

## Service Kit Instructions

### Series 90

## Multi-function valve replacement and adjustment



### Removal and Installation

The multi-function valve cartridge is removed with an 1-1/4 inch (030 through 100 frame size pumps) or a 41 mm (130 through 250 frame size pumps) hex wrench on the largest hex on the cartridge.

Inspect replacement cartridge for damage to parts and O-rings.

Install cartridge in multi-function valve cavity and torque to 79 Nm (58 lbf·ft) for 030 through 100 frame size pumps or 210 Nm (155 lbf·ft) for 130 through 250 frame size pumps.

#### CAUTION

**Do not over-torque the Multi-function Valve Cartridge.**

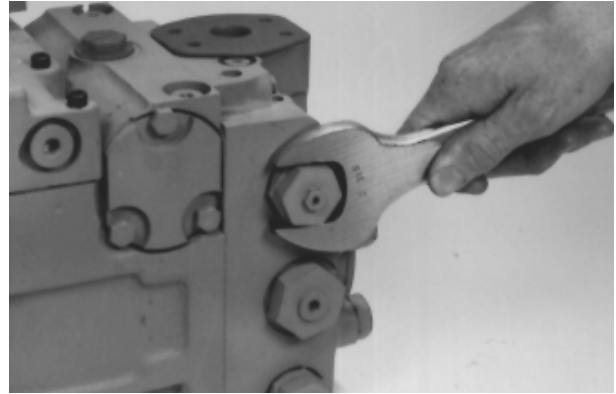
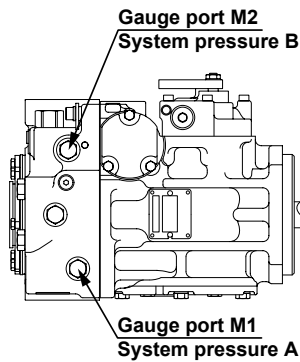


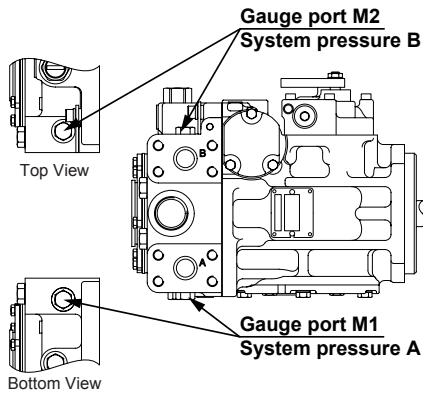
Fig. 1 - Remove Multi-function Valve Cartridge (Typical)



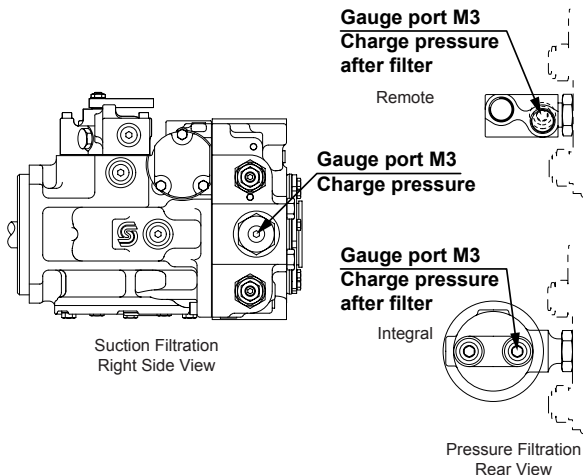
Fig. 2 - Install and Torque Cartridge (Typical)



**Fig. 3 - Gauge Connections: Variable Pump with Radial Port End Cap (Typical)**



**Fig. 4 - Gauge Connections: Variable Pump with Twin Port End Cap (Typical)**



**Fig. 5 - Charge Pressure Gauge Connections: Variable Pump (Typical)**

## Multi-function Valve Adjustment

Multi-function valves sold as spare parts are NOT adjusted at the factory. A typical adjustment procedure is described in the following sections. Refer to the technical information for your vehicle or machine for the correct high pressure setting and any special procedures.

## Gauge Installation

It will be necessary to install a high pressure gauge into the system pressure gauge ports to check the high pressure setting of the multi-function valves. This setting is referenced to charge pressure.

Snubbers are recommended to protect pressure gauges. Frequent gauge calibration is necessary to insure accuracy.

## Gauge Information

M1	System Pressure Port "A"	600 bar or 10,000 psi gauge 9/16 — 18 O-ring fitting
M2	System Pressure Port "B"	600 bar or 10,000 psi gauge 9/16 — 18 O-ring fitting
M3	Charge Pressure	60 bar or 1000 psi gauge 9/16 — 18 O-ring fitting or tee into line from charge pressure filter

### Multi-function Valve Pressure Adjustment

Adjustment of the pressure limiter and high pressure relief valve pressure setting is accomplished by the same procedure.

In order to set the pressure setting on the pressure limiter or high pressure relief valve, the motor output shaft must be locked so it does not rotate. This may be accomplished by locking the vehicle's brakes or rigidly fixing the work function so it cannot rotate.

**WARNING**

**Take necessary precautions that the motor shaft remains locked during the adjusting procedure.**

Install two (2) 600 bar or 10,000 psi pressure gauges in the high pressure gauge ports. Install a 60 bar or 1000 psi pressure gauge in the pump charge pressure gauge port.

Start the prime mover and operate at normal speeds.

Loosen locking nut (smallest hex on multi-function valve) with a 19 mm wrench for all 030 through 100 frame size units, a 24 mm wrench for 130 through 250 frame size units with "Range 1" valves, or a 13 mm wrench for 130 through 250 frame size units with "Range 2" valves.

Insert a 5 mm (all 030 through 100 units), 8 mm (130 through 250 frame size units with "Range 1" valves), or 4 mm (130 through 250 frame size units with "Range 2" valves) internal hex wrench into the pressure adjusting screw.

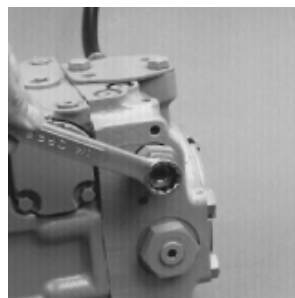
NOTE: A plastic dust plug may be installed in the adjusting screw used on 030 through 100 units and "Range 1" 130 through 250 units.



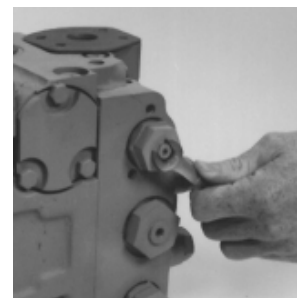
**Fig. 6 - Multi-function Valves (Typical for all 030 through 100, and 130 through 250 "Range 1")**



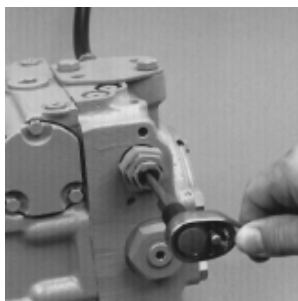
**Fig. 7 - Multi-function Valves (Typical for 130 through 250 "Range 2")**



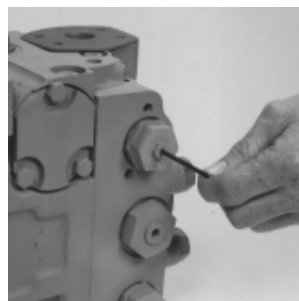
**Fig. 8 - Loosen Pressure Adjusting Screw Locknut (Typical for all 030 through 100, and 130 through 250 "Range 1")**



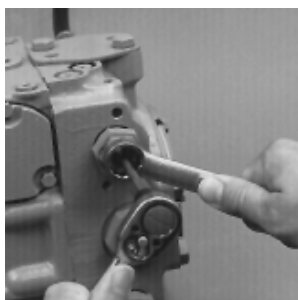
**Fig. 9 - Loosen Pressure Adjusting Screw Locknut (Typical for 130 through 250 "Range 2")**



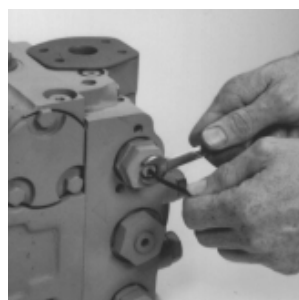
**Fig. 10 - Rotate Pressure Adjusting Screw (Typical for all 030 through 100, and 130 through 250 "Range 1")**



**Fig. 11 - Rotate Pressure Adjusting Screw (Typical for 130 through 250 "Range 2")**



**Fig. 12 - Tighten Pressure Adjusting Screw Locknut (Typical for all 030 through 100, and 130 through 250 "Range 1")**



**Fig. 13 - Tighten Pressure Adjusting Screw Locknut (Typical for 130 through 250 "Range 2")**

Activate or move the input signal to the control so that pressure increases in the high pressure closed circuit to the pressure limiter pressure setting. The pressure limiter setting is reached when the pressure stops increasing and remains steady at a given pressure level (as shown on the gauges). The pressure limiter pressure setting is referenced to charge pressure.

Release system pressure and rotate the pressure adjusting screw with the internal hex wrench. Re-check the setting.

NOTE: Clockwise rotation of the pressure adjustment screw will increase the pressure setting, and counterclockwise rotation will decrease the pressure setting. Each complete rotation of the pressure adjusting screw changes the pressure setting by approximately 93 bar (1350 psi).

Repeat this procedure until the desired pressure level is established (as shown on the gauges).

While holding the internal hex wrench and pressure adjusting screw in the same position, tighten the pressure adjusting screw lock nut to 16 Nm (12 lbf•ft) on all 030 through 100 units and 130 through 250 frame size units with "Range 1" valves, or 3 Nm (26 lbf•in) on 130 through 250 frame size units with "Range 2" valves. **Do not over-torque.**

Activate or move the input signal so pump returns to the neutral position. The pressure in the high pressure circuit should return to the charge pressure setting. To verify the actual pressure setting, actuate or move the input signal to the control such that the pump again develops pressure in the high pressure circuit to the newly adjusted pressure limiter pressure setting. Then allow the pump to return to its neutral position.

The same procedure is used for setting the pressure of the other multi-function valve, but the input control signal must be activated or moved in the opposite direction so that the pressure develops in the opposite high pressure side of the closed circuit.

Shut down the prime mover and remove the gauges and install the gauge port plugs. Replace the plastic dust plugs (if used).