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The hydrostatic system consists of the following components:

- 1 ~~19.~~ Hydraulic reservoir - Right front of engine compartment.
- 2 ~~20.~~ Suction line - From the reservoir to the gear pump under the operator's seat.
- 3 ~~21.~~ Pressure line - From the gear pump to the control valve.
- ~~22.~~ Return line - From the control valve to the oil cooler.
- ~~23.~~ Oil cooler - Engine side of radiator in engine compartment.
- ~~24.~~ Oil filter - After the oil cooler at the engine compartment rear door.
- ~~25.~~ Charge pump suction line - From tee in the line from the oil filter to the hydrostatic charge pump.
- ~~26.~~ Hydrostatic charge pump - Attached to the front of the right hydrostatic pump.
- ~~27.~~ Hydrostatic pump for right drive - Under operator's seat.
- ~~28.~~ Hydrostatic motor for right drive - Attached to the right gearbox assembly.
- ~~29.~~ Hydrostatic pump for left drive - Under operator's seat.
- ~~30.~~ Hydrostatic motor for left drive - Attached to the left gearbox assembly.
- ~~31.~~ Two-Speed high/low control valve, if equipped.
- ~~32.~~ Two-Speed high/low shift cylinder, if equipped.
- ~~33.~~ Engine.
- ~~34.~~ Engine to transmission gearbox.
- ~~35.~~ Hydraulic gear pump.

**OTHER MATERIALS**

Hydraulic Oil ..... API Service SH/CG-4 10W-30  
NH #9613313 - 1 qt.  
NH #9613314 - 5 gal.  
NH #9613385 - 1 L  
NH #9613360 - 20 L

Sealing Material ..... NH Ultra Blue silicone sealer  
NH #L81724 - 3.35 oz. tube (cord)  
NH #L82519DS - 8 oz. tube  
NH #L58775 - 10.2 oz. cartridge

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**NOTE:** Always use a noncorrosive silicone sealer to prevent damage to the components being sealed during the silicone curing process.

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SECTION 29 - HYDROSTATIC TRANSMISSION

PROBLEM	POSSIBLE CAUSE	REMEDY
Machine will not move either direction	Parking brake engaged Low hydraulic oil Low charge pressure Incorrect oil Air in system Water in system Output pressure too low Internal pump or motor damage Linkages loose or broken	Release parking brake Check oil level Check charge pressure/repair Drain and replenish with proper oil Purge air and repair system Drain, clean, and replace oil Check pressure replace relief valve Check pump/motor case drain flow Check and repair
One side moves, other side does not	Relief valve stuck open Internal pump or motor damage Brake engaged on one side Linkage loose or broken Broken drive chain Gearbox damaged	Check and repair Check pump/motor case drain flow Check parking brake system and repair Check and repair Check and repair Check and repair
Noisy pump or motor	Air in system Wrong kind of oil Water in system Internal pump or motor damaged Linkage loose or broken Parking brake engaged	Purge air and repair system Drain, clean system and replace oil Drain, clean, and replace oil Check pump/motor case drain flow Check and repair Release parking brake
Low power	Low hydraulic oil Low charge pressure Relief valve stuck open Air in system Output pressure too low Internal pump or motor damage	Check oil level Check charge pressure/repair Check and repair Purge air and repair system Check pressure replace relief valve Check pump/motor case drain flow
Sluggish response to changes in speed	Relief valve stuck open Air in system Output pressure too low Linkage loose or broken Oil too heavy, cold weather Wrong kind of oil	Check and repair Purge air and repair system Check pressure replace relief valve Check and repair Allow unit to warm up before operating Drain, clean system and replace oil

**LS180 - Adjustable steering links**

- Hole 1 - Gives maximum linkage travel and wheel speed.
- Hole 2 - Reduces linkage travel and wheel speed when steering levers are fully stroked.
- Hole 3 - Maximum reduction in linkage travel and corresponding wheel speed.

Factory assembly of linkage is in hole, 2, as shown in Figures 3 through 5. If an operator is in a less power-demanding operation and needs maximum ground speed, the linkage can be moved to hole, 1.

For maximum wheel torque, use hole, 3.

**NOTE:** Left and right linkage must be in the holes for machines to operate in a straight line of travel and with the same power.

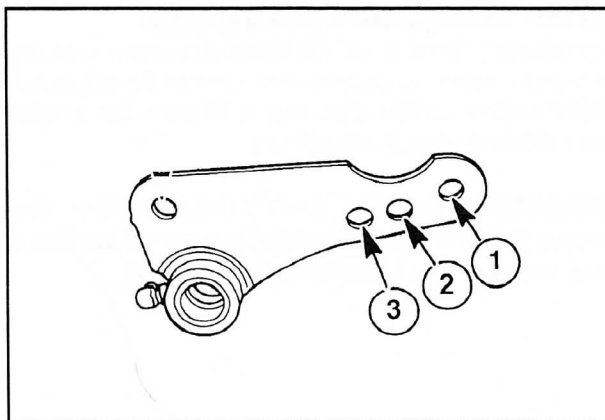
Wheel speed on LS180 (in low range, if two-speed) and engine speed at high idle ( $2350 \pm 25$  RPM) is:

- Hole 1 - 80 RPM  $\pm$  5
- Hole 2 - 67 RPM  $\pm$  5
- Hole 3 - Seldom used (use only when 67 RPM cannot be reached using hole 2)

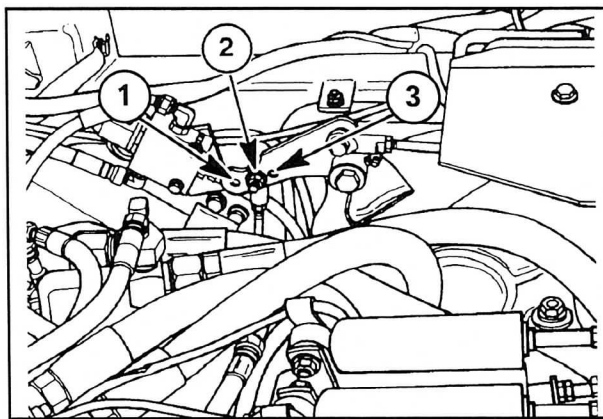
Axle speeds should be set as close as possible to maximize straight travel in the forward direction.

When moving the linkage between holes 1, 2, and 3, neutral positioning may have to be reset.

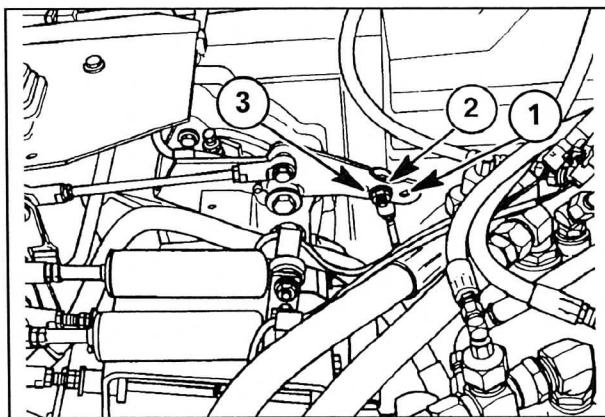
**NOTE:** When changing linkage position, have the skid steer up on blocks, securely supported with all four wheels off the ground so neutral can be adjusted, if needed, on engine start-up. This also aids when using a tachometer to adjust wheel speed.



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**HYDROSTATIC DRIVE SYSTEM TESTING****Hand controls - forward and reverse**

Pre-test instructions:

- \* Operator in seat
- \* Seat belt buckled
- \* Service/Run switch in "RUN" position
- \* Key switch in the "OFF" position

STEP	TEST	RESULT	PROBABLE CAUSE AND CORRECTION
1	Levers should move freely	NO	Check control linkage from levers to the pumps.
		YES	System OK
2	Stroke both levers forward or reverse, the levers should return to neutral position	YES	System OK
		NO	Check neutralizer system for binding or adjustment.
3	Stroke both levers forward or reverse and release one lever, both levers should stay in direction stroked	YES	System OK
		NO	Check neutralizer system for binding or adjustment

**Hand controls - forward and reverse**

Pre-test instructions:

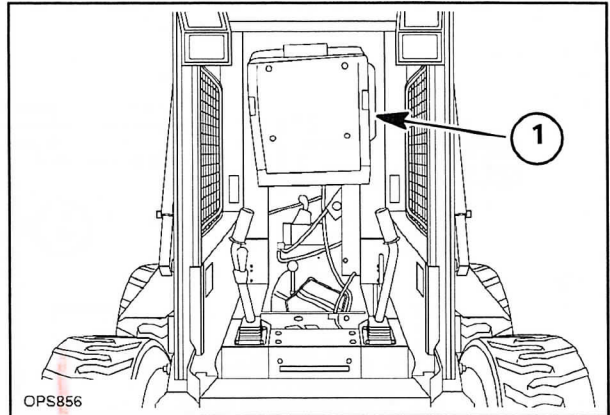
- \* Operator in seat
- \* Seat belt buckled
- \* Service/Run switch in "RUN" position
- \* Parking brake disengaged
- \* Key switch in the "RUN" position
- \* Engine operating at low idle speed

STEP	TEST	RESULT	PROBABLE CAUSE AND CORRECTION
1	Control levers in neutral, unit should not move	YES	System OK
		NO	Check and adjust for neutral
2	Stroke both levers forward or reverse, unit should accelerate smoothly	YES	System OK
		NO	Check for loose or damaged control linkage, if OK go to next step.
3			Check hydraulic oil level and add as required, if OK go to next step.
4			Check hydrostatic hoses, tubing, and connections for leaks, if OK go to next step.
5			Check parking brake for being engaged or correct adjustment, if OK go to next step.
6			Check hydrostatic charge pressure, if OK go to next step.
7			Check forward or reverse relief valve operation and pressure settings.
8	Control levers in neutral park brake engaged, pumps should be quiet	YES	Control System OK
		NO	Check and adjust for neutral, if OK go to next step.
9			Check for loose or damaged control linkage, if OK go to next step.
10	Control levers in full forward, machine should go in straight line	YES	Control System OK
		NO	Reset control lever stops

5. Raise the operator's seat and latch, 1, in the raised position.



Never work under a raised seat unless it is securely latched in the raised position.



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6. Check the hydraulic oil level, 1, and add if required to the proper level.



Gauges, gauge fittings, and hoses must have operating pressure ratings of at least 25% higher than the highest pressures of the system.

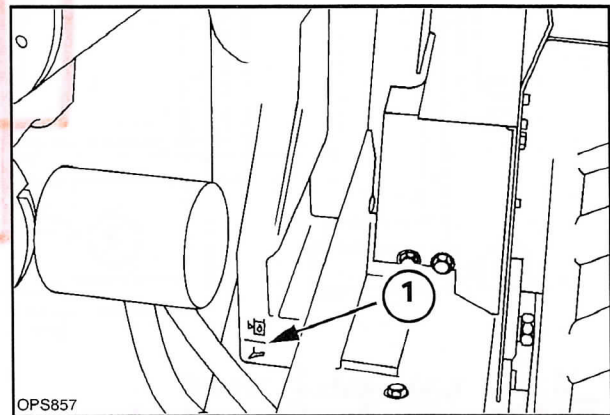
Never adjust or replace the relief valves to get higher pressures than those specified by the equipment manufacturer.

Fluid under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Always protect the skin and eyes from escaping fluid under pressure.

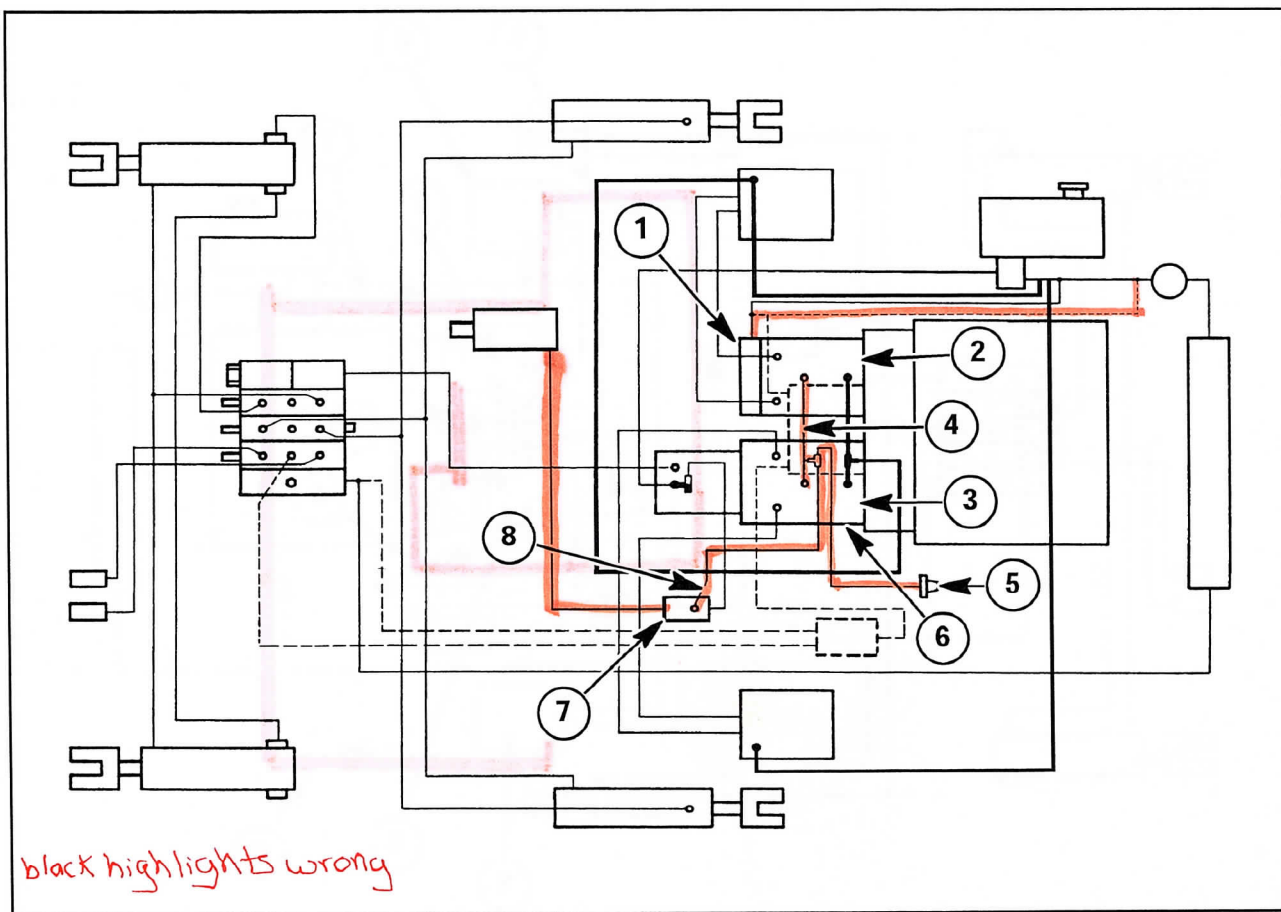
Before disconnecting lines or fittings, be sure to turn off the skid steer engine and relieve all pressure. Before applying pressure to the system, be sure all connections are tight and that lines, pipes, and hoses are not damaged.

If injured by escaping fluid, obtain medical assistance at once. Serious infection or reaction can develop if medical treatment is not administered immediately.

Remove any attachment from the mounting plate before loosening or disconnecting any hydraulic lines.



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### Hydrostatic Pump Charge Pressure Oil Flow

A gerotor charge pump, 1, is attached to the right hand hydrostatic pump, 2, and provides charge pressure oil to both the right and left hand hydrostatic pumps, 2 and 3. Oil is supplied to the left hand hydrostatic pump through line 4. This charge oil replaces oil in the high-pressure circuit that was used for lubrication and cooling of the internal rotating parts of the pumps and motors.

Charge oil is also supplied to the Transmission Charge Pressure switch, 5, through hose 6. This hose tees into the charge pressure circuit at the left hand hydrostatic pump.

On the two-speed skid steers, charge oil is used to supply oil to the Hi/Low Control Valve, 7, through hose 8. This hose also tees into the charge pump circuit at the left hand hydrostatic pump.

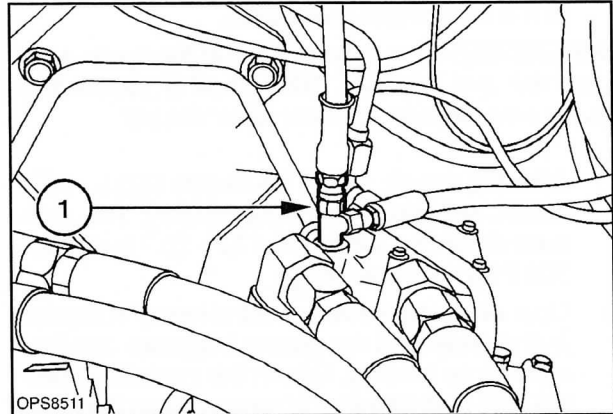


## HYDROSTATIC CHARGE SYSTEM PRESSURE TEST

The hydrostatic charge pump provides charge pressure oil to the right and left hand hydrostatic pumps. This oil replenishes the hydrostatic system for lubrication and cooling of the hydrostatic pumps and motors.

The charge pressure can be checked at the charge pressure port on the top of the left hand hydrostatic pump, 1.

The charge system pressure is regulated by the charge pump relief valve and can not be adjusted. If there is some reason to suspect incorrect pressure, check the pressure as follows:



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### Checking Charge System Pressure

#### Fittings and gauge required:

1. 0 - 50 bar (0 - 600 PSI) gauge (minimum)
2. 7/16 - 20, 37° (JIC) swivel nut run tee and hose to gauge

#### Test Procedure

1. Raise the boom and rest on the boom locks.
2. Put the SERVICE/RUN switch in the SERVICE position.
3. Disengage the parking brake.
4. Securely block the skid steer with all four wheels off the ground. Support the front of the skid steer at 1, to the front of the final drive case and at 2, to the rear of the case (tires removed for clarity).



**CAUTION**

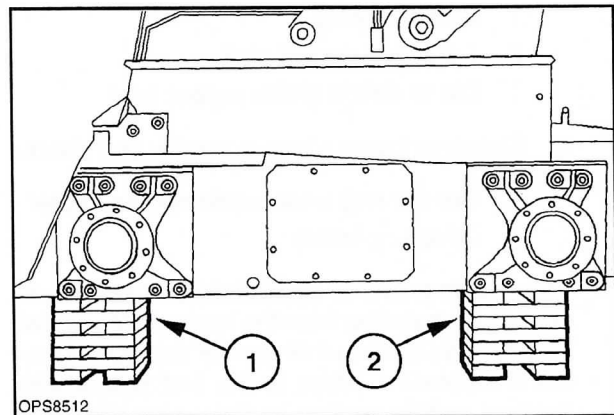
**Failure to securely support the skid steer could result in movement of the skid steer causing serious injury or damage to the equipment.**

5. Raise the operator's seat and latch in the raised position.



**CAUTION**

**Never work under a raised seat unless it is securely latched in the raised position.**



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## HYDROSTATIC PUMP CASE DRAIN TEST

The hydrostatic pump case drain oil flow should be checked to determine if wear and possible damage to the internal rotating components has occurred.

### Checking Pump Case Drain Flow

#### Fittings and other equipment required:

1. Misc. 37° JIC fittings for case drain tubes: Plugs, elbows and adapters.
2. Drain hose
3. 5 gallon bucket
4. Stop watch

#### Test Procedure

1. Raise the boom and rest on the boom locks.
2. Put the SERVICE/RUN switch in the SERVICE position.
3. Engage the parking brake.
4. Securely block the skid steer with all four wheels off the ground.

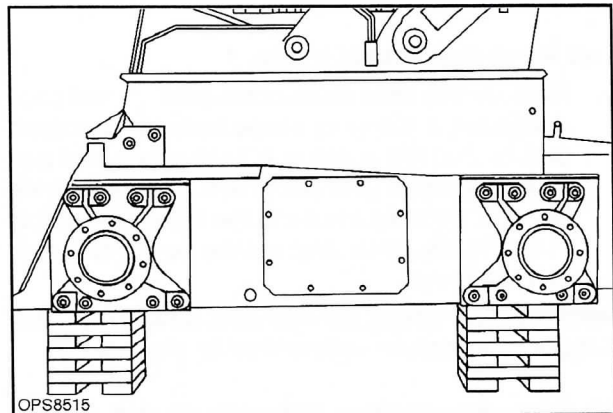


**Failure to securely support the skid steer could result in movement of the skid steer during testing causing serious injury or damage to the equipment.**

5. Raise the operator's seat and latch in the raised position.



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## HYDROSTATIC PUMP HIGH-PRESSURE TEST

The hydrostatic drive system is protected by four high-pressure relief valves; two in each pump, one for forward and one for reverse. All four valves are the same and are factory set at 345 bar (5000 PSI).

The valves are located opposite each other at the bottom of the backplate section of the pumps. Right hand pump at 1, and left hand pump at 2.

If one relief valve is in question, the valve can be switched with a known good valve; if the problem follows the switched valve, replace the suspect valve. Switching forward and reverse relief valves on the same pump should reverse the problem if the relief valve is defective. If the problem remains, internal wear or damage in the pump or motor is the likely cause. Refer to the pump case drain test for further testing to locate the problem.

### Gauge Required

0 - 690 bar (0 - 10,000 PSI)

### Relief Valve Test Procedure

1. Raise the boom and rest on the boom locks.
2. Put the SERVICE/RUN switch in the SERVICE position.
3. Engage the parking brake.
4. Securely block the skid steer with all four wheels off the ground.

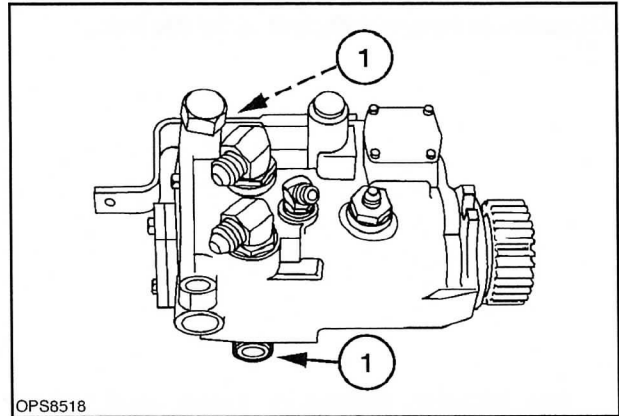


**Failure to securely support the skid steer could result in movement of the skid steer during testing causing serious injury or damage to the equipment.**

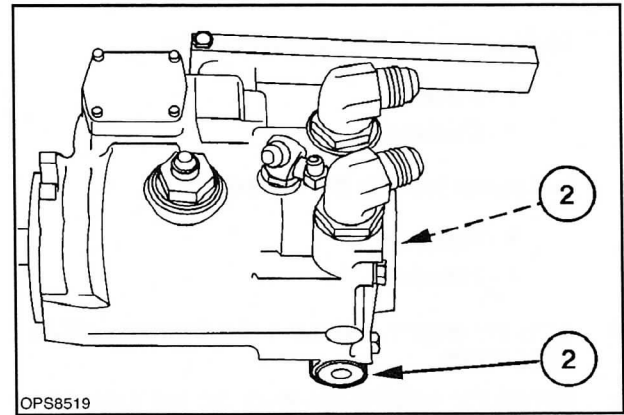
5. Raise the operator's seat and latch in the raised position.



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## HYDROSTATIC MOTOR CASE DRAIN TEST

The hydrostatic motors should be checked for excessive internal leakage if one or both of the ground drive systems appears weak. The excessive leakage is caused by wear or damage to the motors internal rotating groups, thus allowing high-pressure oil to leak into the case.

### Checking Motor Case Drain Flow

Ideally, case drain to each motor should be checked individually to properly evaluate their condition. But due to the inaccessibility of the hydrostatic motor and case drain lines, the following procedure should be used.

#### Fittings and other equipment required:

1. Misc. 37° JIC fittings
2. Drain hose
3. 5 gallon bucket
4. Stop watch

#### Test Procedure

1. Raise the boom and rest on the boom locks.
2. Put the SERVICE/RUN switch in the SERVICE position.
3. Engage the parking brake.
4. Securely block the skid steer with all four wheels off the ground.



**CAUTION**

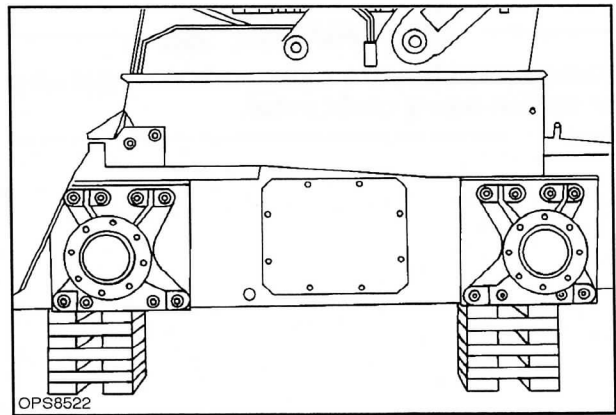
**Failure to securely support the skid steer could result in movement of the skid steer during testing causing serious injury or damage to the equipment.**

5. Raise the operator's seat and latch in the raised position.



**CAUTION**

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## HYDRAULIC, HYDROSTATIC SYSTEM AIR INGRESS TEST

Hydraulic system air ingress, causing oil aeration, can affect performance of the hydraulic oil. This may be evident on a machine by jerky or uneven movement of the skid steer boom or bucket.

To assist in testing and finding leaks, a tool has been developed (part #FNH22ESS95). This tool comprises a cap which replaces the reservoir filler breather for testing purposes, a pressure gauge and a relief valve. The cap has fittings for air pressure to be applied to the hydraulic reservoir.



### CAUTION



**Do not start the engine with the test tool installed, as the hydraulic system must be able to breathe.**

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### Test Procedure

1. Remove the filler/breather cap.
2. Remove the self-tapping screws around the cap base and screen assembly.
3. Remove the base, screen and gasket assembly, clean all sealing surfaces.
4. Re-install new gaskets and base, taking care not to overtighten the screws.
5. Make sure the tank has 10W-30 oil visible.
6. Pressurize the tank using an air pressure line. The tool is equipped with a 3 PSI relief valve and a pressure gauge. The reservoir should not be pressurized beyond 4 PSI.

The following checks should then be performed to trace the source of the air ingress.

- Examine the suction tubes and fittings to the hydraulic gear pump and the return tubes from the filter to the reservoir.
- Examine the transmission case drain tubes/hoses and fittings from the hydraulic motors and pumps to the suction side of the hydraulic pump. Also check the cam plate shaft seals and the pump and motor casing gaskets.
- Potential leakage areas could also be input shaft seals in the engine bell housing, gearbox or output shaft seals in motors and gearboxes and the chain case.