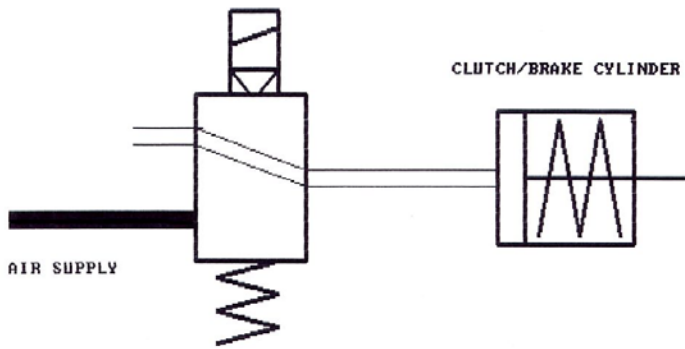
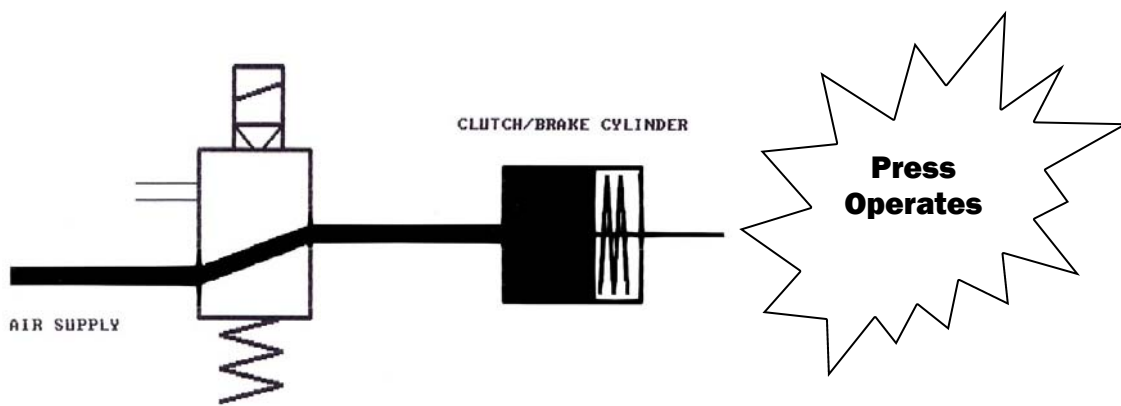


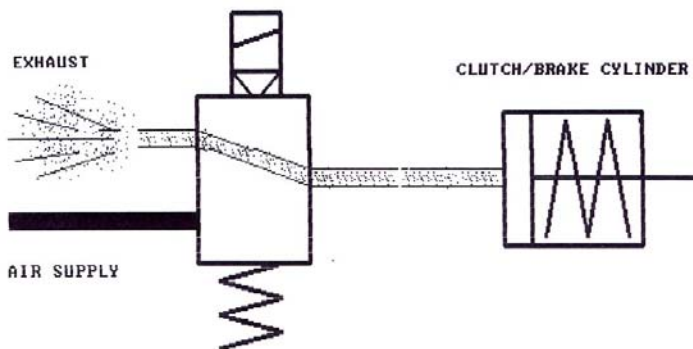
# Single Valve Flow Path



The rest position of the valve is the No-Flow position. The valve should spring to this position when not energized. The clutch/brake springs will not allow the press to cycle.



When the valve is energized, air flow is allowed through. This overrides the clutch/brake springs to allow the press to cycle. Whilst the air is applied, the press will continue to cycle.

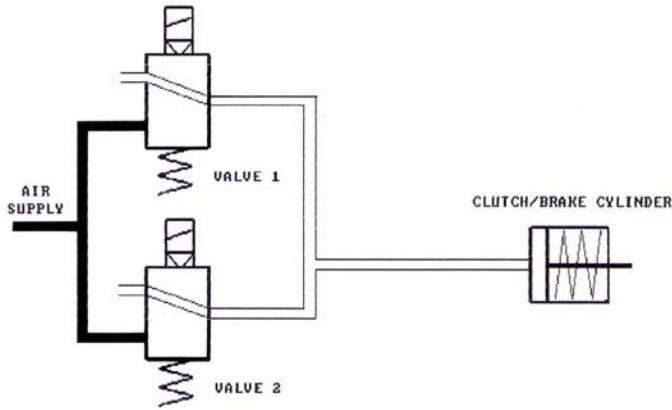


When the valve is de-energized, it's spring shifts it to the exhausting position. Air is exhausted from the clutch/brake halting the press. The faster the air is exhausted, the quicker the press stops.

Pneumatic Safety is entirely dependent on the successful performance of the (one) valve. If the valve passes air, the press will crush things. Any fault is unsafe.

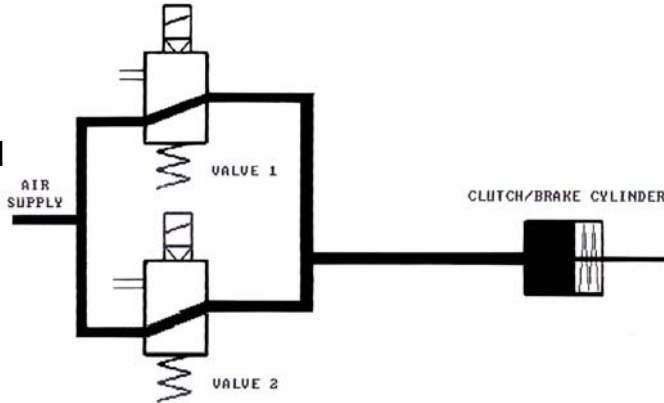
# Parallel Flow Path

**At Rest**



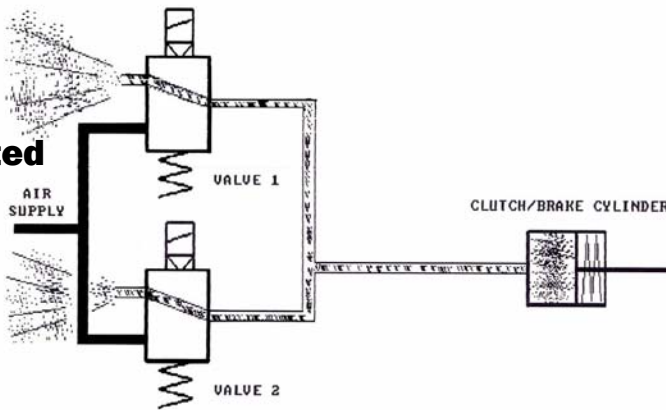
Both valves have supply. The output of both valves is piped to the clutch/brake.

**Air Applied**



When both valves are energised, air is applied to the clutch/brake through both valves. The flow rate through the valve passages in both directions is critical in this model. It is possible for faults to go unnoticed.

**Air Exhausted**

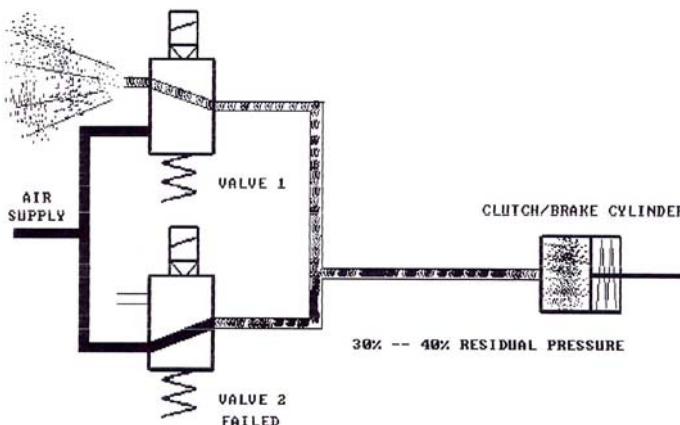


When both valves are de-energised, the clutch/brake is exhausted through both valves.



**OR function**

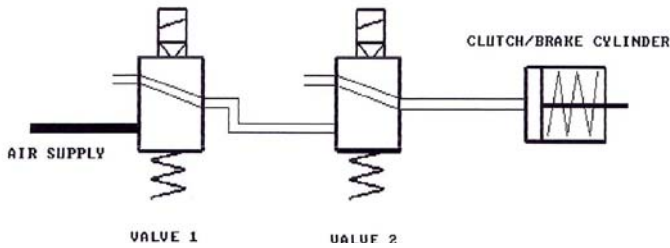
**Failure**



If either valve fails to exhaust, there may not be sufficient exhausting capacity in the other valve to stop the press from operating. Pressure from the failed valve is still being applied.

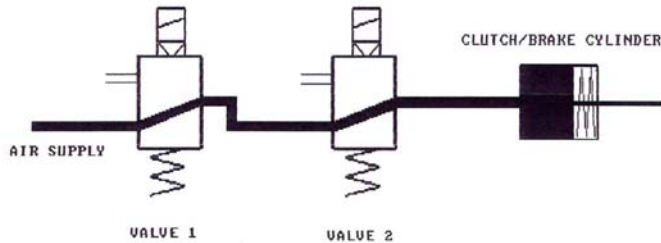
# Series Flow Path

## At Rest



Two valves are connected one after another.  
The second valve is supplied air via the first valve.

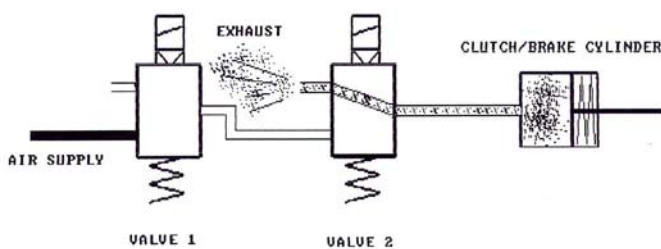
## Air Applied



The 2nd valve will only get supply if the 1st valve is actuated.  
Both valves need to be energized to allow flow through to the clutch/brake.  
If either valve fails to actuate, the press won't cycle.

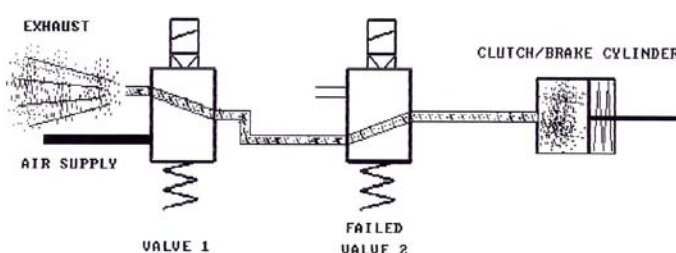


## Air Exhausted



When both valves are de-energised,  
the clutch/brake is exhausted through valve 2.

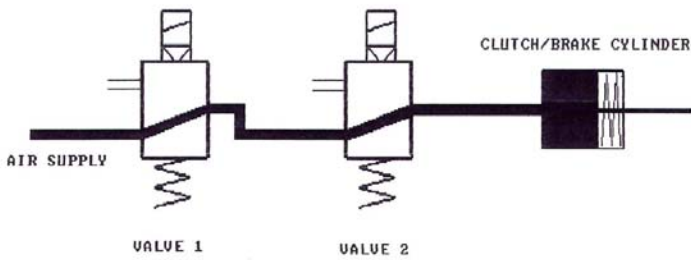
## Failure



If there is a fault with valve 2, air  
should still be able to exhaust back  
through valve 1 (this may take longer).  
If this happens, the fault may not be  
noticed.

# SerPar Flow Path

## Air Applied

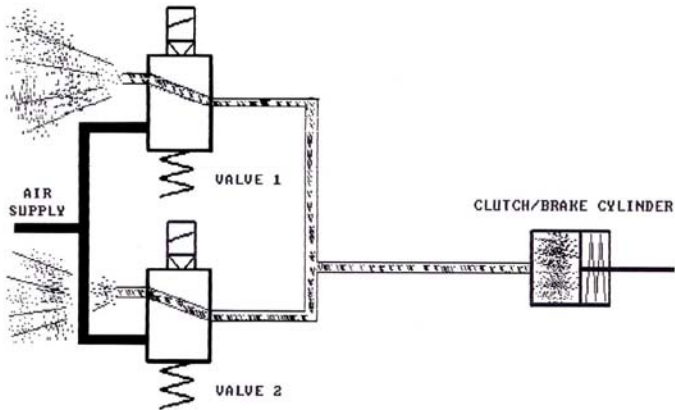


Air is applied in series. It must go through one then the other valve element to get to the clutch/brake. Both valve elements must actuate to apply air. If either one fails to actuate, the press will not cycle.



**AND function**

## Air Exhausted



Air is exhausted in parallel. It can go to atmosphere through both valve elements.

Either valve element has the exhaust capacity to release all the volume of the clutch/brake and also the volume of air which the other valve could apply if it fails in the actuated state.



**OR function**