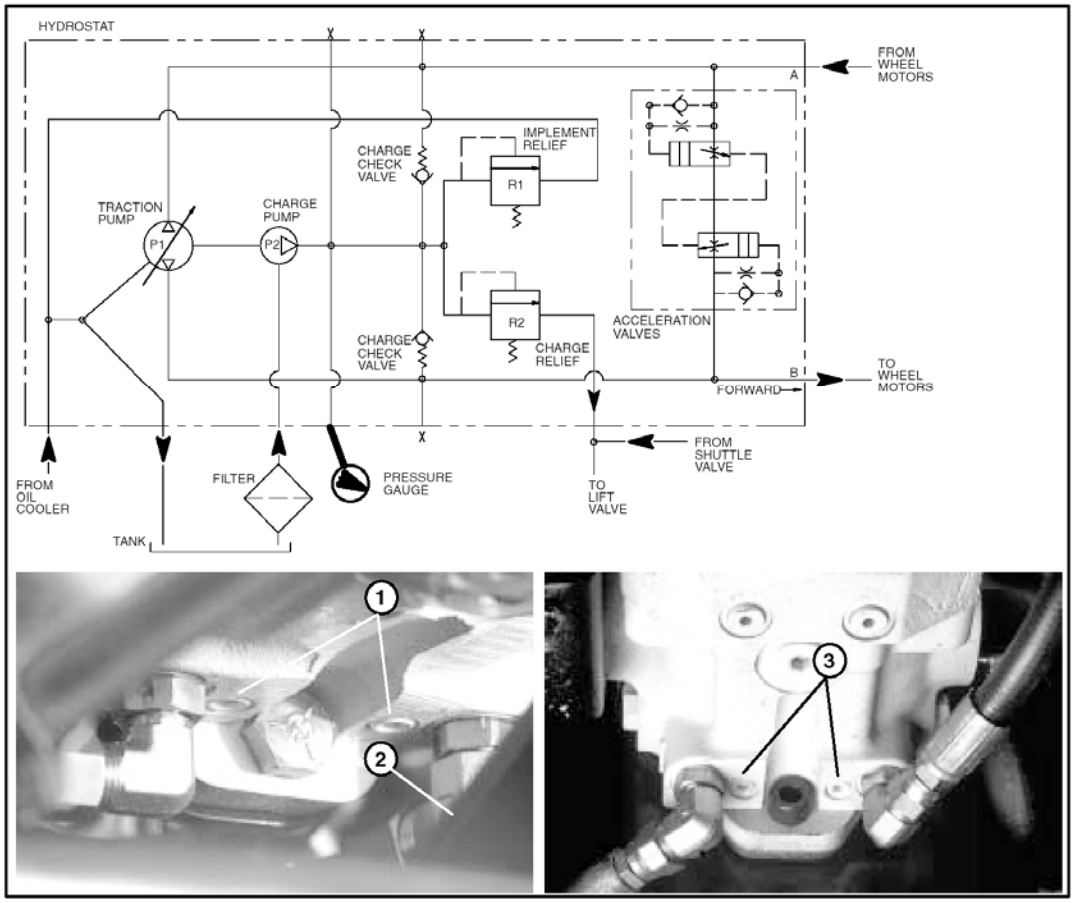


Figure 13

1. **Charge test port (SP 2020/3020)**
2. **Engine base plate (SP 2020/3020)**
3. **Charge test port (SP 5020)**

**Procedure for Charge Relief Valve (R2) and Implement Relief Valve (R1) Pressure:**

1. Make sure hydraulic oil is at normal operating temperature by operating the machine for approximately 10 minutes.

2. Park machine on a level surface with the attachments lowered. Make sure engine is off. Make sure the parking brake is engaged.

**CAUTION**

**An attachment must be installed to the lift cylinder for the performance of this test to prevent personal injury and damage to the machine.**

3. Read Precautions for Hydraulic Testing.

**NOTE:** On the **SP 2020/3020**, special hydraulic fittings are required to fit the test gauge into the test port because of the engine base plate (see Hydraulic Test Fittings in the Special Tools section of this Chapter).

4. Remove plug and install pressure gauge to the hydrostat charge test port.

**NOTE:** An alternate pressure gauge location for this test is to install a T–connector with pressure gauge in series with the hose from the pump and the T–fitting on the lift valve (Figure 14).

5. Make sure that traction pedal and lift control lever are in neutral and the parking brake is engaged.

6. After installing pressure gauge, start engine and run at low idle speed. Check for hydraulic leakage and correct before proceeding with test.

7. Operate engine at full speed **(3150 ± 50 RPM)**. Verify pump hub speed with a phototac.

8. The pressure gauge will display system charge pressure and should read from **170** to **380 PSI**. Record test results.

9. If the specification is not met, replace charge relief valve (R2) (see Hydrostat Service in this Chapter).

10. With the engine still running at full speed **(3150 ± 50 RPM)**, lower attachment. Hold lift lever in the lower position to allow the implement relief valve to activate. Pressure gauge should read from **700** to **1000 PSI**. Record test results.

11. If specification is not met, replace implement relief valve (R1) (see Hydrostat Service in this Chapter).

12. Shut off engine.

13. Disconnect gauge and fittings from the hydrostat charge test port. Install and tighten plug to test port.

14. Make sure hydraulic tank is full (see Check Hydraulic System Fluid).

## TEST NO. 3: Charge Pump (P2) Flow

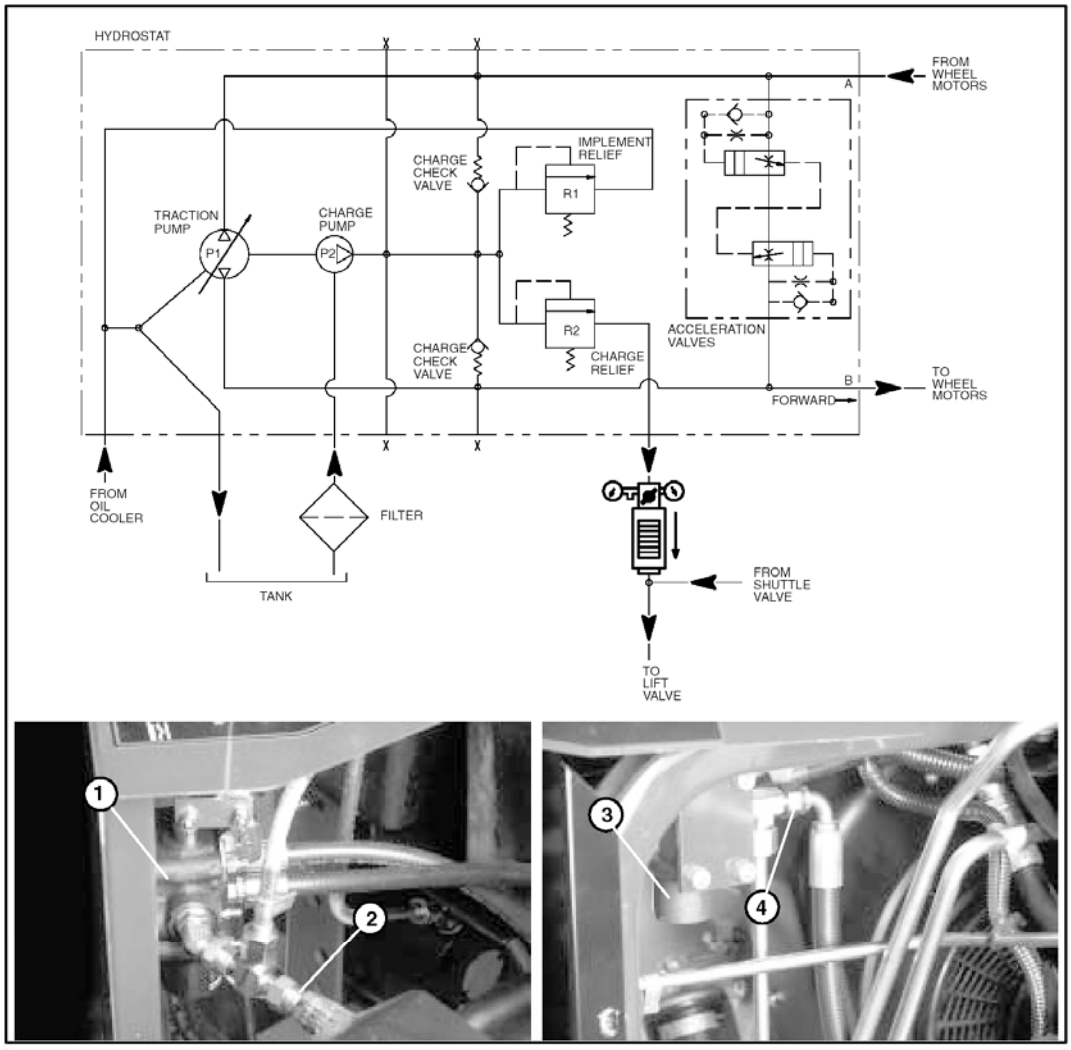


Figure 14

1. Lift valve (SP 2020/3020)
2. Hose from pump (SP 2020/3020)
3. Lift valve (SP 5020)
4. Hose from pump (SP 5020)

**Procedure for Charge Pump (P2) Flow:**

1. Make sure hydraulic oil is at normal operating temperature by operating the machine for approximately 10 minutes.

2. Make sure machine is parked on a level surface with the attachments lowered. Make sure engine is off and the parking brake is engaged.

3. Read Precautions for Hydraulic Testing.

4. Disconnect hose from the T–fitting on the lift valve.

5. Install hydraulic tester (flow meter) in series with the hose from the pump and the T–fitting on the lift valve. Make sure the flow arrow points toward the lift valve and the flow control valve on the tester is fully open.

6. Make sure that traction pedal and lift control lever are in neutral and the parking brake is engaged.

7. After installing hydraulic tester, start engine and run at low idle speed. Check for hydraulic leakage and correct before proceeding with test.

8. Operate engine at full speed **(3150 ± 50 RPM)**.

9. Slowly close the flow control valve on the tester until **500 PSI** is obtained.

10. Verify pump speed is **3150 ± 50 RPM** with a phototac.

11. Flow indication on tester should be a minimum of **1 GPM (3.8 LPM)**. Record test results.

12. Open the flow control valve on the tester and shut off engine.

13. If flow is less than **1 GPM** or **500 PSI** can not be obtained, check for restrictions in the pump circuit. If pump circuit is not restricted, repair or replace charge pump (see Hydrostat Service in this Chapter).

14. Disconnect tester from the hose and T–fitting. Reconnect hose to T–fitting.

15. Make sure hydraulic tank is full (see Check Hydraulic System Fluid).

## TEST NO. 4: Wheel Motor Efficiency

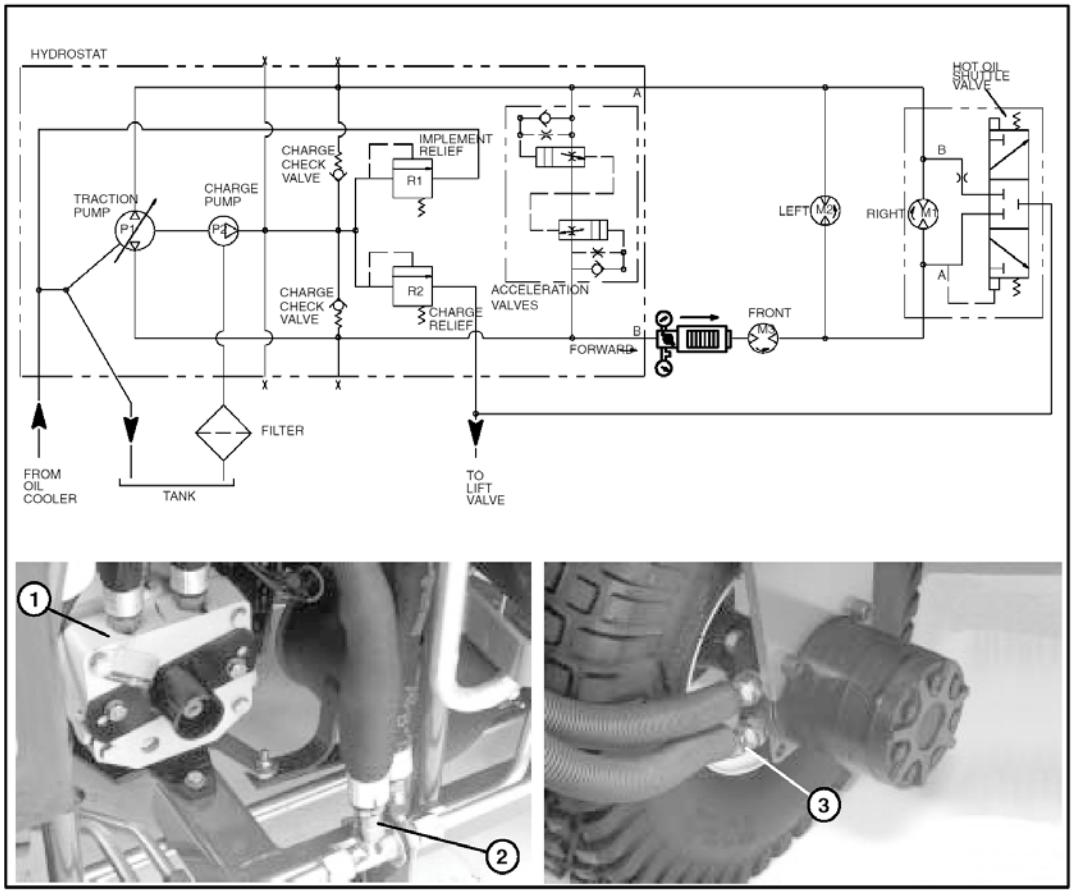


Figure 15

1. Hydrostat (SP 2020/3020)
2. Forward header (SP 2020/3020)
3. Wheel motor connector (SP 5020)

**Procedure for Wheel Motor Efficiency:**

**Note:** Over a period of time, a wheel motor can wear internally. A worn motor may by–pass oil causing the motor to be less efficient. Eventually, enough oil loss will cause the wheel motor to stall under heavy load conditions. Continued operation with a worn, inefficient motor can generate excessive heat, cause damage to seals and other components in the hydraulic system, and affect overall machine performance.

1. Make sure hydraulic oil is at normal operating temperature by operating the machine for approximately 10 minutes. Make sure the hydraulic tank is full.

2. Park machine on a level surface with the attachments lowered. Make sure engine is off and the parking brake is engaged.

3. Read Precautions for Hydraulic Testing.

4. Make sure that traction pedal is adjusted to the neutral position (see Adjust Traction Drive for Neutral in the Adjustments Section).

5. Attach a heavy chain between the rear of the machine frame and an immovable object to prevent the machine from moving during testing.

6. Install hydraulic tester (flow meter) using the same tester connections as TEST NO. 1: Traction Pump Flow. **Make sure the tester flow control valve is fully open.**

7. Make sure parking brake is engaged. On machines with 3 wheel drive, chock the front wheel to prevent front wheel rotation.

8. After installing hydraulic tester, start engine and run at low idle speed. Check for hydraulic leakage and correct before proceeding with test.

**CAUTION**

**Use extreme caution when performing test. The drive wheels will be trying to move the machine.**

9. Move throttle to full speed **(3150 ± 50 RPM)**.

10. Slowly push traction pedal in the **forward** direction until **1000 PSI** is displayed on the tester pressure gauge.

11. With all drive wheels locked (not rotating), total internal leakage for all wheel motors will be shown on the flow meter. Flow should be **less than 2 GPM (7.6 LPM)**. Record test results.

12. Release traction pedal and shut engine off.

13. If specification is not met, individual wheel motors need to be removed from the traction circuit to determine which motor(s) is leaking excessively.

   A. For SP2020/3020 machines, a wheel motor can be removed from the traction circuit by disconnecting and capping the two hydraulic lines at the motor.

   B. For SP5020 machines, the front motor can be removed from the traction circuit by disconnecting the two hydraulic lines at the motor and then connecting the hoses together to allow flow to the rear wheels. A rear motor on a SP5020 can be removed from the traction circuit by disconnecting and capping the two hydraulic lines at the motor.

14. After removing a motor from the circuit, retest using steps 6 through 10 making sure that the remaining drive wheels are locked (not rotating) during testing. When a worn motor is removed from the traction circuit, the test results should show a decrease in leakage flow from the system. Any wheel motor that has leakage **greater than .7 GPM** needs to be repaired or replaced.

**Example:** consider a SP5020 that has a total internal leakage of 3.5 GPM. When the right, rear wheel motor is disconnected, the system leakage decreases to 1 GPM. The leakage for the disconnected motor is 2.5 GPM which indicates the need to repair or replace the right, rear wheel motor.

Multiple wheel motors may be worn, so efficiency testing of all wheel motors may be required. After an individual motor is tested, reconnect that motor before proceeding to test another motor.

15. After testing is completed, disconnect tester from machine and reconnect all hose connections.