

## Pump Control

Pump speed is controlled on a hydraulic system by the hydraulic PWM valve and by the electric pump driver (EPD) module on an electric pump system.

Both of these receive the PWM signal from the controller and control the speed of the pump by increasing hydraulic flow or increasing electric current to the pump

**PWM**—Pulse width modulated signal. Signal is ON or OFF. The amount of time that the signal is ON varies and is referred to as the DUTY CYCLE. On most systems, the DUTY CYCLE varies from 0 to 100%. On the JD controller, the PWM DUTY CYCLE varies from 0 to 255 (so a 50% duty cycle shows as 128).

The PWM signal is always a full 13 volts, and is either on or off. When tested with a voltmeter, the signal will appear to be a voltage that varies from 0 to 13 volts depending on the duty cycle. If the duty cycle is 50%, the voltage will appear to be about 6.5 volts (50% of 13 volts). To see the duty cycle and the pulse width modulation, you need an oscilloscope. Most displays have a screen where the PWM Duty Cycle is shown.

## PumpRight Hydraulic PWM Valve

### Troubleshooting Tip:

**Manual Override** - Push down and turn 1/2 turn CCW to lift the valve for manual override to check for proper hydraulic connections. Override will completely open valve, so limit tractor hydraulic flow to valve.

(May need to clean packed dirt to allow movement of override knob.) Push down and turn 1/2 turn CW to return to operating position.

PWM Valve Connector - 2-pin MP Shroud

Pressure from Tractor

Return oil to Tank - Check valve included on return port

**Electromagnetic Solenoid:** When electromagnet is energized by PWM signal, the proportional needle valve is opened, allowing hydraulic flow through the motor to the pump. A paper clip should be attracted to the cylinder when it is energized.

**Load Sense Port**—For power beyond hydraulic use only.

**Bypass Valve**—Remove the cap to access a bypass needle valve. This valve is shipped from the factory closed. **The only case when valve should be open is when running in series with other hydraulic motors.**

Depending on your tractor and exact hydraulic plumbing scenario your pump may turn very slowly when it should stop. To stop the pump completely, open the bypass valve slightly.

To adjust the Bypass Needle Valve, first loosen the lock nut. Do not overtighten the needle valve.

Red knob (manual override) is down and locked for normal operation. The up position is used for testing the hydraulic circuit.

