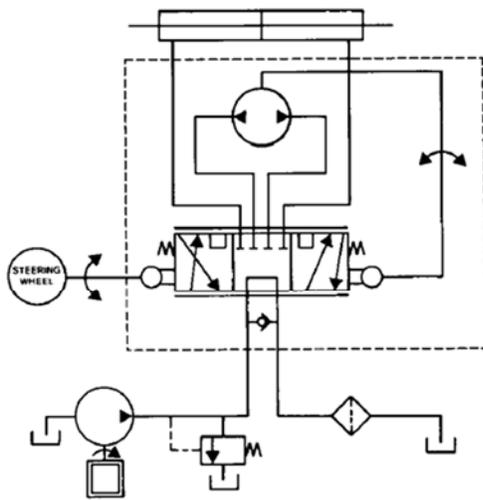


**ME 4232: Fluid Power Control Lab**  
**University of Minnesota**  
**Prof. Perry Y. Li**

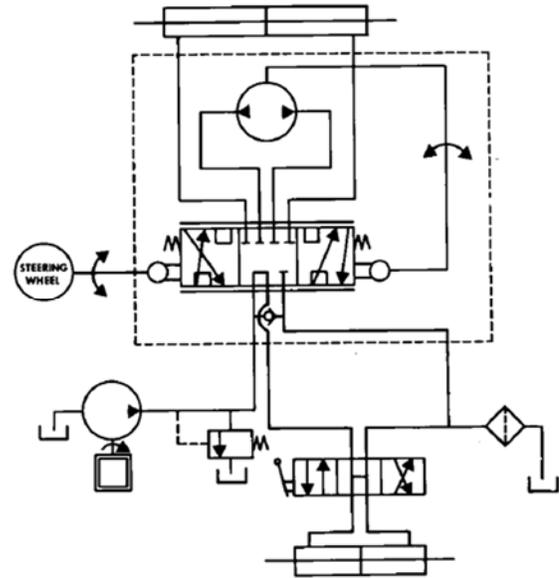
**Lab 13: Hydraulic power steering**

**Objective**

In this lab, you will study the operation of a two types of power steering valves. After gaining a basic understanding of their working principle, you will design hydraulic circuits using them to realize various functions.



**Open center steering**



**Power beyond steering**

**Pre-lab – Due as a hardcopy at the beginning of lab**

Study the circuit diagram for the open center steering and describe the circuit operation in a paragraph. Note that the steering wheel provides actuation to the valve and the input shaft of the bi-directional pump shown inside the dashed box.

**Procedure**

- Study the schematics and hypothesize about the working principle of the two types of steering valves
- Construct a simple circuit to drive one actuator using the power steering valve. Comment on the performance of the circuit at various system pressures
- Comment on the number of revolutions of the steering wheel when the actuator moves from one end to the other while extending and retracting
- Construct the circuit shown in the next page to drive two cylinders (this simulates two wheels). Will it reliably do its job and why?
- Design and test an alternate circuit so that you can steer both cylinders simultaneously and at the same speed (1 extend, and 1 retract).
- Design and test one or more circuits so that you can steer both cylinders simultaneously and at the same speed, but with the cylinders both retracting and both extending. You can assume a convenient cap-side / piston side area ratio. Comment on the reliability of each method.

## Report

Your report should include the following

- Brief description of the working principle of the steering valve.
- Your observations about the performance of the steering valve under various conditions
- Documentation about all the experiments you performed (as required in the procedure section) with comments about why you choose a particular circuit to realize the required function.

