CLAIMS:

1. A system comprising:

a spring-loaded hydraulic pressure regulator having a maximum deadband of less than 200 pounds per square inch when coupled to a source of pressurized fluid having a supply pressure of at least 1000 pounds per square inch, the spring-loaded hydraulic pressure regulator ~~including~~comprising:

a housing having first and second inner chambers;

a spring disposed within the second inner chamber;

a single sensing piston disposed within the housing and responsive to pressure within the first inner chamber and to a biasing force generated by the spring; and

at least one ~~a~~ supply seal ring disposed within the first inner chamber.

2. The system of claim 1, wherein the maximum deadband of the spring-loaded hydraulic pressure regulator is less than 120 pounds per square inch for a supply pressure of 3000 pounds per square inch.

3. The system of claim 1, wherein the average deadband of the spring-loaded hydraulic pressure regulator is less than 100 pounds per square inch for a supply pressure of 3000 pounds per square inch.

4. The system of claim 1, wherein the average deadband of the spring-loaded hydraulic pressure regulator is less than 130 pounds per square inch for a supply pressure of 5000 pounds per square inch.

5. The system of claim 1, wherein an output pressure of the spring-loaded hydraulic pressure regulator is manually adjustable.

6. The system of claim 1, comprising an adjustment mechanism with a rotatable screw that enables ~~enabling~~ manual adjustment of compression of the spring disposed within the second inner chamber.

7. The system of claim 1, comprising a blowout preventer and an associated control system that includes the spring-loaded hydraulic pressure regulator.

~~8. The system of claim 1, wherein the sensing piston includes only a single sensing piston.~~

8~~9~~. The system of claim 1, comprising the source of pressurized fluid.

9~~10~~. A device comprising:

a spring-loaded hydraulic pressure regulator including:

a housing having a first chamber for receiving a pressurized fluid and a second chamber separated from the first chamber by a dividing structure;

a single piston disposed in the first chamber, the piston including a portion extending into the second chamber through an aperture in the dividing structure;

a spring disposed in the second chamber and positioned to bias the piston into the first chamber;

a plurality of supply seal rings disposed within the first chamber and configured to selectively allow the pressurized fluid to enter the first chamber;

wherein the ratio of a diameter of the portion of the piston extending through the aperture in the dividing structure to the sum of the diameters of the plurality of supply seal rings is greater than 0.50 to reduce deadband and increase sensitivity of the spring-loaded hydraulic pressure regulator.

10~~11~~. The device of claim 9~~10~~, wherein the ratio of the diameter of the portion of the piston extending through the aperture in the dividing structure to the sum of the diameters of the plurality of supply seal rings is greater than 0.65 to reduce deadband and increase sensitivity of the spring-loaded hydraulic pressure regulator.

11~~12~~. The device of claim 9~~10~~, comprising a plurality of supply seal plates with apertures to facilitate flow of the pressurized fluid into the first chamber.

12~~13~~. The device of claim 11~~12~~, wherein the apertures are arcuate apertures having opposing sides with the same direction of concavity.

13~~14~~. The device of claim 11~~12~~, wherein the spring-loaded hydraulic pressure regulator includes only two supply seal rings.

14~~15~~. The device of claim 9~~10~~, wherein each of the supply seal rings of the plurality of supply seal rings is disposed within an aperture that extends through the piston.

15~~16~~. The device of claim 9~~10~~, wherein the spring-loaded hydraulic pressure regulator includes a plurality of vent seal rings.

16~~17~~. The device of claim 15~~16~~, comprising a plurality of vent seal plates having apertures to facilitate venting of the pressurized fluid out of the first chamber if the pressure of the pressurized fluid exceeds a threshold level.

17~~18~~. The device of claim 9~~10~~, wherein the spring-loaded hydraulic pressure regulator includes a plurality of springs disposed in the second chamber positioned to bias the piston into the first chamber.

18~~19~~. A method comprising:

receiving a fluid within a chamber of a pressure regulator, wherein the pressure regulator is a spring-loaded~~,~~ hydraulic pressure regulator that includes a manual adjustment mechanism with a rotatable screw;

translating rotation of the screw into axial movement of a plunger of the manual adjustment mechanism to change a biasing force applied to a piston in the pressure regulator by a spring; and

moving the piston in response to rotation of the screw through multiple revolutions and to the resulting changes in the biasing force such that the piston moves and an output pressure of the pressure regulator changes during each revolution of the screw;

wherein the spring-loaded hydraulic pressure regulator has a maximum deadband of less than 200 pounds per square inch when coupled to a source of pressurized fluid having a supply pressure of at least 1000 pounds per square inch.

19~~20~~. The method of claim 18~~19~~, wherein receiving the fluid includes receiving the fluid pressurized to about 3000 pounds per square inch.

20~~21~~. The method of claim 19~~20~~, wherein receiving the fluid includes receiving the fluid pressurized to about 5000 pounds per square inch.

21. The device of claim 9, comprising a manual adjustment mechanism with a rotatable screw that enables manual adjustment of compression of the spring disposed within the second chamber.

22. The device of claim 9, wherein the piston forms an annular ring between the two supply seal rings.