BI016884
A6474X369
April 2013

Operation and Maintenance Manual

CM445 Continuous Miner

A6474X369 (Hydraulic)

Hydraulic pump assembly

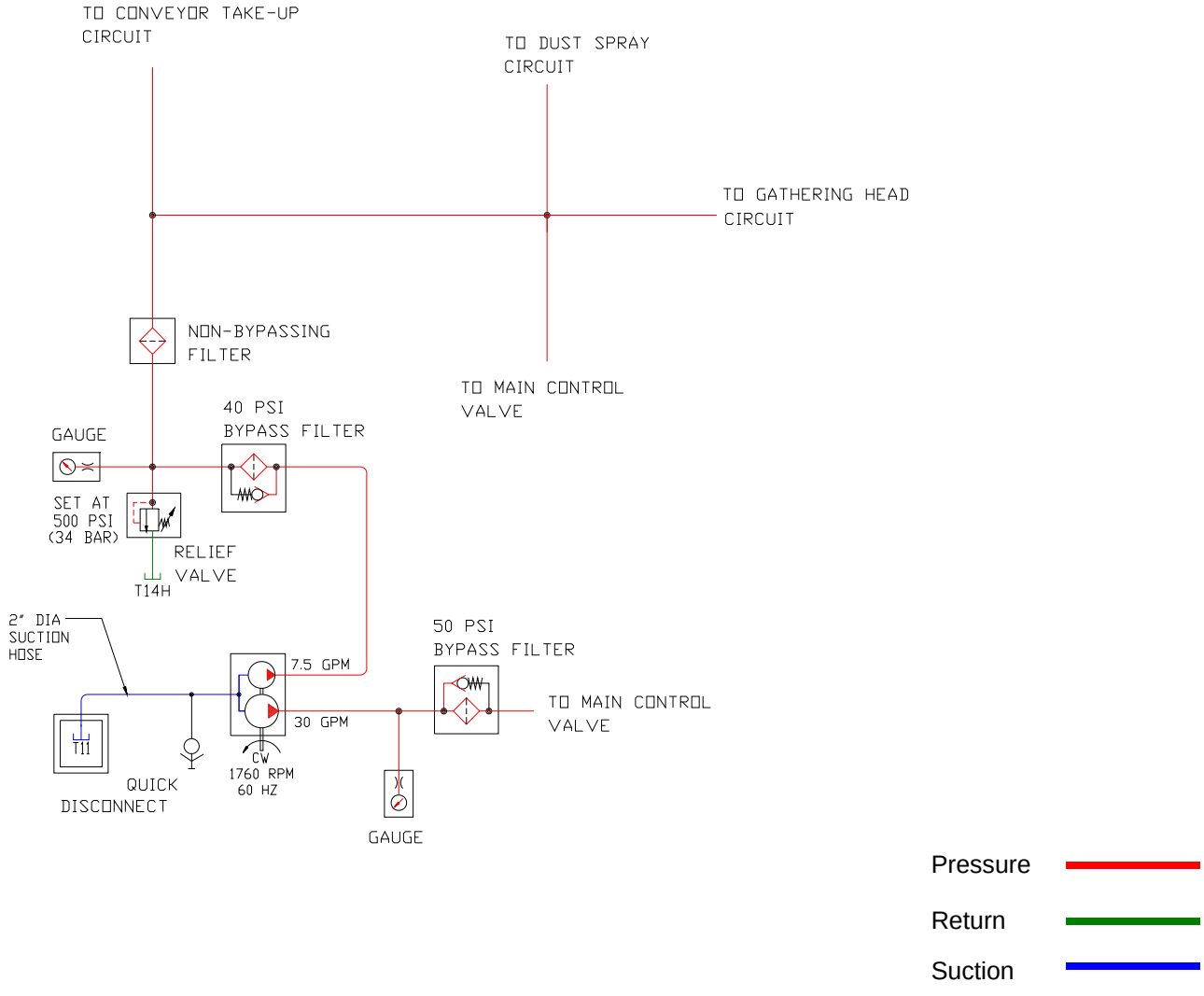
Hydraulic power for all of the hydraulically actuated functions originates with the pump assembly (Fig. 4). Always be sure the shut-off valve (if equipped) is turned to open and the locking device is replaced before starting the machine.

Hydraulic pump on circuit

This pump utilizes two working sections: main flow and pilot flow. Oil is supplied from the oil reservoir through a suction line to the pump inlet ports. The main flow is monitored by a pressure gauge and moves through a bypass filter set at 50 psi and before entering the main control valve. After leaving the pump, the pilot flow enters a bypass filter set at 40 psi. Before continuing on to a non-bypassing filter and the conveyor take-up circuit, dust spray circuit, gathering head circuit and main control valve, pilot oil passes through a relief valve set at 500 psi (34 bar). The flow relief is monitored by a pressure gauge.

IMPORTANT **The two inch locking ball valve must be locked open in normal operation.**

Fig. 4: Hydraulic pump circuit



Gathering head raise/ hold/float/lower circuit

Oil is supplied by the hydraulic pump to the gathering head working section of the main control valve. By manual or remote solenoid control, the valve spool allows oil to enter the gathering head raise circuit.

Circuit operation - Raise (extend)

Reference Fig. 14: To manually raise the gathering head pan (extend the cylinder), pull the valve's handle. Remote operation is achieved by energizing the gathering head up solenoid (GHU). Oil free flows through the check valve in counterbalance valve designated "VR" in the gathering head float valve block and is directed to both cylinder extend ports. At any time while raising the gathering head, the operator can stop the gathering head pan by centering the handle on the valve (or de-energizing the solenoid) and the pan will hold in position. The gathering head raise circuit is protected by a port relief that is set at 1,700 psi (117 bar).

Circuit operation - Lower (retract)

Reference Fig. 15: To put the gathering head pan in the lower mode, push the valve's handle. Remote operation is achieved by energizing the gathering head down (GHD) solenoid. This vents the port labeled "V" on the gathering head float valve block to tank and allows control of the gathering head lower via the valves in the block. The counterbalance valve "VR" is set to relieve at 1,200 psi to allow the gathering head to drift down at a controlled rate of speed. This valve is adjustable and the rate of retract speed for the cylinders can be increased by decreasing the pressure setting of the valve.

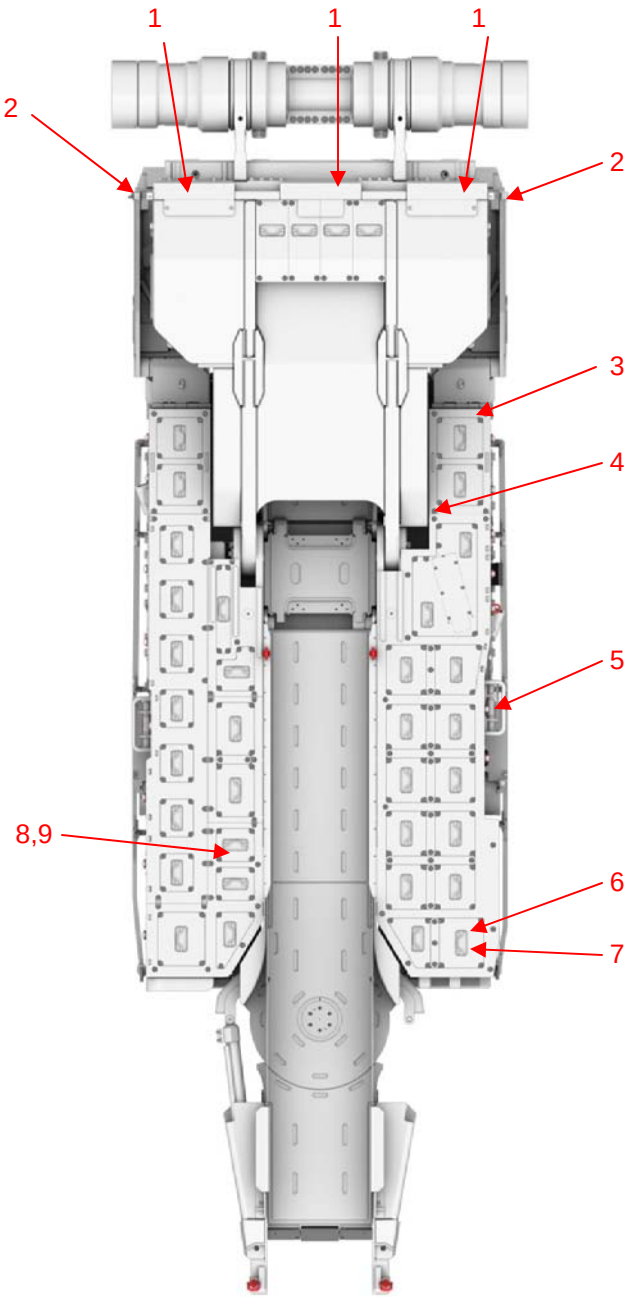
Conversely, the retract speed for the cylinders can be decreased by increasing the pressure setting of the valve. When in the float condition, the cylinders carry some of the gathering head pan weight to prevent the gathering head leading edge from digging into the soft bottom of the mine and moves the machine's center of gravity forward when mining. The gathering head lower circuit is protected by a port relief that is set at 1,700 psi (117 bar).

The counterbalance valve that is designated "CR" is set to relieve at 1,800 psi (124 bar). This setting will relieve pressure directly to the tank in the event of a forced movement of the gathering head.

The pilot pressure supply for the gathering head float comes from the hydraulic pump through a 10 micron bypass filter and a 3 micron non by-pass filter, to the gathering head float valve. The pilot pump provides make up oil for the gathering head cylinders. When the pan goes over uneven terrain, it may raise quickly and extend the gathering head cylinders at a rapid rate. This temporary condition can create high demand for pilot oil supply. In extreme cases, the pilot pressure may decrease to the point where the main control valve may not have sufficient pilot pressure to shift when the solenoids are engaged. It is, therefore, possible to experience a momentary loss of radio control of the machine.

To minimize the chance of the occurrence, a restrictor orifice is installed in the pilot supply for the valve block. This orifice is protected from contamination by an upstream filter. A downstream check valve keeps system pressure from entering the pilot pressure lines. An adjustable needle valve allows for the bleeding off of pressure for maintenance. This needle valve is to remain closed except for performing maintenance. A gauge is incorporated into the valve block for maintenance and troubleshooting.

Fig. 22: Dust-cooling component locations



1. Cutter head front spray manifold
2. Cutter head side spray manifold
3. Right hand chassis side spray manifold
4. Relief valve
5. 0-400 psi pressure gauges (2)
6. Atmospheric relief
7. Ball valve
8. 2-unit pressure manifold
9. 2-way pilot operated valve

Introduction

The following section lists possible problems encountered when servicing the Continuous Miner and can aid in locating and correcting these problems. This section covers basic components, with each listed in a trouble-cause-remedy format.

WARNING **Some procedures must be carried out with the cover of the electrical controller removed and some procedures require the controller to be energized during the tests. It is extremely important that you take all necessary precautions to prevent accidental electrical shock while working within the controller. An certified electrician must supervise and inspect all work performed.**

Hydraulic troubleshooting procedures

For maintenance procedures and tests that DO NOT require the controller to be energized, precautions include:

1. Before removing the controller covers, remove power from the system by disconnecting the trailing cable.
2. Use insulated gloves and tools where possible.
3. All connections must be tight and care must be taken to prevent bolts, nuts, washers and other small metal fasteners from being dropped or lost inside the controller. These lost fasteners could cause electrical shorts inside the controller.

For procedures that DO require that the controller be energized while the cover is off:

1. At no time should you reach inside the controller while it is energized. If it becomes necessary to make adjustments or to replace parts inside the controller, the “POWER OFF” button must be pushed.
2. Use insulated gloves and tools where possible.
3. All connections must be tight and care must be taken to prevent bolts, nuts, washers and other small metal fasteners from being dropped or lost inside the controller. These lost fasteners could cause electrical shorts inside the controller.