

## TESTING PUMPS AND MOTORS

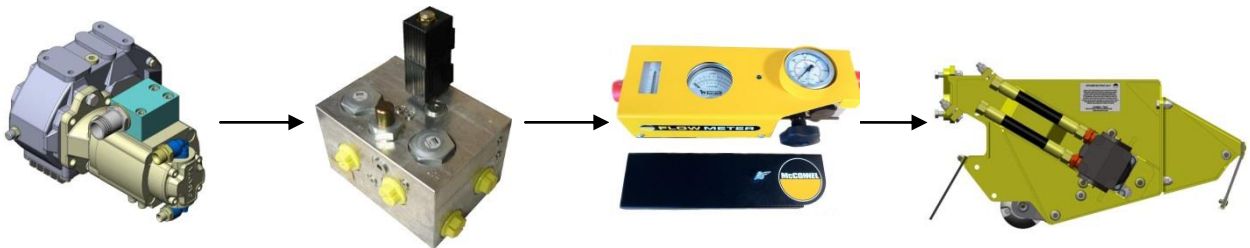
### Test equipment.

- a. Flow meter with pressure gauge and restriction control.
- b. Suitable short hoses and unions to enable the test equipment to be connected to any Power Arms in the field. Normally these would be 5/8", 3/4" or 1" BSP for Imperial build flail circuits, and M26 & M36 for metric flail circuits.

Imperial arm head circuits are 1/4", 3/8" or 1/2" BSP. Whilst the metric equivalent on arm heads would be M14 and M18.

### Flail Circuit

Fitting the flow meter between the rotor control valve and motor, see diagram 1, will allow all components of the circuit except the motor to be tested at once. Diagram 1.



### Test Procedure

Test meter restriction control must be fully OPEN at this stage.

Set the tractor to 500 rpm at the p.t.o. shaft for gear pumps or 800 rpm for piston pumps and NOTE the flow.

Gradually close the flow meter restriction control to raise pressure, until the system relief valve operates, but OPEN the control if the relief has not opened at its pre-set pressure (consult machine handbook for correct setting.) If this situation arises, the relief valve must be reset, or replaced if its condition is suspect.

When satisfied that the relief valve is working correctly, the next step is to close the restriction control to raise pressure to approximately 35 bar below relief valve setting. Ensure tractor retains a steady 500 rpm or 800 rpm at the p.t.o. and NOTE the flow under load.

Use the formula below to calculate the pump efficiency.



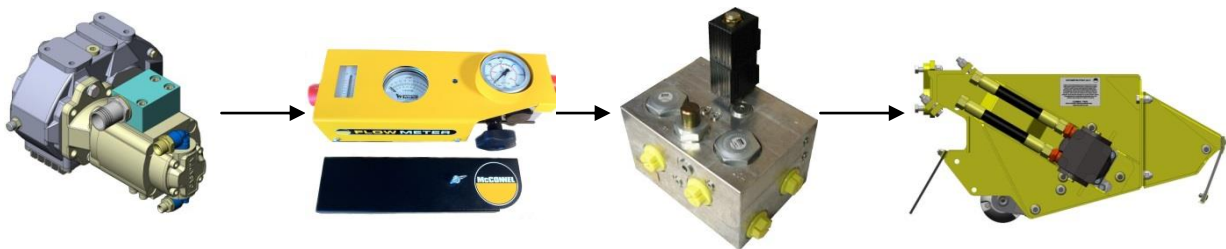
PUMP EFFICIENCY % =  $\frac{\text{FLOW UNDER PRESSURE (2nd reading)}}{\text{FLOW OPEN CIRCUIT (1st reading)}} \times 100$

Example =  $\frac{41 \text{ litres / min}}{46 \text{ litres / min}} \times 100 = 89.1\%$  at test pressure of 138 bar.

**Note.** A new gear pump has an efficiency rating of 90% plus and a piston pump 95%, however, when testing a machine in service, 85%+ at 172 bar. Is acceptable for practical purposes assuming the relief valve is set at 210 bar.

If loss of hydraulic oil flow or pressure through the rotor relief/control valve is suspected, a second test should be made, to test the pump, see below.

## Flail or Armhead pump test.



Fit the flow meter between the pump and the rotor control valve or armhead valve. Great care must be taken to ensure that the flow meter restriction control is fully OPEN initially, and is closed gradually to ensure the pressure rating of the system is not exceeded. Satisfactory pump performance will confirm the relief/control valve is at fault.

If rotor speed fluctuates and /or hydraulic oil becomes aerated, check all suction connections between tank and pump including flange face joints, threads and suction hose. On PA2000 series machines ensure tank tap is fully open.

**Note.** It is rare for the tank suction strainer to cause an obstruction as it has a large surface area, but in the event of serious contamination, the tank should be drained and “back flushed” on older machines or the elements replaced on newer models.



## Testing the Motor.

An accurate assessment of motor efficiency can only be achieved by loading the motor with a Dynamometer. However, by elimination we can conclude that if the pump, rotor control, and rotor relief valve prove to be efficient at normal operating temperature, any remaining losses must be through the motor.

A reasonable indication of motor condition can be obtained in the field as follows: Install a flow meter as shown in diagram 1. With the flow meter restriction control fully OPEN, the machine can be put to cut thick grass while the flow and pressure are monitored.

If the flail rotor slows down with no corresponding drop in flow through the flow meter, this indicates oil slippage through the motor.

*Important. Never carry out this test with the flow meter close to the flail head and ensure that the ground is free of stones, sticks or any obstruction. The roller must be set to its lowest position. Observe all safety precautions*

