Understanding the Brake System on the J&M Vibros

As you know, the newer J&M Model vibros use a braking valve system to force the vibrator to stop quickly after the unit has been switched to "off". This system is designed to reduce the vibration to the crane line by stopping the vibro quickly. In order to troubleshoot this device you must be able to understand how it works. Please read the following description of how it works and study the hydraulic schematic drawings for a further understanding. Call King Evarrts, J&M's engineer, if you need help with any problems with this circuit.

The first drawing (static) shows the J&M Vibro brake circuit. The CV-6 is a standard 65-psi check valve used for anti-cavitatiion when the motor is coasting to a stop. Item #4 is a Din poppet valve, 2:1 ration, with internal orifice used to sense pressure in the main poppet. Item #3 is a Sun cartridge (CBCH-LKN), a 10:1 ratio counterbalance valve used to pilot the Din cartridge poppet valve. It has a reverse check valve but is not needed or used in this application. Item #5 is a standard 50-psi pop-off relief valve used to limit case drain pressure.

It is important to note that item #3 has two ways to sense its pressure setting. One is through #3 port, (external pilot) connected to the inlet side of the vibro motor. Because of the ratio of 10:1, the pressure sensed here would only need to be a few hundred psi to fully open the pilot valve and thus open the Din poppet valve as well. The other sensing port is internal on port #2 and will require a full pressure of 2000-psi to open the pilot valve and thus the Din poppet valve. This means the Din poppet valve would open at 2000-psi, providing a backpressure to stop the vibro.

The second drawing (driving) shows the oil flow when the vibro is operating. Note that the pressure being sensed on port#3 of the counterbalance valve (item # 3) is holding the counterbalance valve open. This will allow the Din poppet valve to fully open and allow the oil to flow through the poppet valve back to tank. Any fluid in the pilot line of the Din poppet valve, (which is very small) to drain back through the case drain line to tank.

The third drawing (braking) shows the oil flow during braking of the vibro. Again, note the #3 port of the counterbalance valve item #3. It no longer has any pressure to sense on the inlet side of the vibro motor, and thus will have no affect on the counterbalance valve. This means that the counterbalance valve is closed (blocked) off to the case drain line. This will cause pressure to build in the pilot line of the Din poppet valve, (sensed through an internal orifice in the main poppet). This pressure increase will also be sense through the #2 port of the counterbalance valve. Keep in mind at this point the Din poppet valve is closed. When the sensed pressure at port #2 (internal) of the counterbalance reaches the setting of the counterbalance valve, it will open and allow oil out to the case drain line at its pressure setting. The counterbalance valve now acts more like a relief valve and will allow the Din poppet valve to open just enough to maintain the backpressure at whatever the counterbalance setting. Any oil flowing through the poppet valve will flow through the CV-6 check valve back into the inlet side of the motor. When the vibro

motor comes to a stop, then there is no more pressure on the back side of the motor to keep the counterbalance valve open, and it will close off the path to the case drain line.

The oil flow from the pilot poppet valve is very small, less than a cup at most. However, it is possible that a bad poppet valve seat, worn seat or any material stuck in the seat area could cause an increase of flow down the pilot line through the counterbalance valve into the case drain line. A worn poppet skirt would also allow more fluid to flow into the pilot line of the poppet valve. This would only occur when braking the vibro due to the high pressure in the nose of the poppet area and poppet skirt area.