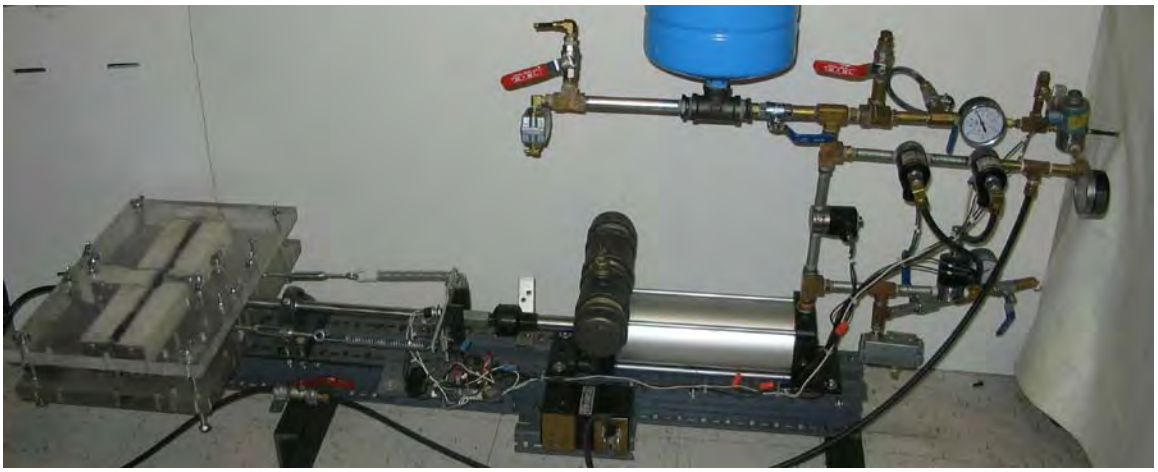
DIAMOND-SHAPED FLUID POWERED LINKAGE, SYSTEM AND ENGINE

TEST MODEL PROVING OPERATION OF THE CONTROL STRATEGY.



USA PATENT # 6,782,800

EUROPEAN PATENT # 1240435

AUSTRIAN PATENT # AT E 280 331 T1

GERMAN PATENT # DE 600 15 181 T2 2005.11.24

UK, IRISH, SWISS, BELGIAN, ITALIAN AND FRENCH PATENT # 1240435

CANADIAN PATENT # CA 2 424 712

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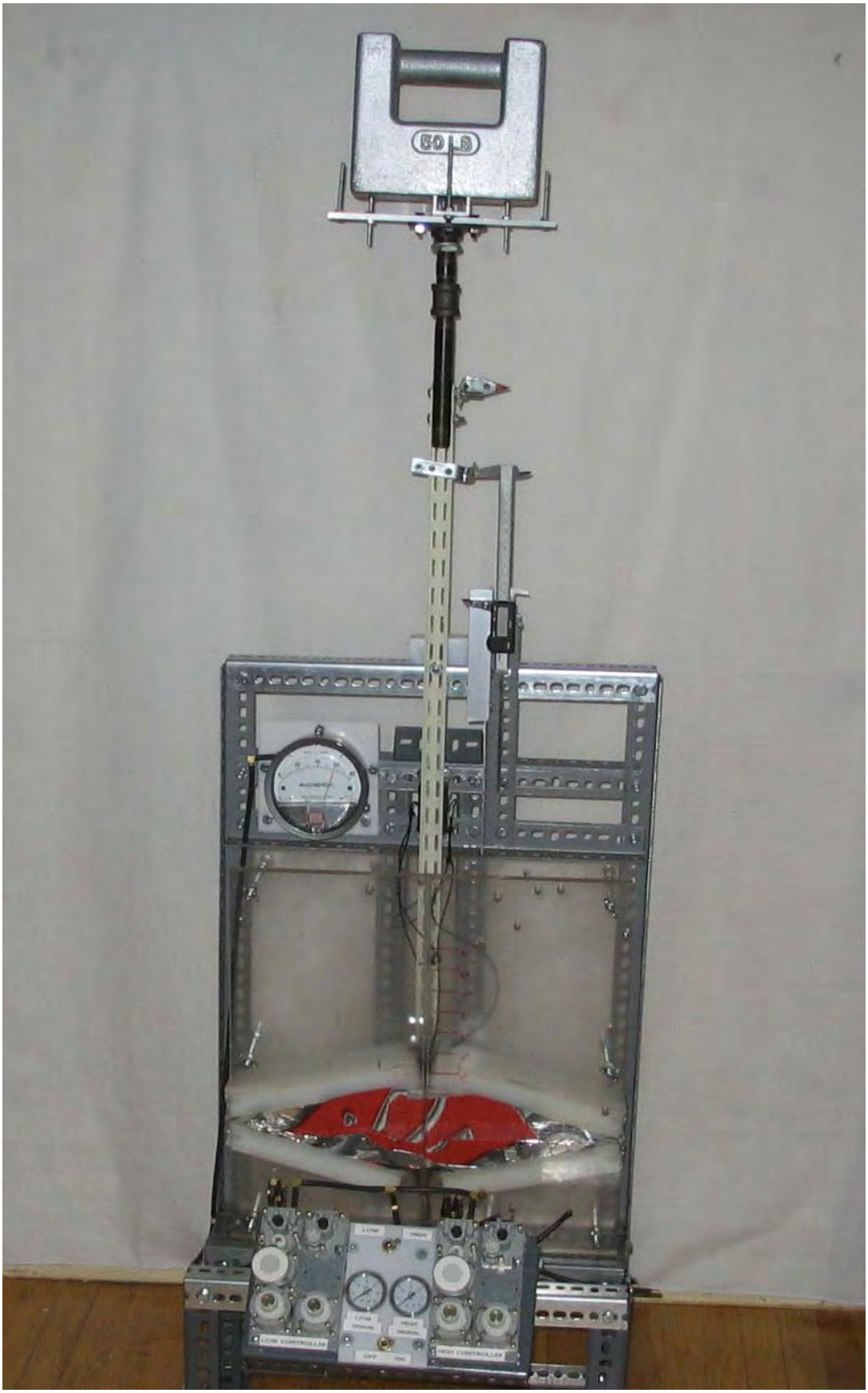
TEST MODEL
PROVING FUNDAMENTAL SCIENCE



EXECUTIVE SUMMARY

The major puzzle pieces, regarding a Global Warming solution, have been registered patents in the US for over a century. The missing component, allowing the creation of a completely clean energy source, was a control logic strategy. A Canadian developed the required control logic from 1971 to 1999, obtaining patents in several countries. We now have at least one tool to assist in the battle against the Global Warming threat.

Three century-old patents, registered in the US Patent Office, presented the design of hydraulic actuators that are more efficient than actuators currently used in modern society. These inventors understood that their actuators achieve more work than conventional actuators when allowed identical fluid inputs.

The three patents are:

- US Patent #147,519 in the year 1874.
- US Patent #345,446 in the year 1886.
- US Patent #696,768 in the year 1901.

A new development, conceived in 1971, was first filed as a patent application in 1999. This application made the step of fitting the century old knowledge into a practical solution regarding a clean energy source. The inventor was awarded patents in the USA, UK, Irish, Belgian, German, Austrian, French, Italian, Swiss and Canadian patent offices.

The current patents pit the work potential of the conventional actuator against the work potential of the Diamond-Shaped Actuator. The Diamond-Shaped Actuator won, as it produces more force through identical travel. As the diamond-shaped actuator pushed the conventional actuator, the volume of fluid required by the Diamond-Shaped Actuator was forced from the conventional actuator. After the Diamond-Shaped actuator produced its own source of fluid from the conventional actuator, there was surplus work potential in the Diamond-Shaped actuator's stroke.

The fundamental science was known 130 years ago. The new development provided a mechanical/control system, creating a machine that runs itself, while allowing extraction of the work differential.

This invention is intended to add to the total effort addressing the Global Warming Threat.

Unfortunately, during the 1800's, early inventors were very close; however, did not see this functional application. If they had, the world would likely be much cleaner now.

REPORT GUIDE

-1- What is the topic of this report?
A solution to global warming. Page four gives some history and an overview.

-2- Has this science been reviewed by scientists?
Many scientists and Engineers have assessed the invention finding nothing incorrect with the claims. It has granted patents in Europe and North America.

-3- What is a conventional actuator?
Page 5 and 6 illustrate a conventional actuator (hydraulic piston).

-4- What is a diamond-shaped actuator?
Pages 7 and 8 illustrate a diamond-shaped actuator.

-5- What were the patented actuators from 1874, 1886 and 1901?
Page 9 illustrates the concept of these actuators.

-6- What is meant by volume displacement regarding actuators?
Page 10 illustrates this concept.

-7-Which type of actuator has greater volume change through identical travel?
Page 11 illustrates this point.

-8- Which type of actuator produces more power through identical travel?
Page 12 illustrates this point.

-9- How does the diamond-shaped actuator provide its own source of pressurized fluid?
Page 13 illustrates this point.

-10- How does surplus power develop when using a diamond-shaped actuator with a conventional actuator, but not with two conventional actuators?
Page 14 illustrates this point.

-11- How did these century old facts allow development of a machine to generate energy?
Pages 15, 16 and 17 illustrate the machine's flow patterns and circuitry.

-12- Can the machine's speed and power output be controlled?
Page 18 is a graph illustrating the relationship of system static pressure to power output and speed.

DIAMOND-SHAPED FLUID POWERED LINKAGE, SYSTEM AND ENGINE

The Diamond-shaped Fluid Powered Linkage, System and Engine patent application was first filed in 1999 in the USA as a provisional patent application. The patent process took it through the Patent Co-operation Treaty (PCT**),** via the European Patent Office, where it gained general international approval. The next steps gained patent approval in the USA under patent number 6,782,800 and approval in Europe under the European patent number 1240435. Patents were granted in Ireland, the UK, Belgium, France, Switzerland and Italy using the European patent number 1240435 as reference in those countries. The patent was granted in Austria under patent number AT E 280 331 T1 and in Germany under patent number DE 600 15 181 T2 2005.11.24. The Canadian Patent Office assigned number CA 2 424 712 to the Canadian patent.

The operation of the Diamond-Shaped Fluid Powered Linkage, System and Engine challenges one of the most accepted concepts in the human scientific knowledge base. "Energy can not be created or destroyed." The fathers of the "laws", declaring the physical results of this invention impossible, did not have the benefit of our current materials and precise test equipment that allowed a more in depth understanding, regarding their claims.

The holder of these patents does not believe that energy is truly understood by our collective human knowledge. The definitions witnessed define energy by what it can do, but do not state what it is.

Declaring anything "impossible", with the knowledge we have accumulated to date, clearly states that for all eternity humanity will not surpass our current level of practical knowledge regarding the matter at hand. That is a lot of confidence, if not arrogance. We have to truly keep open minds if we hope to move forward effectively.

I request that you think your way through this assessment, rather than react based on your belief system. Every point is scientifically supportable, challenge it with logical thinking.

The primary concepts regarding the invention are:

-1- If two unequal forces oppose one another, the stronger force will over-power the weaker force until equilibrium is reached.
-2- If a hydraulic actuator is full of fluid causing its shaft to be extended, the fluid can be forced back out of the actuator by applying force to the shaft greater than the counter force applied by the fluid that fills the actuator.
-3- Conventional cylindrical actuators, currently employed in hydraulics, are less efficient than other patented actuators. The alternate actuators were patented by Terence F. Reilley in 1874 under US patent number 147,519, Titus Powers in 1886 under US patent number 345,446, Frank H. Sleeper in 1901 under US patent number 696,768 and myself, David Strain, in 1999 under the patent numbers outlined in the first paragraph on this page.

This paper walks you through the century old fundamental science and illustrates a control circuit regarding one potential Global Warming Solution.

CONVENTIONAL ACTUATOR

The shaft is extended on the actuator in this picture. The two fluid ports are visible on the two black ends of the actuator.

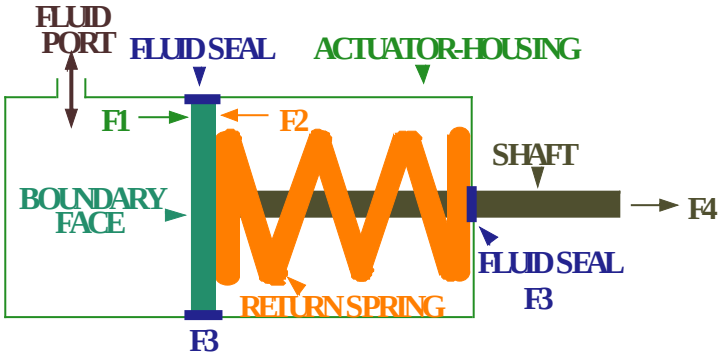
CONVENTIONAL ACTUATOR DISASSEMBLED

The shaft and boundary face assembly (1) is at the front of the photograph.
The black seals (2) around the boundary faceplate that separate the two sides of the actuator are visible.
The black end caps (3) and two of the four assembly rods (4) are present.
The body of the actuator (5) is the hollow tube where the boundary faceplate slides back and forth.

ACTUATORS WITH SPRING RETURN

Fluid actuators produce work via the movement of their shafts caused by fluid exerting pressure on the actuator's boundary face.

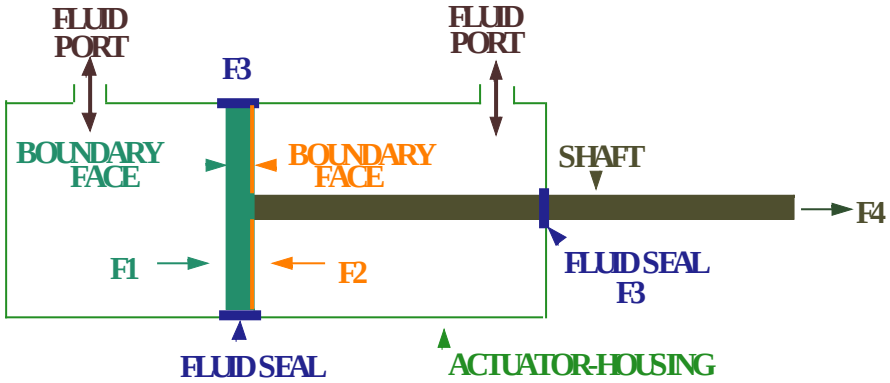
The potential work available at any point in the travel is the pressure of the fluid multiplied by the area of the boundary face, minus the counter force of the return spring, minus the frictional resistance of the actuator.



FORCE ONE (F1) = FLUID PRESSURE TIMES THE AREA OF BOUNDARY FACE
FORCE TWO (F2) = SPRING EFFORT TO RETURN TO REST POSITION
FORCE THREE (F3) = THE FRICTIONAL RESISTANCE OF THE ACTUATOR
ACTUATOR NET FORCE (F4) = F1 - F2 - F3

ACTUATORS WITH NO SPRING RETURN

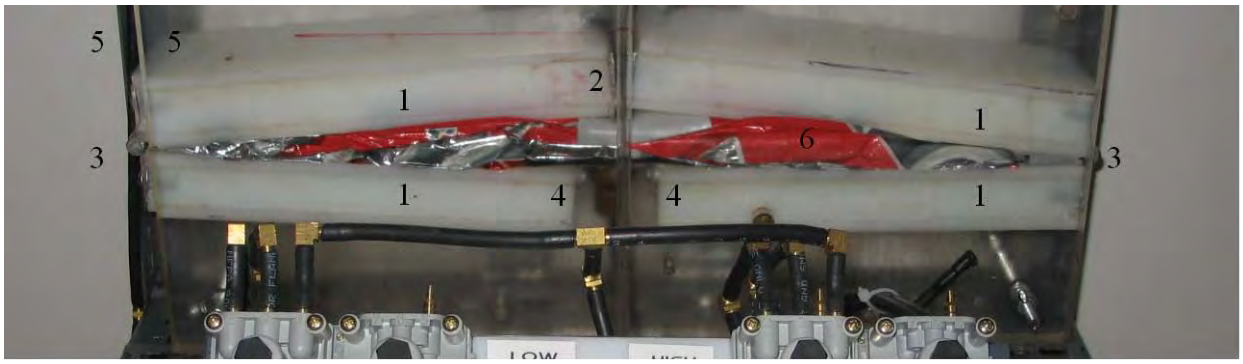
Double drive actuators do not have spring return. The work potential is based on the pressures of the fluid applied to the two opposing boundary faces generating forces (F1) and (F2), as well as the frictional resistance of the actuator (F3).



FORCE ONE (F1) = FLUID PRESSURE TIMES THE AREA OF BOUNDARY FACE
FORCE TWO (F2) = FLUID PRESSURE TIMES THE AREA OF BOUNDARY FACE
FORCE THREE (F3) = THE FRICTIONAL RESISTANCE OF THE ACTUATOR
ACTUATOR NET FORCE (F4) = F1 - F2 - F3

DIAMOND-SHAPED ACTUATOR IN NON-DRIVEN POSITION

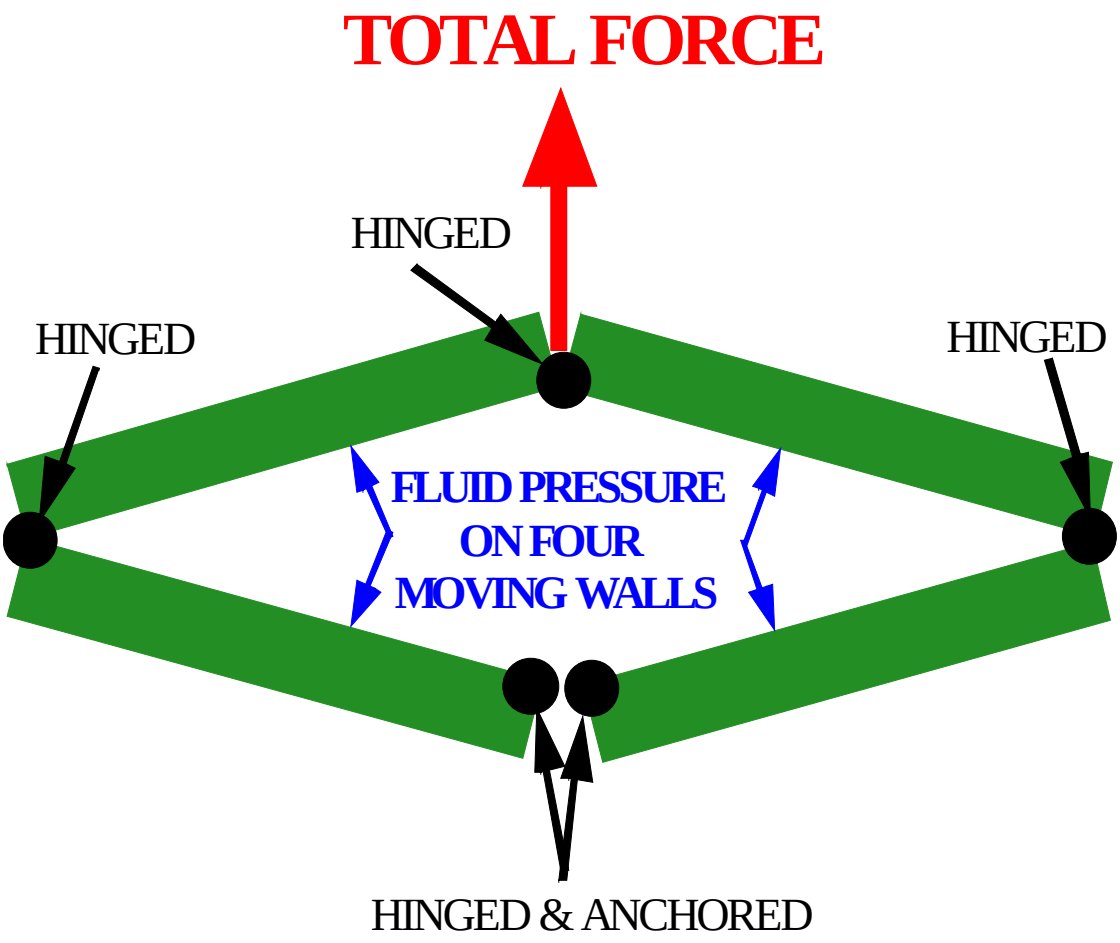
This photo shows our test model of the diamond-shaped actuator.
The four white walls (1) are hinged at the upper connection (2) and the two outside connections (3).
The lower white walls are hinged separately and anchored at the lower mid point (4).
The walls are enclosed by two large pieces of plexiglass (5) allowing the four walls to move inside.
The coloured diaphragm (6) contains the fluid, preventing leaks.



DIAMOND-SHAPED ACTUATOR IN DRIVEN POSITION

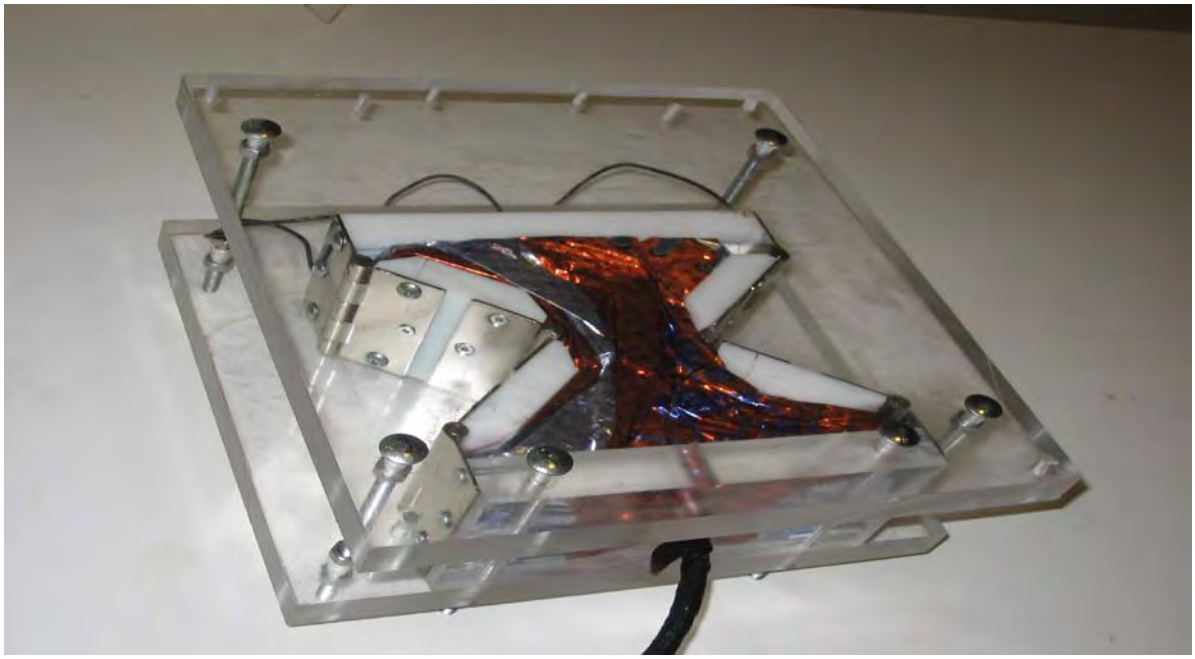
This photo shows the diamond-shaped actuator driven.
The force created by the pressure applied to the four moving walls is totaled at the upper hinge.

DIAMOND-SHAPED ACTUATOR DESIGN CREDITED IN 2002 & 2004 IN USA AND EUROPEAN PATENTS.



ACTUATOR CONCEPTS FROM 1873 AND 1886

Mr. Terence F. Reilley patented the actuator concept presented in the photograph in 1873. Mr. Titus Powers's patent of 1886 employed the same basic concept. Unaware of the earlier inventions, I developed the same actuator between 1971 and 1999, but was informed in 2002, by the US patent office, that I was only late by 127 years, as they referenced Mr. Reilley's and Mr. Power's patents.



ACTUATOR CONCEPT FROM 1901

Mr. Frank H. Sleeper patented the actuator concept in the photograph below in 1901. I developed the actuator in the photograph below between 1971 and 1999. I used linear motion bearings and rails where Mr. Sleeper used a different mechanism allowing for the lengthening of the walls on the forward drive. In 2002 the US patent office made me first aware of Mr. Sleeper's patent. I was a little more up to date with this one, only ninety-seven years too late.

VOLUME DISPLACEMENT

Start with a conventional actuator as in "FIGURE 1".

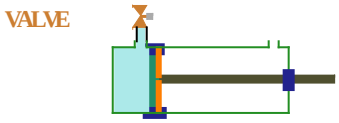


FIGURE 1

Connect a pressurized fluid source to the valve attached to the fluid port of the actuator in "FIGURE 2". Open the valve to fill the actuator and close the valve when a 20 in^3 volume change occurs. The shaft drives out exerting a force dependent on the pressure of the fluid.

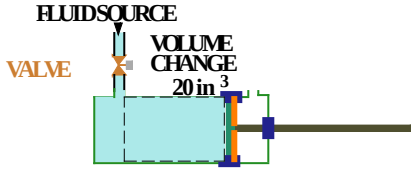


FIGURE 2

Disconnect the fluid supply and connect a balloon to the valve attached to the fluid port of the actuator as in "FIGURE 3". Re-open the valve.

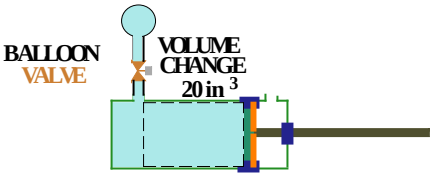


FIGURE 3

Push on the shaft, forcing it back to its position before you first added the fluid supply as in "FIGURE 4".

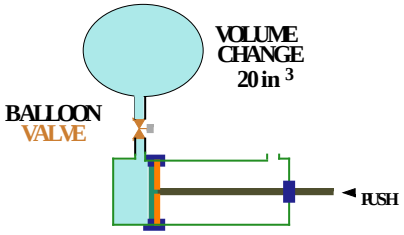


FIGURE 4

Identical volume change occurs, whether filling an actuator or emptying an actuator, for equal linear travel.

VOLUME CHANGE COMPARISON

A conventional actuator and a diamond-shaped actuator are arranged as per "FIGURE 5". The conventional actuator's boundary face area is the same as the area of each of the four equal sides of the diamond-shaped actuator. The valve is closed.

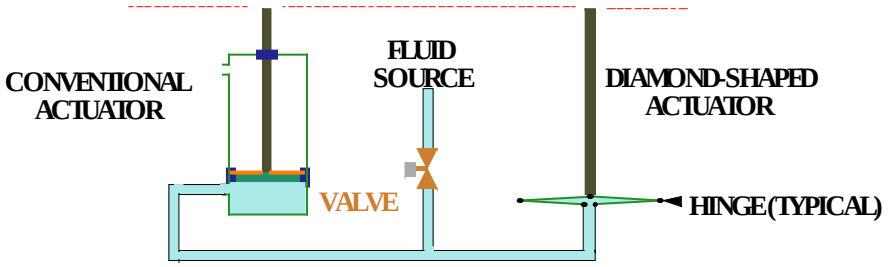


FIGURE 5

The valve is opened causing both the actuators to drive equal distances as per "FIGURE 6".
The relationship is linear regarding the volume change relative to travel for the conventional actuator.
The relationship is non-linear regarding the volume change relative to travel for the diamond-shaped actuator.
For any change in linear travel the diamond-shaped actuator requires less fluid than the conventional actuator achieving identical travels.

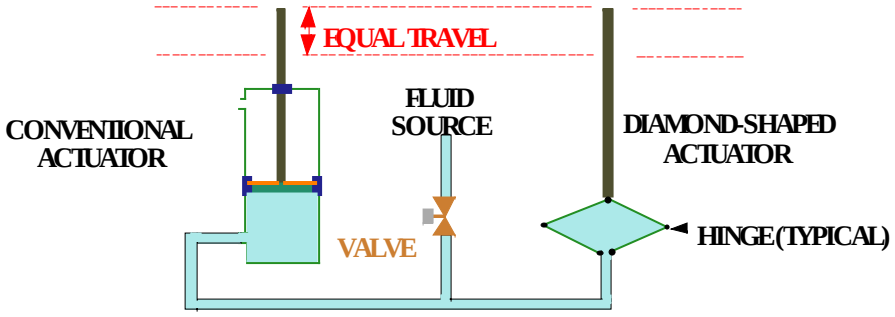


FIGURE 6

POWER COMPARISON

A conventional actuator and a diamond-shaped actuator are arranged as per "FIGURE 7". The conventional actuator's boundary face area is the same as the area of each of the four equal sides of the diamond-shaped actuator. The valve is closed.

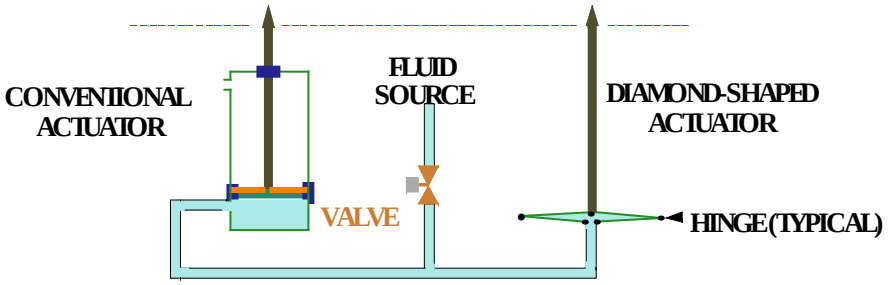


FIGURE 7

Open the valve, driving both actuators with the common source of pressurized fluid as per "FIGURE 8".
The driving force on the conventional actuator is the result of the fluid pressure on the one moving boundary face times the boundary face area.
The driving force at the tip of the diamond-shaped actuator is the effect of the combined force on the four moving walls of the actuator.

We determined the equilibrium point for our diamond-shaped model. This is the point the actuator is able to suspend a weight with neither rising nor lowering. The best our model has demonstrated in actual testing is a 26% advantage over a conventional actuator.

NOTE: The diamond-shaped actuator requires less fluid achieving the same degree of lift with 26% more load.

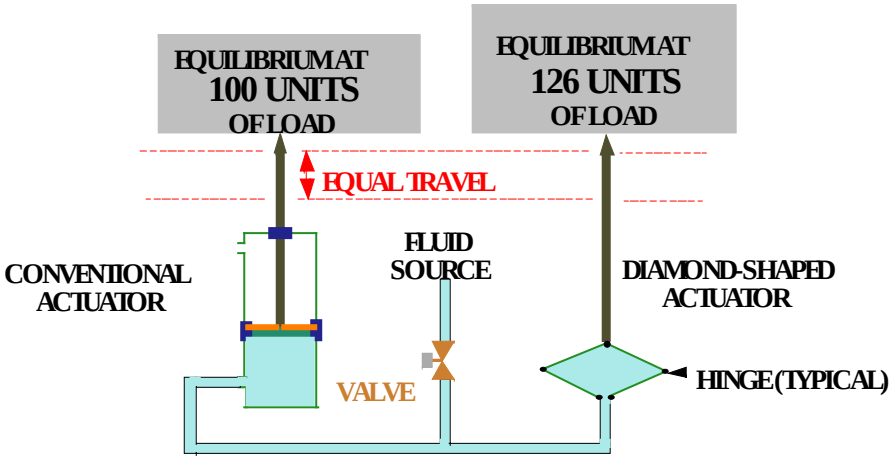


FIGURE 8

POWER/VOLUME RELATIONSHIP

A conventional actuator and a diamond-shaped actuator are arranged as per "FIGURE 9".
The conventional actuator's boundary face area is the same as the area of each of the four equal sides of the diamond-shaped actuator. The valve is closed.

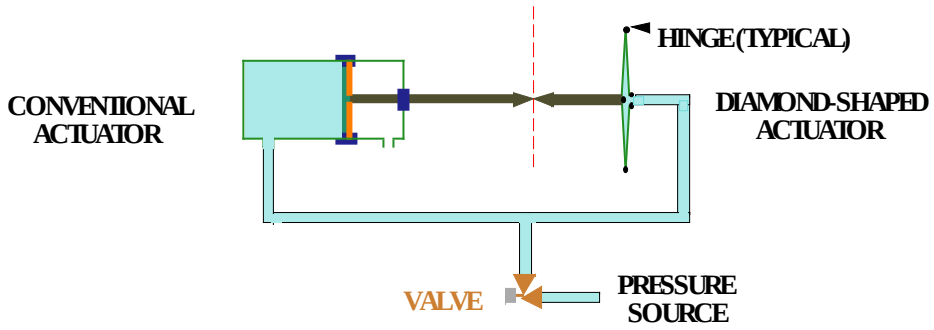


FIGURE 9

Open the valve, exposing both actuators to the common pressure source, as per "FIGURE 10".
The driving force of the conventional actuator is the result of the fluid pressure on the one moving boundary face times the boundary face area.
The driving force at the tip of the diamond-shaped actuator is the effect of the combined force on the four moving walls of the actuator.
The diamond-shaped actuator develops more force than the conventional actuator; therefore, drives forward, forcing fluid from the conventional actuator.
The volume of fluid forced from the conventional actuator is slightly more than the diamond-shaped actuator requires achieving this action.
The diamond-shaped actuator displaces a greater volume of fluid from the conventional actuator than the volume of fluid it requires for the same length of stroke, causing a slight flow of fluid toward the pressure source.
The diamond-shaped actuator sustains a surplus of work potential after it has produced its own source of pressurized fluid for the action.

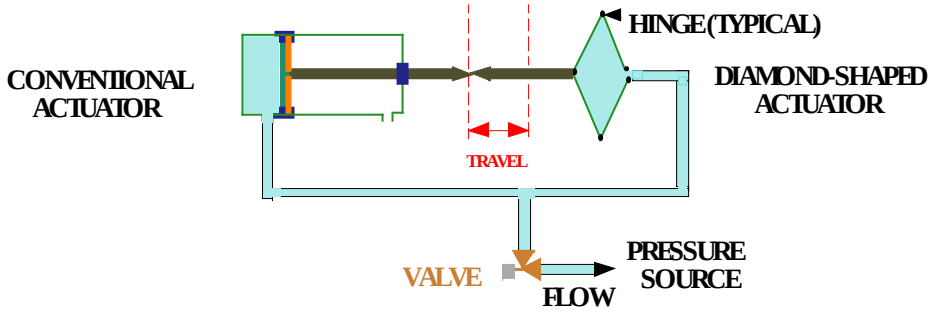
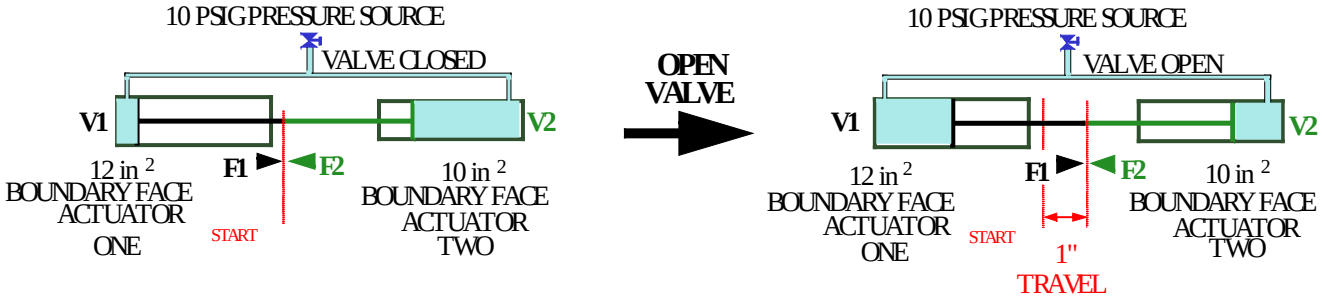


FIGURE 10

ACTUATOR COMPARISON

SCENARIO ONE



VOLUME ONE (V1) CHANGE = 12 CUBIC INCHES

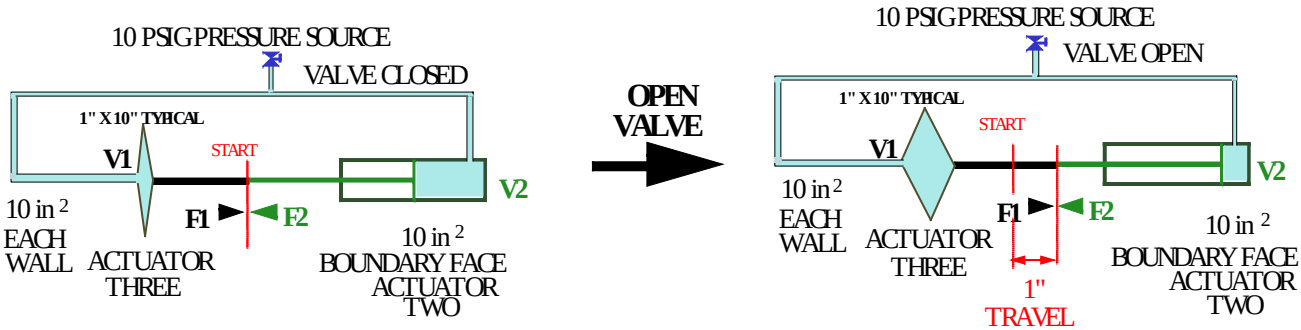
VOLUME TWO (V2) CHANGE = 10 CUBIC INCHES

FORCE ONE (F1) = 120 POUNDS

FORCE TWO (F2) = 100 POUNDS

TRAVEL IS EQUAL FOR BOTH ACTUATORS.

SCENARIO TWO



VOLUME ONE (V1) CHANGE = 9.99 CUBIC INCHES

VOLUME TWO (V2) CHANGE = 10 CUBIC INCHES

FORCE ONE (F1) = 120 POUNDS

FORCE TWO (F2) = 100 POUNDS

TRAVEL IS EQUAL FOR BOTH ACTUATORS.

COMPARISON

-1- Actuators one and three displace 10 in³ of fluid from actuator two during these actions.

-2- Actuators one and three each exert a 120 pounds of force against the 100-pound counter force of actuator two.

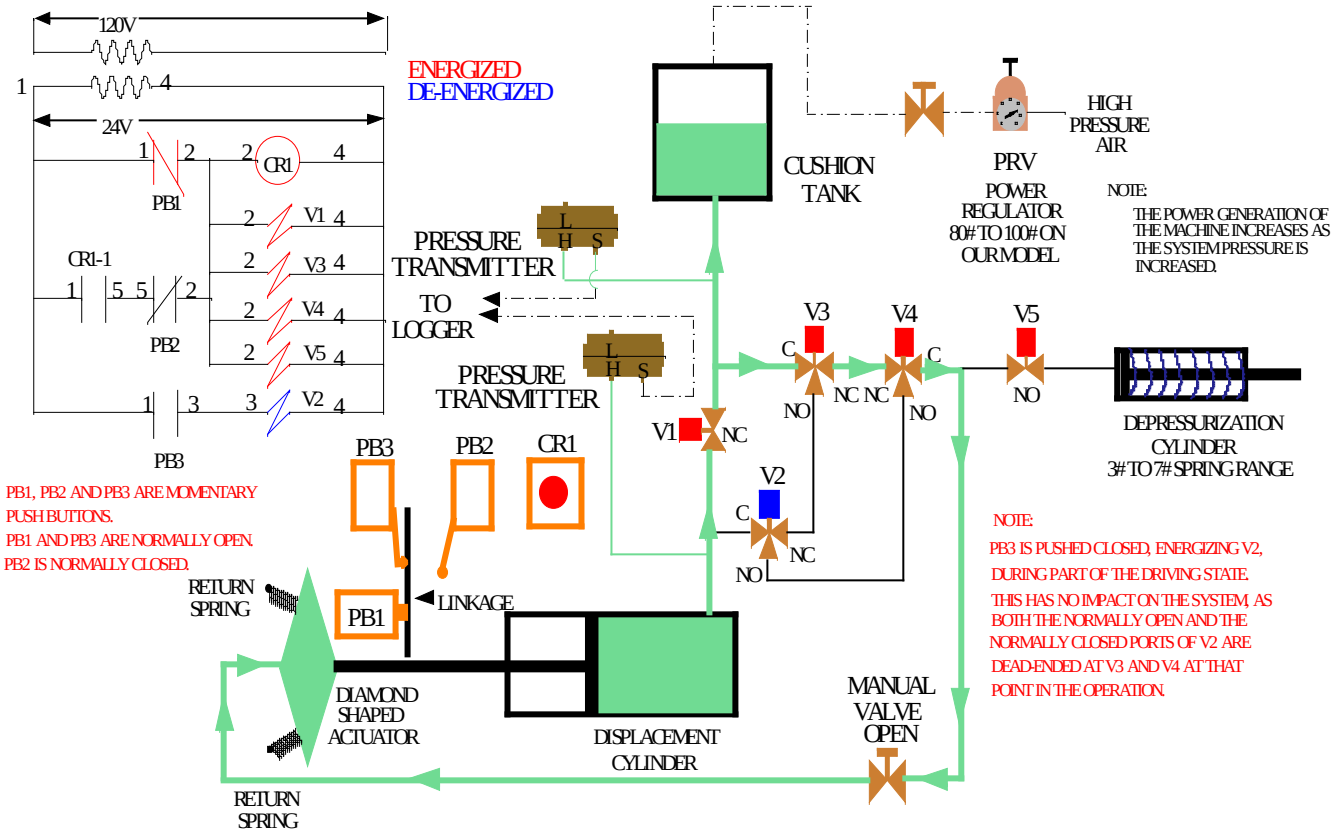
-3- Actuator one requires **20% more fluid** than the volume displaced from actuator two during this action.

-4- Actuator three requires **.01% less fluid** than the volume displaced from actuator two during this action.

-5- Actuator one can not satisfy its fluid volume requirement with the displaced fluid of actuator two.

-6- Actuator three can satisfy its total fluid volume requirement with the displaced fluid of actuator two.

-7- Part of actuator three's 20% surplus power must over come frictional losses and the remaining power can generate FREE ENERGY.



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.

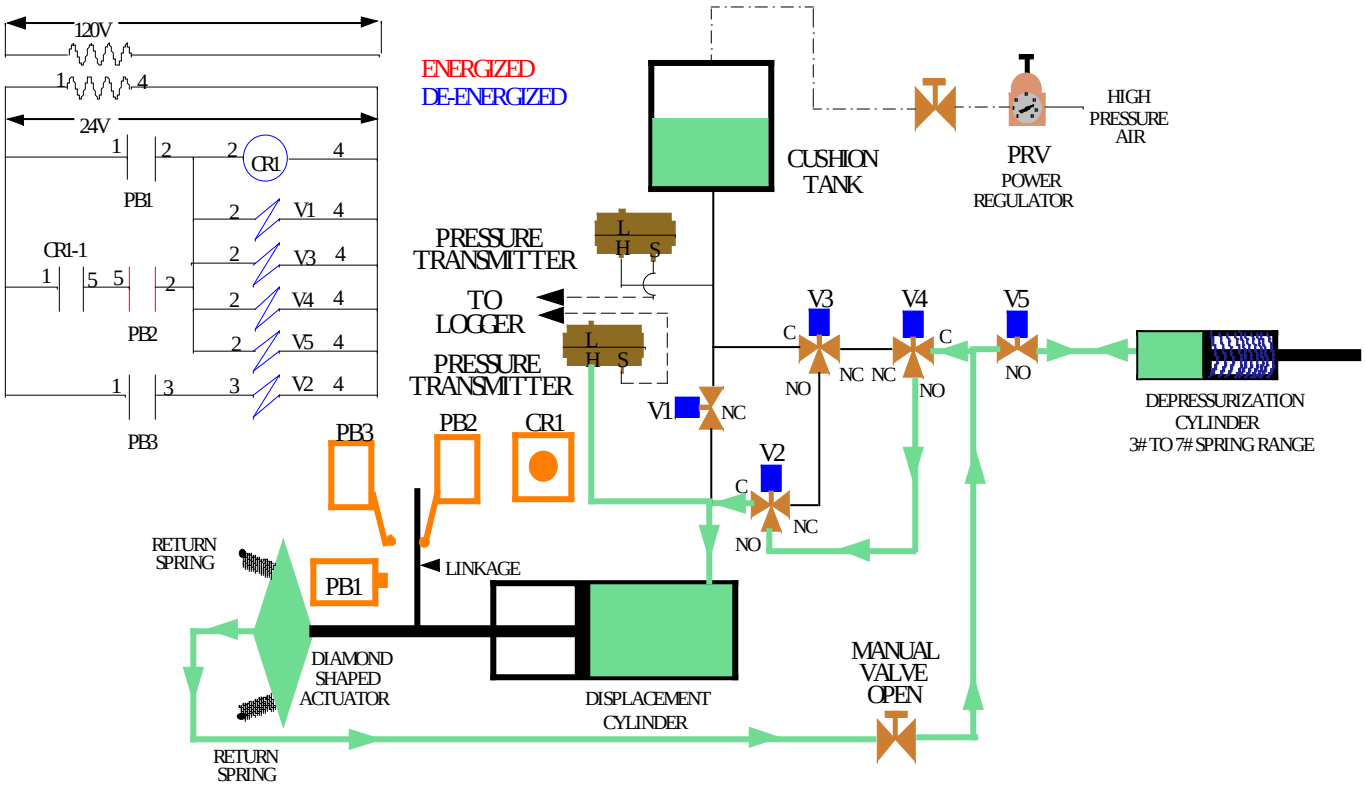
The diamond shaped actuator develops about 10% to 15% greater total force at its tip than the counter force developed in the displacement cylinder.

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.

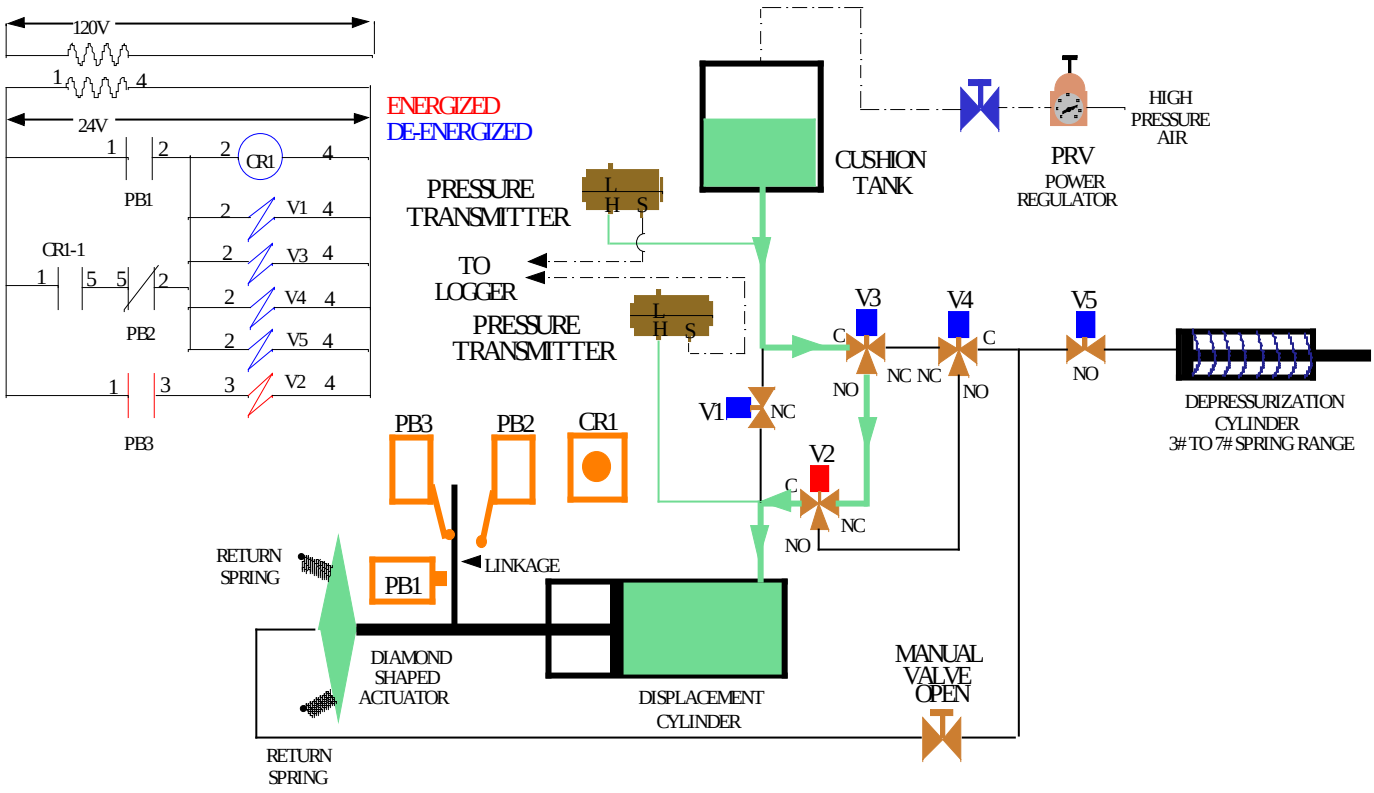
The pressurized cushion tank is isolated.

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.



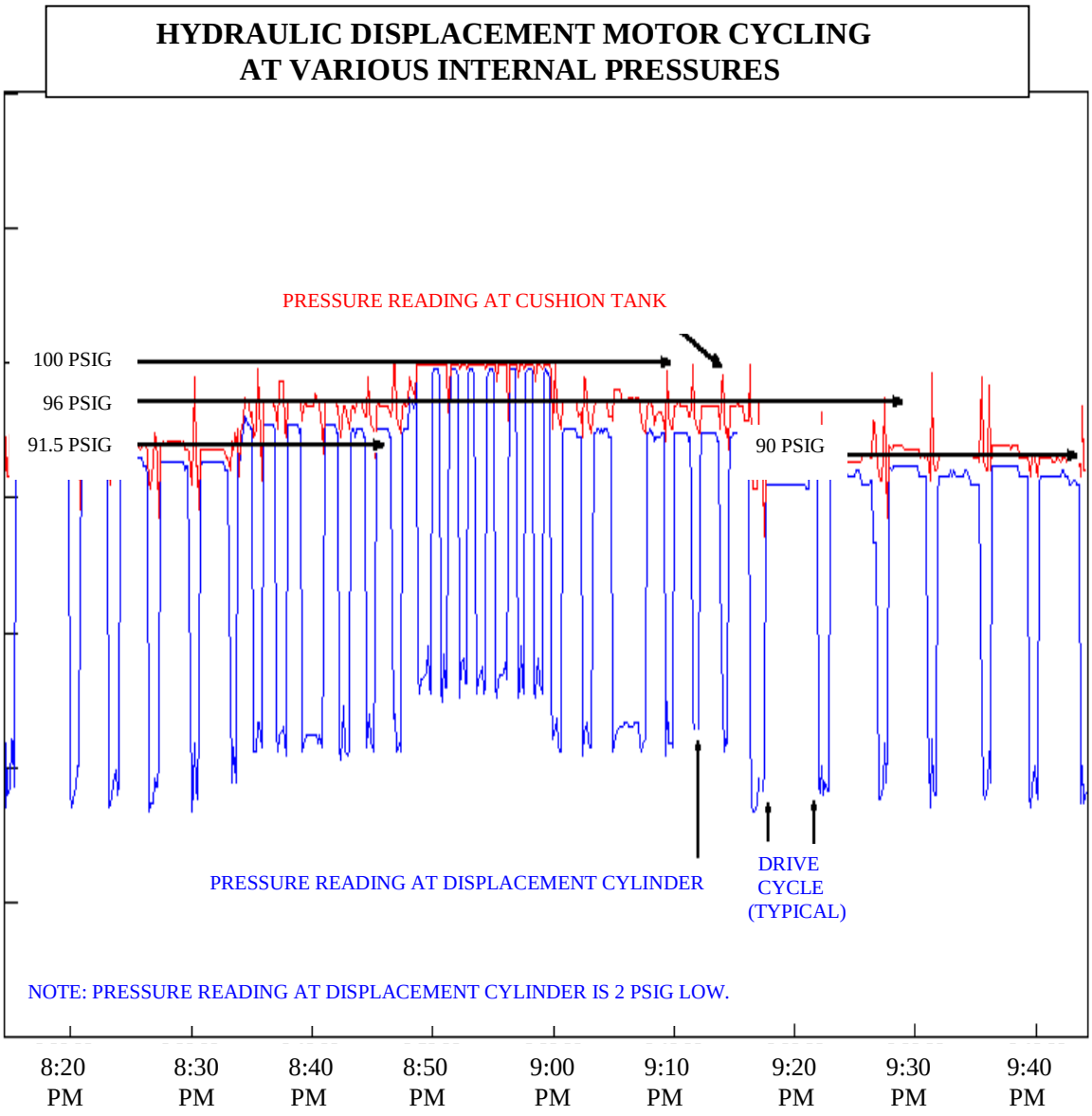
SECOND RECHARGE CYCLE

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 was collected at transmitter points illustrated on the previous drawings on pages 15, 16 and 17.
Data extracted from motor as per exact layout of drawing 12 in patent application document.