

# Newsletters That Teach.

## Unloading Valves - Part II

Sep 15, 2010  
Posted in [Hydraulic](#)

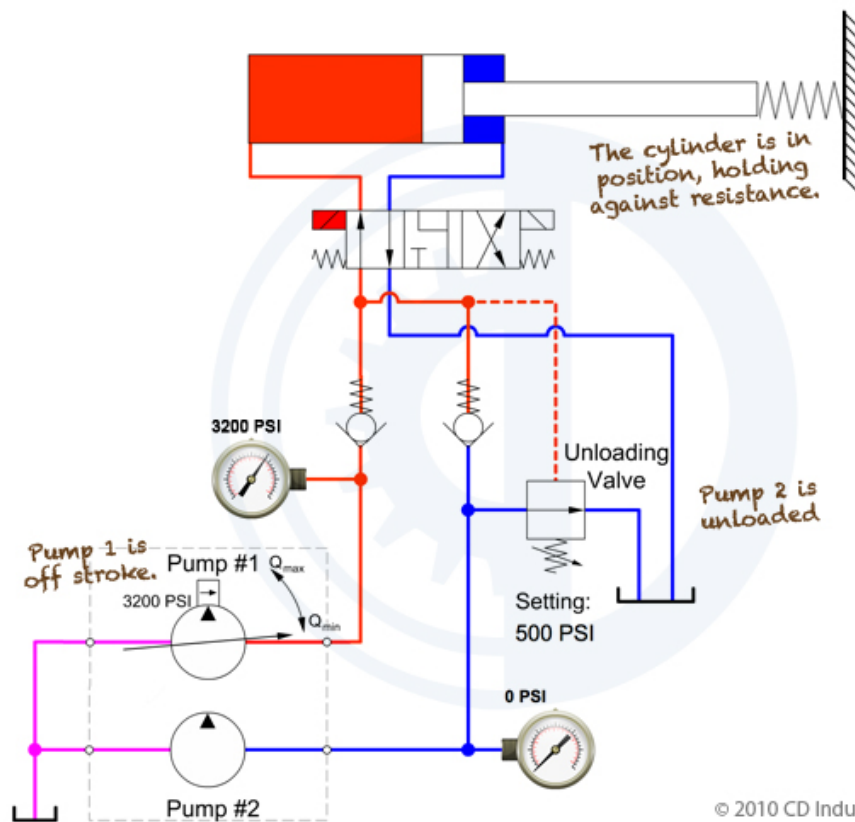
In this edition of [NEWSLETTERS THAT TEACH](#), we look at two example applications of an unloading valve, one in a plant setting, and the other on mobile equipment.

### Plant Pressure System

#### Uhhh... what were we talking about?

For a quick review of unloading valve basics, check out [Newsletter 22](#).

In this plant machine example, a cylinder is being used to move a machine component into position (e.g. head of a large filter press). Once in position, the cylinder must then continue to exert a force on the machine to keep it positioned against all counter-forces that may occur, and take up any slight machine changes that require the cylinder to extend a bit further.



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System pressure spikes quickly once the cylinder has extended as far as possible. This pressure spike triggers the unloading valve. The flow from high volume pump no. 2 is routed back to tank at low pressure. With the check valve in place, low volume, pressure compensated pump no. 1 continues to supply a very small flow to make up for internal system leakage and hold the needed pressure value in the cylinder.

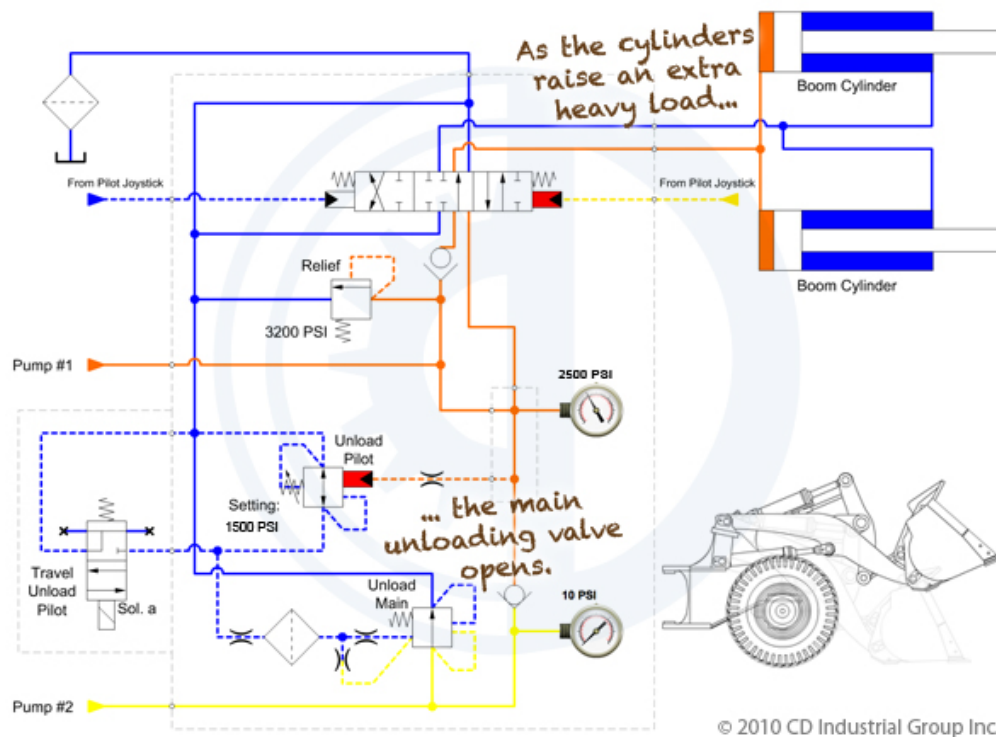
With pump no. 1 unloaded for a cycle of the main manufacturing machine, electric energy is saved in the driving of an unloaded pump, and needless heating of the hydraulic fluid is avoided.

**This unloading valve...**

- saves energy
- avoids extra heat

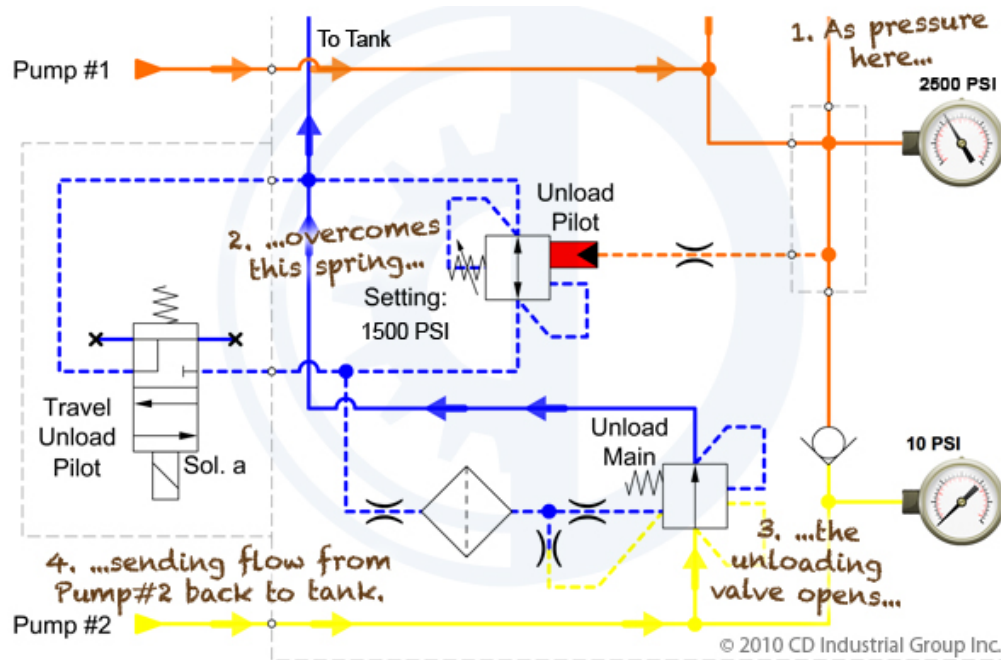
## Front End (Wheel) Loader

A loader will typically have several hydraulic pumps. In order to avoid stalling the diesel engine when an extremely heavy bucket load is being lifted, an unloading valve will respond.



The pressure in the example circuit is determined by how much resistance there is to the two loader boom cylinders as they extend. In other words, the heavier the bucket load, the greater the pressure.

If the pressure rises to the level of the spring setting (e.g. 1500 PSI) on the unloading valve pilot section, then flow will occur through this section causing the main unloading poppet to open. Once this occurs, pump no. 2 will be routed back to the tank at low pressure.



Only pump no. 1 will continue to supply flow to the boom cylinders. The boom cylinders will still continue to extend, but at a slower rate due to the use of the single pump.

The result of this unloading function is that the demand for power from the engine will be reduced.

In some cases the purpose behind this horsepower limiting function is to allow the loader to travel forward while lifting the bucket. In this case, the electronic control module in the loader will sense forward motion and energize the travel unload pilot valve (solenoid 'a') automatically. Both travel and boom lift require power for which the engine may not have enough if the bucket is extremely heavy.

### **This unloading valve...**

- reduces demand on the engine.