DIAMOND-SHAPED ACTUATOR

AND

HYDRAULIC DISPLACEMENT MOTOR

SUGGESTED ASSESSMENT METHOD

CONTACT:
Dave Strain
(905) 640-2333 (1-800-646-8414)
WEB: http://www.apscontrols.ca
EMAIL: analystsofpneumatic@bellnet.ca

CONTENTS

HYDRAULIC DISPLACEMENT MOTOR
SUGGESTED ASSESSMENT PATH

The invention contests conventional knowledge relating to laws of physics, creating a belief system conflict in most individuals. I suggest breaking the invention into a few blocks for individual assessment, allowing you to contest singular facts one at a time. One may agree with **all** the individual components and claims relating to the invention, yet still disagree when the whole picture is considered. At that point the person will not be able to define any science, engineering or math to support their opinion. This is a psychological barrier created by our belief systems. (Dr. Gregory W. Lester wrote a paper, Why Bad Beliefs Don't Die, that describes this human condition.)

The three steps suggested to assess the invention are:

STEP ONE:

Determine if you agree or disagree with the Fundamental Science.

The Fundamental Science states that configurations of the diamond-shaped actuator, with identical fluid inputs, produce more force through the same travel, when compared to a conventional piston.

If you disagree, please allow the opportunity to take your own readings, with your own certified test equipment, at the actual models that prove this fact.

Page two illustrates the Fundamental Science presenting three configurations of the diamond-shaped actuator, as well as a conventional piston.

Mr. Robert Blanchard P.Eng collected data with certified test equipment confirming the data collected with my certified test equipment. After witnessing the operation of the diamond-shaped actuator on site, Dr. Mile Ostojic of the NRC, agrees with the operational claims made regarding the diamond-shaped actuator.

STEP TWO:

Determine if you agree or disagree with the three physical principles relating to the invention.

Page three illustrates our actual model, which demonstrates these principles.

STEP THREE:

Determine if you agree or disagree on the three modes of operation relating to the invention.

Pages four, five and six illustrate the three operational modes.

A control expert from Siemens, one of the most respected control companies in the world, assessed the three drawings and found nothing wrong in the control logic.

SECTION 2.0
2.1

FUNDAMENTAL SCIENCE

The first point of agreement required relates to the fundamental science. The fundamental science states that the different configurations of the diamond-shaped actuator are more efficient than a conventional piston: meaning that more work is achieved via these actuators than with a conventional piston with identical pressurized fluid inputs.

This fact is acknowledged in patents by:

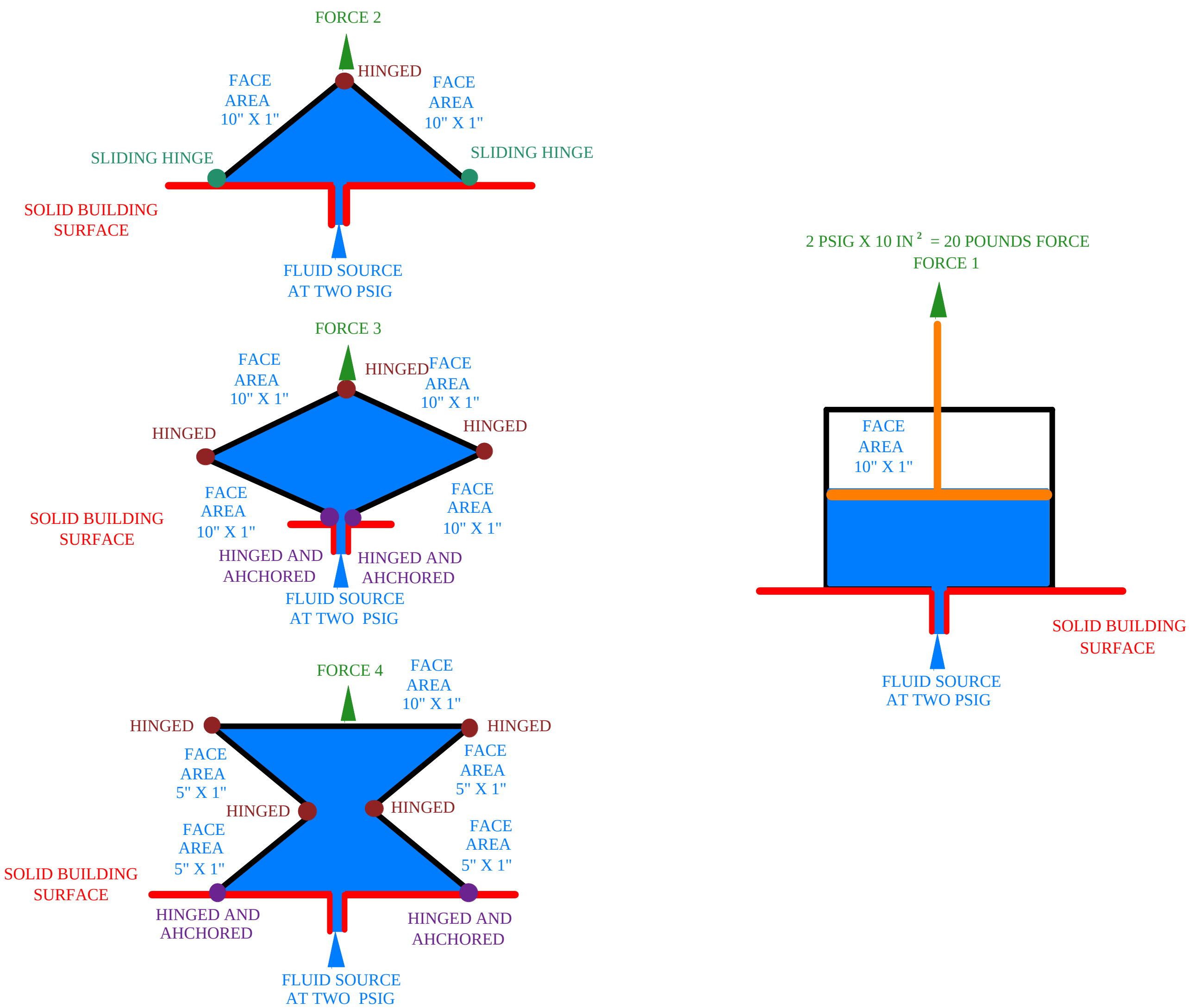
-1- Terence F. Reilley, US patent 147,519 from February17, 1874.

-2- Titus Powers, US patent 345,446 from July 13, 1886.

-3- Myself, David W. Strain, US patent 6,782,800 from August 31, 2004, European patent EP1240435 from October 20, 2004.

Frank H. Sleeper, US patent 696,768 from April 1, 1901 invented an improved motor using a configuration of the diamond-shaped actuator, but did not state the efficiency advantage as a direct fact.

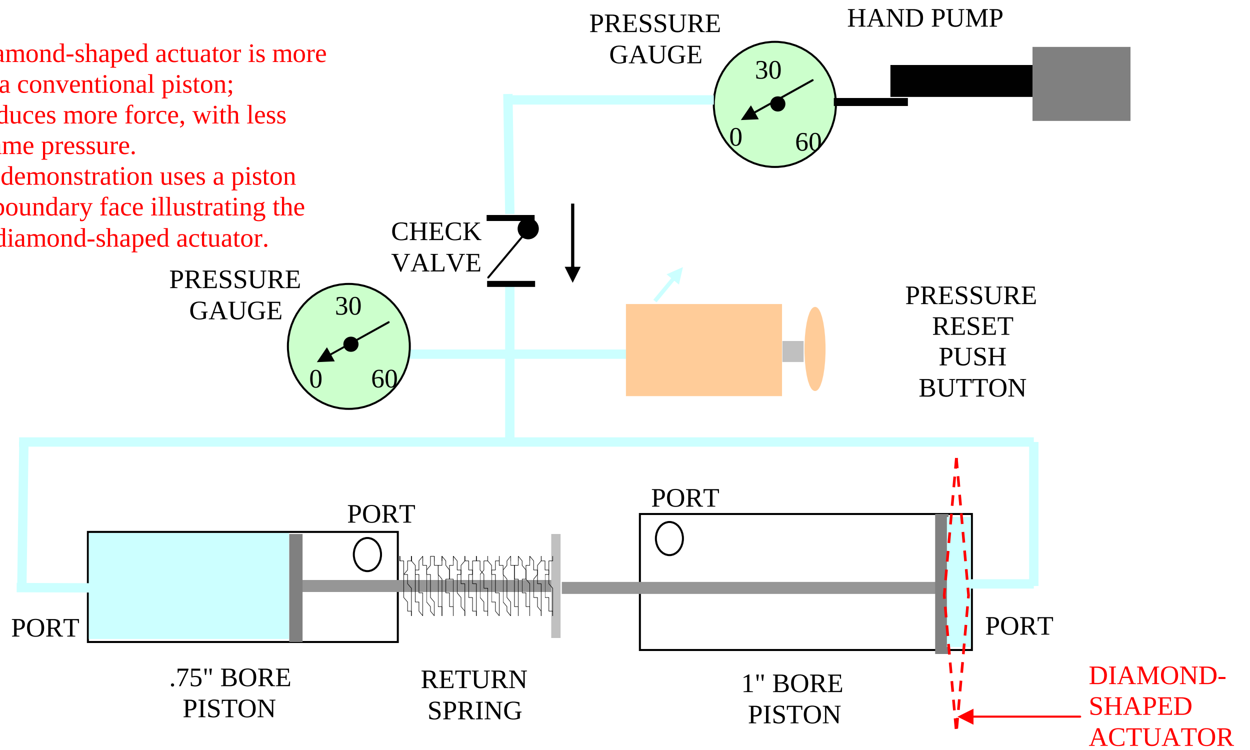
Please consider the following illustrations. Force **one** is produced by a conventional piston with a fluid boundary face of ten square inches and a fluid pressure of two PSIG, resulting in a force of twenty pounds. The fundamental science of our invention maintains nonlinear forces **two**, **three** and **four** are each greater than force **one** during a segment of their travel ranges. Through this segment of each travel range more work is accomplished with identical fluid input comparing the same travel of the conventional piston.



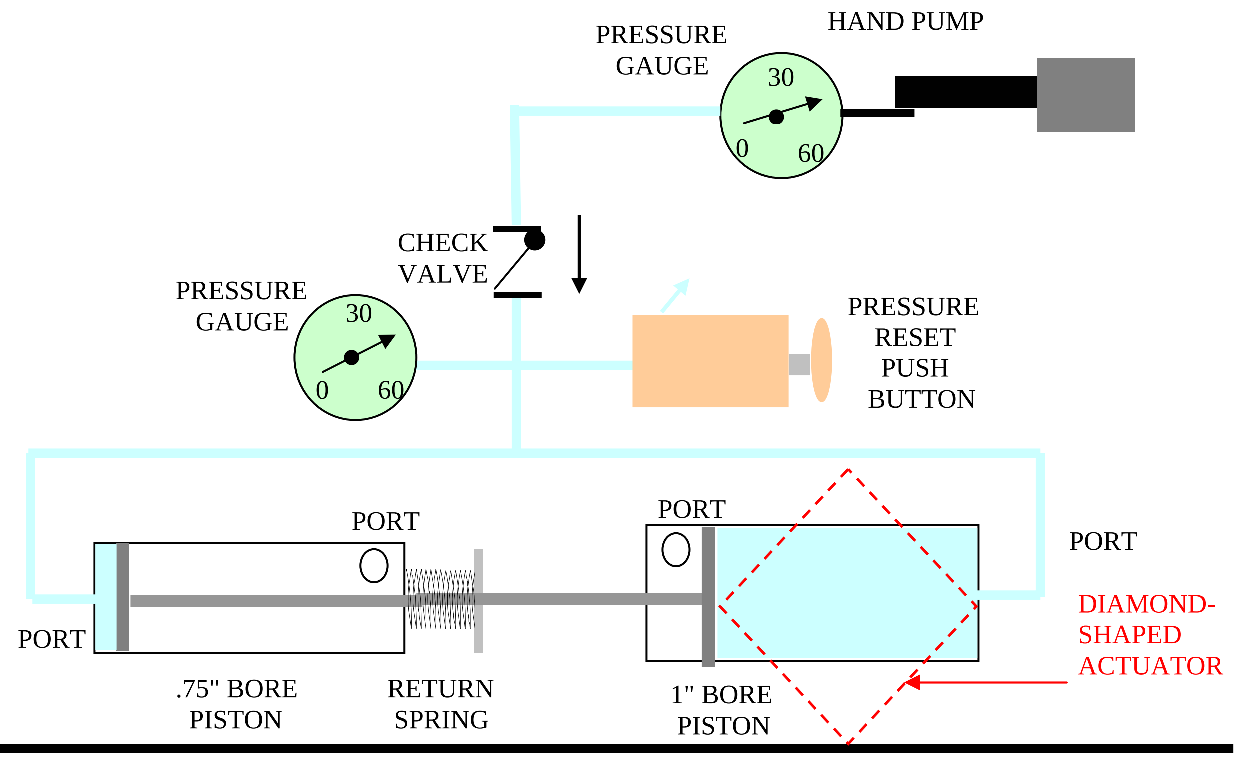
SECTION 3.0
3.1

SET UP APPARATUS AS PER THE UPPER DRAWING

NOTE:
A diamond-shaped actuator is more efficient than a conventional piston; therefore, produces more force, with less fluid, at the same pressure.
This demonstration uses a piston with a larger boundary face illustrating the function of a diamond-shaped actuator.



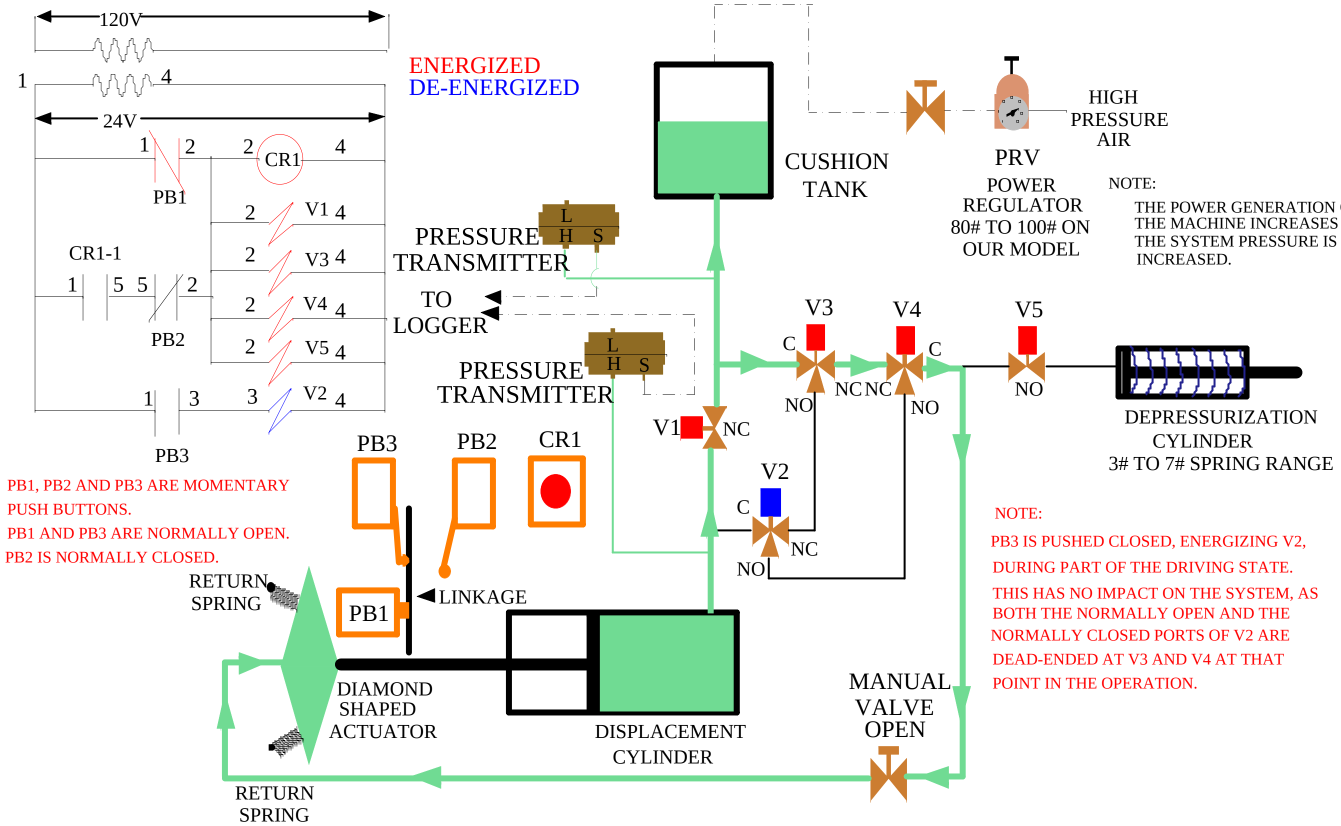
PRESSURIZE THE SYSTEM WITH THE HAND PUMP.



THE MODEL, ARRANGED AS ABOVE, DEMONSTRATES THREE PRINCIPLES.

1) A piston with the larger effective boundary face will force fluid from a piston with a lesser effective boundary face.
2) The piston with the larger effective boundary face feeds itself with fluid from the other piston.
3) The return spring will return the system to the start point when de-pressurized.

NOTE: These principles, combined with the diamond-shaped actuator's efficiency advantage, allowed the development of the hydraulic displacement motor.



DRIVING STATE

The driving state is started when the linkage forces push button (PB1) closed to energize V1, V3, V4, V5 and CR1. The contact of CR1 closes to lock power on these devices when PB1 re-opens as the drive movement starts.

When V1, V3, V4, and V5 are energized the flow pattern is as illustrated on this drawing.

The diamond shaped actuator, the displacement cylinder and the cushion tank experience the same pressure.

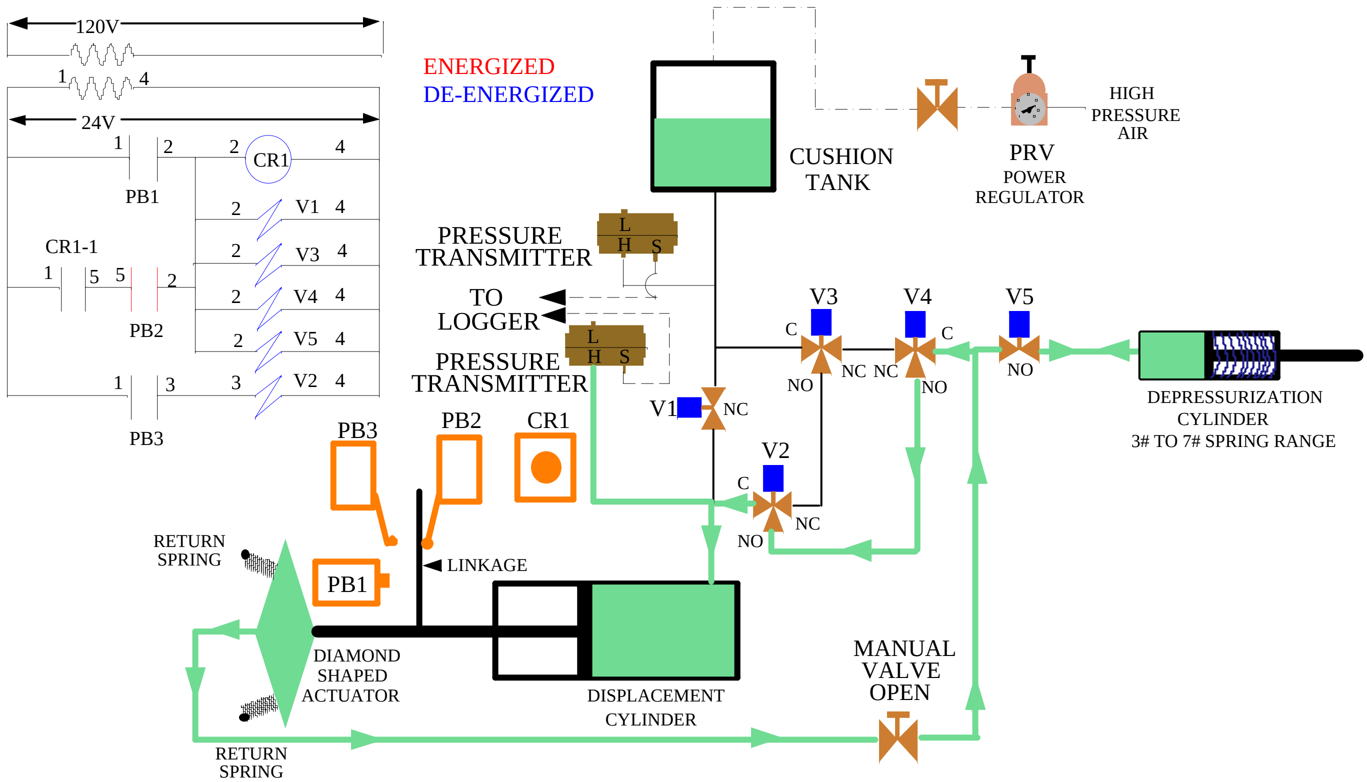
The diamond shaped actuator develops about 10% to 15% greater total force at its tip than the counter force developed in the displacement cylinder.

Each of the four faces of the diamond shaped actuator have the same area as the displacement cylinder's boundary face. This causes more fluid to be driven out of the displacement cylinder than is required to drive the diamond shaped actuator for the same linear travel.

About 99% of the fluid driven out of the displacement cylinder flows to the diamond shaped actuator and about 1% of the fluid flows into the cushion tank.

The differential in force between the diamond shaped actuator and the displacement cylinder may be used to drive any mechanical device external to this machine, such as a generator or pump.

When the linkage forces push button (PB2) open V1, V3, V4, V5 and CR1 are de-energized which causes the driving state to stop.



FIRST RECHARGE CYCLE

The linkage pushes PB2 open, which causes V1, V3, V4, V5 and CR1 to de-energize and the flow pattern illustrated on this drawing is established.

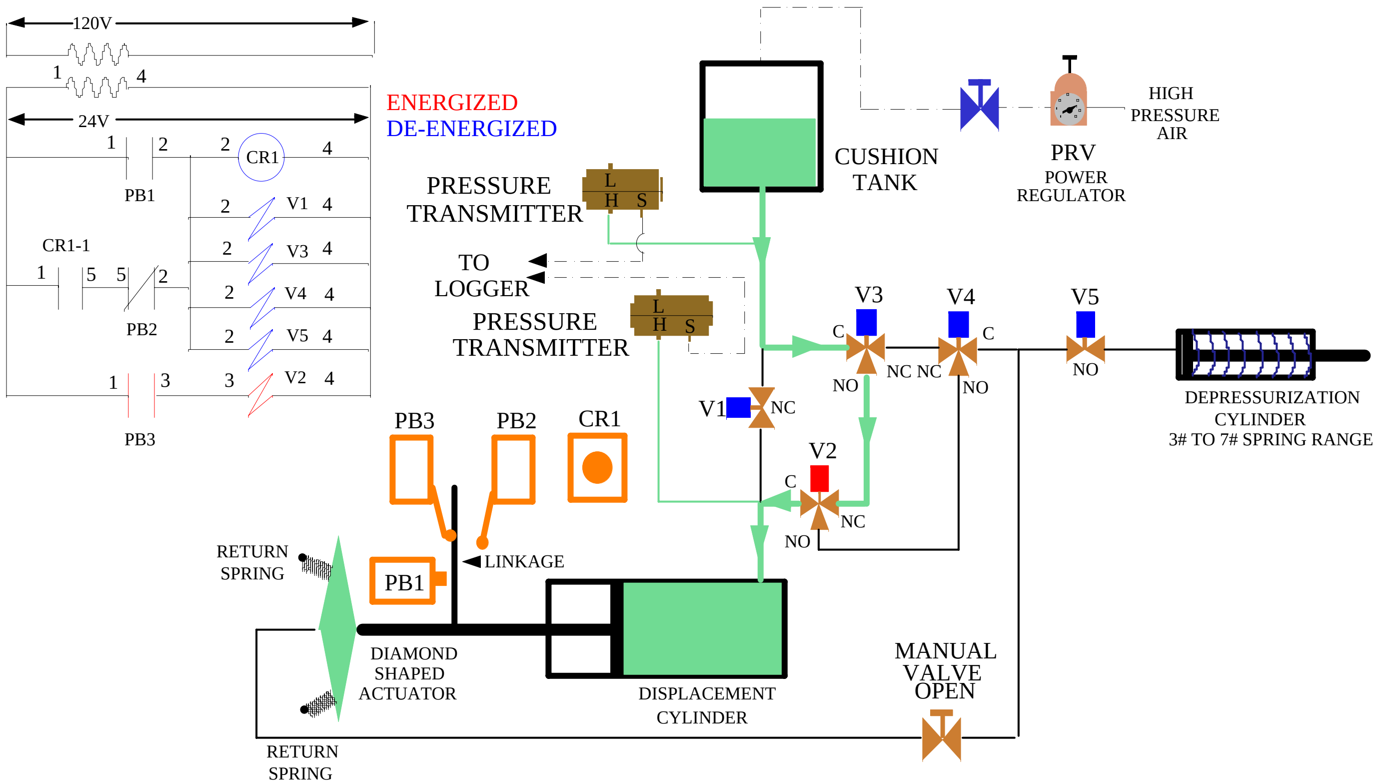
The pressurized cushion tank is isolated.

The diamond shaped actuator, the displacement cylinder and the depressurization cylinder all experience a common pressure.

The depressurization cylinder strokes, which de-pressurizes all three components. This removes the diamond shaped actuator's power advantage over the return springs. The return springs retract to force the fluid in the diamond shaped actuator back into the displacement cylinder.

When the common pressure drops below the spring range of the depressurization cylinder, the fluid is forced into the displacement cylinder from the depressurization cylinder.

When the 99% of the fluid that came out of the displacement cylinder has been returned to the displacement cylinder, the linkage forces push button (PB3) to close which energizes V2.



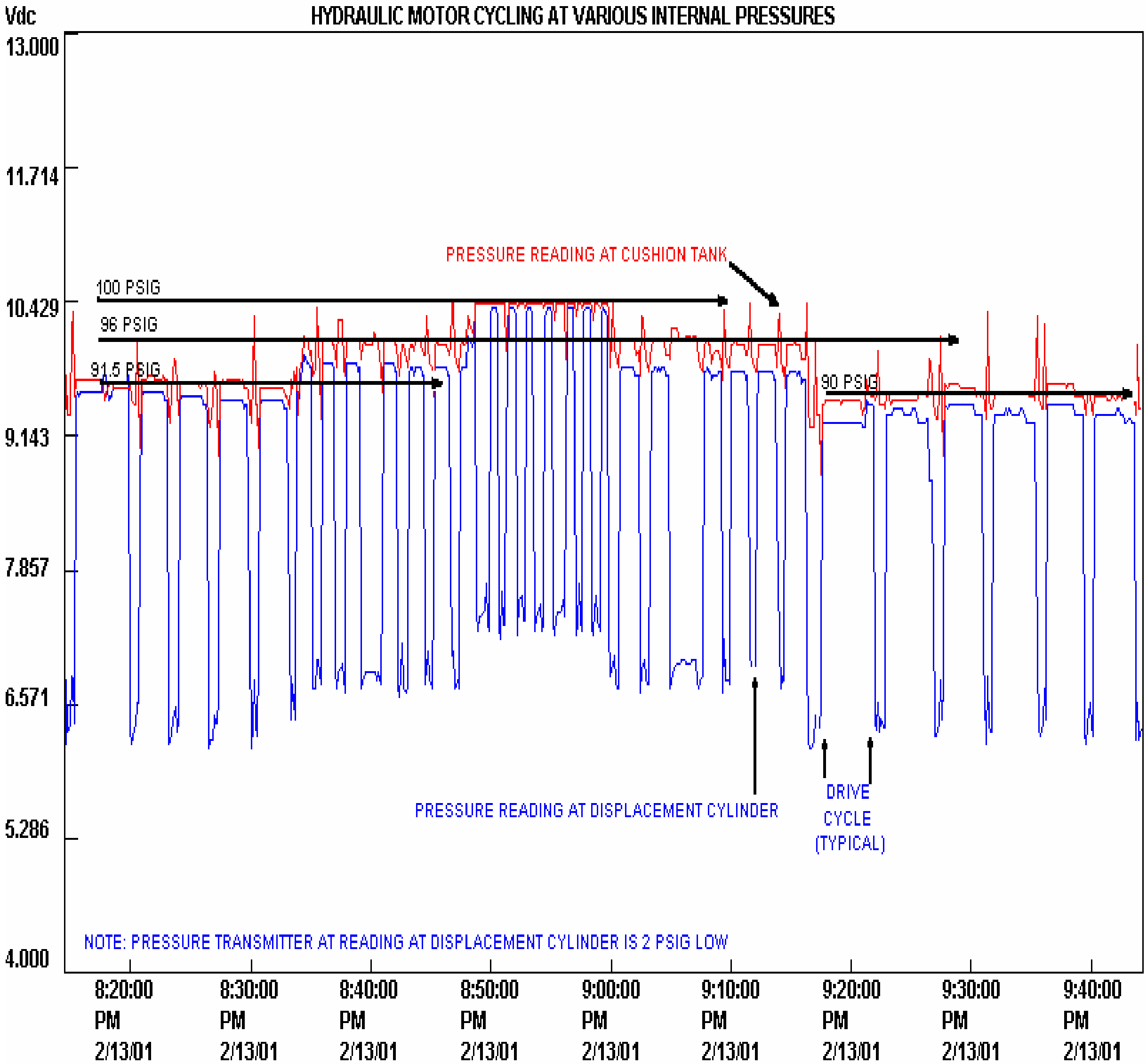
SECOND RECHARGE CYCLE

The linkage pushes PB3 closed to energize V2. This establishes the flow pattern illustrated on this drawing.

The 1% of the fluid that was forced from the displacement cylinder into the cushion tank is forced back into the displacement cylinder from the cushion tank.

When the displacement cylinder is completely refilled, the linkage of the displacement cylinder pushes PB1 closed and the cycle repeats.

NOTE: The linkage is not mechanically connected to the diamond shaped actuator; therefore, there will be a temporary gap between them during the second recharging stage.



Data extracted from motor as per exact layout of drawing 12 in patent application document.