

## A Device, System and Method for Hydraulic Pressure Testing

### 5 FIELD OF INVENTION

The present invention relates broadly to a Precision Pressure-Hydraulic Adjuster, to a system for hydraulic pressure testing, and to a method of for hydraulic testing.

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### BACKGROUND

In hydraulic static pressure testing, test equipment must often be able to provide a wide range of pressure levels. Some test regimens also require very fine adjustments in pressure levels, for example  $\pm 0.01\%$  at 15 10,000 PSI (Pounds Per Square Inch). In order for pressure tests to be conducted satisfactorily, pressure stability should be maintained for the duration of the testing. 20 Current test equipment is unable to meet these criteria.

The hydraulic fluids used in the test equipment can also be corrosive by nature. The hazards of operating test equipment at high pressures require strict adherence to 25 safety guidelines. Complicating the matter further, there are different types of connectivity options for hydraulic pressure equipment.

This combination of circumstances poses a problem for 30 testing facilities. Test rigs are often bulky due to the different types of test equipment used. Due to the

inability to make fine pressure adjustments and maintain stable pressures throughout, the test results may also be inaccurate.

5 A need therefore exists to provide a Precision Pressure Hydraulic Adjuster (PPHA) that seeks to address at least one of the abovementioned problems.

## 10 SUMMARY OF INVENTION

In accordance with a first aspect of the present invention there is provided a Precision Pressure Hydraulic Adjuster (PPHA) comprising a housing; a fluid orifice  
15 extending through said housing for providing a connection to an external fluid reservoir; and an adjustment mechanism comprising a threaded section having a first end threaded into an adjustment mechanism chamber within said housing and a second end extending outwardly from said housing, and  
20 a plunger coupled to said first end of said threaded section, said threaded section extending into a fluid chamber within said housing and defining an effective volume within said fluid chamber, said fluid chamber having a smaller cross-sectional area than said adjustment  
25 mechanism chamber and being connected to said fluid orifice; wherein rotating said threaded section with respect to said housing provides a linear movement of said plunger in said fluid chamber to change said effective volume for adjusting and maintaining a pressure in the  
30 external fluid reservoir.

Said plunger may be coupled to said threaded section using two dowel pins such that said plunger is rotationally independent of said threaded section and wherein said plunger is fitted with at least three seals, such that said pressurized liquid is contained within said fluid chamber.

Said adjustment mechanism chamber may have a cross-sectional area at least 10 times larger than a cross-sectional area of said fluid chamber.

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Said pressure may be in a range of 15 to 10,000 PSI, and said adjustment mechanism can adjust and maintain said pressure by 1 PSI.

Said adjustment mechanism can adjust said pressure within a 1,500 PSI range.

Said housing may further comprise a cover plate, said threaded section being threaded through said cover plate, and said housing, said cover plate and said adjustment mechanism comprise stainless steel selected from a group consisting of SS304 or SS316.

Said external reservoir may contain a corrosive liquid.

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Said external reservoir may contain a liquid which is selected from a group consisting of Skydrol (BMS3-11), Red Oil (MIL-H-83282), Lubrication Oil (MIL-PRF-23699) and Jet Fuel (MIL-PRF-7024).

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In accordance with a second aspect of the present invention there is provided a system for hydraulic pressure testing comprising a fluid reservoir; a pressurization source for providing a pressure to a liquid in the reservoir; a device under test in fluid contact with the fluid reservoir; a Precision Pressure Hydraulic Adjuster comprising a housing, a fluid orifice extending through said housing for providing a connection to said device under test and said pressurization source, and an adjustment mechanism comprising a threaded section having a first end threaded into an adjustment mechanism chamber within said housing and a second end extending outwardly from said housing, and a plunger coupled to said first end of said threaded section, said threaded section extending into a fluid chamber within said housing and defining an effective volume within said fluid chamber, said fluid chamber having a smaller cross-sectional area than said adjustment mechanism chamber and being connected to said fluid orifice; a pressure gauge for measuring said pressure; and a valve disposed between said pressurization source and said device under test, said adjuster and said gauge; wherein said device under test, said pressurization source, said adjuster, said valve and said pressure gauge are all in fluidic contact with each other by way of said reservoir, and wherein rotating said threaded section with respect to said housing provides a linear movement of said plunger in said fluid chamber to change said effective volume for adjusting and maintaining the pressure in the reservoir.

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Said device may be hydraulic equipment.

Said pressurization source may pressurize said liquid to an approximate pressure, and said valve is then closed to maintain said approximate pressure in said system.

5 Said precision pressure hydraulic adjuster may then be used to adjust said approximate pressure to said desired pressure.

Said valve can be opened to adjust said pressure to a  
10 lower desired pressure for testing said device.

Said desired pressure may be in a range of 15 to 10,000 pounds per square inch (PSI) and said adjustment mechanism can adjust and maintain said pressure by 1 PSI.

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Said liquid may be a corrosive liquid.

Said liquid may be selected from a group consisting of Skydrol (BMS3-11), Red Oil (MIL-H-83282), Lubrication Oil  
20 (MIL-PRF-23699) and Jet Fuel (MIL-PRF-7024).

Said adjustment mechanism can adjust said pressure within a 1,500 PSI range.

25 Said housing may further comprise a cover plate, said threaded section being threaded through said cover plate, and said housing, said cover plate and said adjustment mechanism comprise stainless steel selected from a group consisting of SS304 or SS316.

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In accordance with a third aspect of the present invention there is provided, in a system for hydraulic

pressure testing, said system comprising a device under test; a pressurization source for providing a pressure to a liquid; a Precision Pressure Hydraulic Adjuster comprising a housing, a fluid orifice extending through said housing for providing a connection to said device under test and said pressurization source, and an adjustment mechanism comprising a threaded section having a first end threaded into an adjustment mechanism chamber within said housing and a second end extending outwardly from said housing, and a plunger coupled to said first end of said threaded section, said threaded section extending into a fluid chamber within said housing and defining an effective volume within said fluid chamber, said fluid chamber having a smaller cross-sectional area than said adjustment mechanism chamber and being connected to said fluid orifice; said system further comprising a pressure gauge for measuring said pressure, and a valve disposed between said pressurization source and said device, said adjuster and said gauge; a method for hydraulic testing of the device, the method comprising the steps of connecting the device, the pressurization source, the Precision Pressure Hydraulic Adjuster, the valve and the pressure gauge, such that the device, the pressurization source, the Precision Pressure Hydraulic Adjuster, the valve and the pressure gauge are all in fluidic contact with each other; utilizing said pressurization source to provide an approximate desired pressure to said system; adjusting said approximate desired pressure to said pressure by rotating said threaded section with respect to said housing; and conducting the test.

Said test may be conducted at a plurality of desired pressures.

The method may further comprise a step of closing said  
5 valve after said utilizing step.

The method may further comprise the step of opening  
the valve to reduce said approximate pressure to a lower  
approximate desired pressure, and repeating said closing,  
10 adjusting and conducting steps.

The method may further comprise the steps of opening  
the valve; utilizing said pressurization source to increase  
said approximate pressure to a higher approximate desired  
15 pressure; and repeating said closing, adjusting and  
conducting steps.

Said desired pressure may be in a range of 15 to  
10,000 pounds per square inch (PSI) and said adjustment  
20 mechanism can adjust and maintain said pressure by 1 PSI.

Said liquid may be a corrosive liquid.

Said liquid may be selected from a group consisting of  
25 Skydrol (BMS3-11), Red Oil (MIL-H-83282), Lubrication Oil  
(MIL-PRF-23699) and Jet Fuel (MIL-PRF-7024).

Said connecting step may further comprise the step of  
setting said adjustment mechanism to a neutral position,  
30 such that said adjustment mechanism can be adjusted to a  
positive and a negative range from said neutral position.

Said adjusting step may further comprise the step of allowing said test pressure to stabilize.

## 15 BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which like numerals describe like parts regardless of the figure numbering, and in which:

Figure 1 is a schematic diagram illustrating a system for hydraulically testing a device;

Figure 2 is a perspective view of one embodiment of the Precision Pressure Hydraulic Adjuster shown in Figure 1;

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Figure 3 is a cross-sectional view of the Precision Pressure Hydraulic Adjuster of Figure 2;

Figure 4 is an exploded view of one embodiment of an adjustment mechanism of the Precision Pressure Hydraulic Adjuster of Figures 2 and 3;

Figure 5 is a partially magnified cross sectional view of a plunger of the adjustment mechanism of Figure 4;

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Figure 6 is a partially magnified cross sectional view of the adjustment mechanism of Figure 4;

Figure 7 is a top view of the housing of the Precision Pressure Hydraulic Adjuster of Figure 3;

5. Figure 8 is a top view of the cover plate of the Precision Pressure Hydraulic Adjuster of Figures 2 and 3; and,

Figure 9 is a flowchart illustrating one embodiment of a method of using the system of Figure 1.

#### DETAILED DESCRIPTION

Figure 1 is an example of a system, designated generally with reference numeral 100, used to pressure test a device. The system 100 shows a Precision Pressure Hydraulic Adjuster (PPHA) 200, a pressure gauge 104, a pump 106 and a Device Under Test (DUT) 108. The PPHA 200, a pressure gauge 104 and the DUT 108 can be interconnected with piping 110 to a 4-way omnidirectional valve 112, so that they are in fluidic contact with each other. Other types of valves can also be used. The pump 106 can be connected to the rest of the system via an isolation valve 114. Any pressure change in a hydraulic fluid 238 is experienced by all interconnected equipment. For safety reasons, and to maintain test protocols, the interconnected equipment has to be able to withstand the pressure levels required for testing.

30. The pressure gauge 104 measures the range of pressure levels in the test. To facilitate fine pressure adjustment using the PPHA 200, the pressure gauge 104 should be able

to provide consistent, accurate pressure readings. In some embodiments, the pressure gauge 104 can be accurate to within 1 PSI (Pounds Per Square Inch). Such accuracy often requires the use of a digital gauge. One example of a digital pressure gauge 104 is a Fluke gauge, model number 700P31, which has a specified range up to 10,000 PSI. The gauge can accurately measure pressure levels to within 1 PSI, and is able to withstand a maximum overpressure of 1.5 times its maximum range. It is understood that the Fluke pressure gauge is provided by way of example only and that different pressure gauges can be used.

The pump 106 is a source of pressure and provides an approximate pressure level suitable for the PPHA 200 to make fine adjustments. Some pressurization sources, such as test stands, are limited to a range of 50 to 5,000 PSI. It is understood that many types of pumps 106 can be used. By way of example, and not limitation, compressor pumps, test pumps and hand pumps can be used. Some models of suitable compressor pumps include SPX Powerteam P159, P300 and P460. Some models of suitable hand pumps include Enerpac P-801, P-464 and P-462. It is understood that other models of pumps 106 can also be used.

If the pressure provided by the pump 106 is unstable and fluctuates, the isolation valve 114 can be turned off after an approximate pressure level has been achieved. In this way, the pump 106 can be isolated from the PPHA 200, the pressure gauge 104 and the DUT 108 and may not influence the system pressure stability. By way of example, and not limitation, shut-off valves and flow control valves can be used.

Although the PPHA 200 can withstand higher pressures, the safe working limit of this embodiment of the pressure adjuster is typically 10,000 PSI. In one embodiment, the PPHA 200 provides a 1,500 PSI (full travel) pressure range adjustment at 10,000 PSI. This embodiment of the PPHA 200 can provide a pressure adjustment of 1 PSI at 10,000 PSI.

Figure 2 is a perspective view of the PPHA 200 showing a housing 202, a cover plate 204 and an adjustment mechanism 210. The housing 202 can have two parallel planes 208 that allow the PPHA 200 to be clamped and secured onto test benches while making adjustments. Alternatively, the PPHA 200 can rest on a test bench. Also shown is a threaded section 226 on the adjustment mechanism 210.

Figure 3 is a cross-sectional view of the PPHA 200 shown in Figure 2. The housing 202 has a closed end 234, a fluid chamber 212, an adjustment mechanism chamber 242 and an open end 236 sealed with a cover plate 204. The cover plate 204 has a threaded adjustment hole 230, in communication with the threaded section 226 of the adjustment mechanism 210, assisting and guiding the adjustment mechanism 210 into the adjustment mechanism chamber 242.

Proximate the closed end 234 of the housing 202, there is an external fluid orifice 214, which is in fluidic contact with a fluid chamber 212. The fluid orifice 214 provides an external connection to, by way of example and not limitation, pressure gauge 104, pump 106 and DUT 108. In one example embodiment, the fluid orifice 214 can

include a common valve fitting 260 for easy interconnection to other test equipment.

The length of the fluid chamber 212 accommodates the advance and retreat of a plunger 244. Likewise, the adjustment mechanism chamber 242 accommodates the advance and retreat of the threaded section 226 of the adjustment mechanism 210. In some embodiments, the adjustment mechanism chamber 242 has a cross-sectional area at least 10 times larger than a cross-sectional area of the fluid chamber 212. In alternate embodiments, the adjustment mechanism chamber 242 has a cross-sectional area at least 20 times larger than a cross-sectional area of the fluid chamber 212.

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Figure 4 shows an exploded view of the adjustment mechanism 210. In some embodiments, the plunger 244 can be mounted on the first end 252 of the threaded section 226 of the adjustment mechanism 210 such that it moves in tandem with the threaded section 226. As shown in Figure 5, a pair of dowel-pins 256 inserted into a corresponding pair of dowel pin-holes 246, holds the plunger 244 loosely by the plunger neck 248 in the plunger cavity 228 located at the first end 252 of the threaded section 226, preventing extraction of the plunger 244 from the plunger cavity 228. In this configuration, the plunger 244 can rotate independently of the rotation of the threaded section 226. This rotational independence reduces wear between the surfaces of the plunger 244 and the fluid chamber 212 and allows the plunger 244 to move linearly when the threaded section 226 is rotated to adjust the pressure in the fluid chamber 212.

Referring to Figure 3, the portion of the fluid chamber 212 between the plunger 244 and the fluid orifice 214 accommodates a reservoir of hydraulic fluid 238. The cross-sectional area of the plunger 244 is sized to fit snugly within the fluid chamber 212. One or more seal rings 218 interspaced with one or more retainers 220 are set into the plunger 244. (See Figure 6 for a detailed cross-sectional diagram of plunger 244, seal rings 218 and retainers 220). When the plunger 244 is advanced or retreated along the length of the fluid chamber 212, there is a respective increase or decrease in the volume of the fluid 238. When connected to the system 100, this increase or decrease in the volume of the fluid 238 provides a corresponding increase or decrease in the hydraulic pressure of the fluid 238. In one embodiment, a chamfered surface 216 of the housing 202 can be provided at the surface edges where the fluid chamber 212 and adjustment mechanism chamber 242 intersect. This minimizes any tearing of the one or more seal rings 218 when the plunger 244 is advanced or retreated into the fluid chamber 212.

With reference to Figures 3 and 4, the dowel pins 256 can be of a predetermined length to act as a safety catch to stop the adjustment mechanism 210 when the extreme first end 252 of threaded section 226 reaches the cover plate 204. This is a safety feature and avoids the accidental removal of the adjustment mechanism 210 when the PPHA 200 is under high pressure. In some embodiments, there is an end-of-thread indicator 258 to visually indicate that the end of the threaded section 226 has been reached.

An eye knob 206 with a lever hole 232 can be located at the second end 254 of the threaded section 226 of the adjustment mechanism 210. There can be a pair of grip faces 240 on the eye knob 206. The grip faces 240 accommodate a wrench (not shown) to rotate the adjustment mechanism 210 when the PPHA 200 is under pressure. Alternatively, when the PPHA 200 is highly pressurized, a lever rod (not shown) can be inserted into the lever hole 232 to rotate the adjustment mechanism 210. In one embodiment, at a system pressure range of 0 to 3,000 PSI, the adjustment mechanism 210 can be rotated by hand. At higher system pressure ranges of 3,000 to 6,000 PSI, a wrench can be used to rotate the adjustment mechanism. At system pressures higher than 6,000 PSI, a lever rod can be used to provide a higher rotational torque.

In Figure 3, there are 8 securing holes 224 on the cover plate 204 aligned to 8 threaded screw holes 222 on the housing 202. Fasteners (not shown) can be used to secure the cover plate 204 to the open end 236 of the housing 202 via the securing holes 224 and threaded screw holes 222. Figures 7 and 8 show the correspondence of the threaded screw holes 222 and the securing holes 224. Figure 7 further shows a housing seal 250 seated around the face of the open end 234 of the housing 202, eliminating any leakage from the adjustment mechanism chamber 242 when the cover plate 204 is fastened to the housing 202.

Referring to Figure 3, due to the small cross-sectional area of the fluid chamber 212, small pressure changes can be achieved within the fluid chamber 212 with minimum rotational torque on the adjustment mechanism 210.

The long length of the fluid chamber 212 accommodates a wide range of pressure levels. Fine adjustments can be made if the adjustment mechanism 210 is finely threaded, such that a large ratio of turns of the adjustment mechanism 210 to plunger 244 movement is achieved. In one example embodiment, 12 complete rotations of the adjustment mechanism 210 result in a linear translation of 1 inch of the plunger 244.

10 The housing 202 should preferably be constructed to withstand the high pressures encountered in the testing process. The materials used for the housing 202, cover plate 204 and adjustment mechanism 210 should also be able to withstand the corrosive effects of any fluids used in the testing.

In one embodiment, the housing 202, cover plate 204, plunger 244 and adjustment mechanism 210 can be, by way of example and not limitation, fabricated with stainless steel grade SS304, SS316, or other materials capable of withstanding the deleterious effects of corrosive fluids. These corrosive fluids can include, but are not limited to, Skydrol (BMS3-11), Red Oil (MIL-H-83282), Lubrication Oil (MIL-PRF-23699), Jet Fuel (MIL-PRF-7024) or a mixture of 20 any of these. However, it is understood that the PPHA 200 can be used with any type of fluid.

The housing seal 250, seal rings 218 and retainers 220 can be, by way of example and not limitation, regular Commercial-Off-The-Shelf (COTS) rubber products. In some 30 embodiments, a minimum of three seal rings 218 may be required for leak proof operation.

In one embodiment, the housing seal 250 and seal rings 218 can be made of Ethylene Propylene Diene Monomer (EPDM) rubber, model numbers NAS1611-325 (NAS: National Aviation Standards) and NAS1611-006 respectively. The retainers 220 can be made of Polytetrafluoroethylene (PTFE) (also known as Teflon), model number MS28782-1. In an example embodiment, three seal rings 218 interspaced with retainers 220 at a separation distance of 5mm were used. Other materials known to those skilled in the art can also be used as seal rings 218 and/or retainers 220 without departing from the scope of the embodiments.

In the example embodiment, the housing 202 can be 280mm in length and 90mm in diameter. The plunger 244 can be 150mm in length and 5mm in diameter. The adjustment mechanism chamber 242 can be 110mm in length and 26.5mm in diameter, while the fluid chamber 212 can be 150mm in length and 5.5mm in diameter. The adjustment mechanism 210 can be 160mm in length with the threaded section 226 being 110mm in length and 50mm in diameter. These dimensions are provided by way of example only. This provides a large difference between the cross-sectional areas of the threaded section 226 and plunger 244. It is understood that the PPHA 200, and its component parts, can have many other dimensions both larger and smaller, depending on the specific capabilities required.

A high number of threads per inch provides a smaller linear displacement of the plunger 244 when the adjustment mechanism 210 is rotated. In the example embodiment, the threading on the adjustment mechanism 210 can be 1", -12

UNF (Unified National Fine Thread). This allows the PPHA 200 to provide, by way of example and not limitation, a pressure adjustment of 1 PSI at a system pressure of 10,000 PSI. The valve fitting 260 for the fluid orifice 214 can be a 5/8" NPT (National Pipe Thread), -4 size. It is understood that different threading for the adjustment mechanism 210 and different types of pipe threads for the valve fitting 260 can be used.

Figure 9 is a flowchart illustrating a method of using the PPHA 200 in the system of Figure 1. The steps are summarized here:

STEP 902: The hydraulic equipment is connected together, as shown in the example embodiment in Figure 1. The PPHA 200 in the system 100 can be clamped onto a stable flat surface or a workbench.

STEP 904: The adjustment mechanism 210 may be adjusted to an approximate, neutral position so that there is enough range of travel for adjustments in both advance and retreat directions.

STEP 906: While monitoring the pressure gauge 104, the pump 106 is used to bring the pressure required for the test to an approximate desired level. The isolation valve 114 can be shut off to isolate the pump 106 from the system and prevent the pump 106 from influencing the system pressure stability.

STEP 908: Either by hand, wrench or a lever rod, the adjustment mechanism 210 is adjusted to the required test level.

5 STEP 910: The test pressure is allowed to stabilize. In one example embodiment of a method to use the PPHA 200, the pressure can be allowed to stabilize for at least 30 minutes before tests commence. It is understood that longer or shorter stabilization times can be used. STEP 908 is repeated until the test pressure has stabilized at the desired test pressure.

STEP 912: Once the pressure has stabilized, the test can then proceed.

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In the example embodiments that have been discussed, the PPHA 200 is able to withstand system pressures of up to 10,000 PSI and can be used with corrosive fluids. Due to its construction, it is also safe, compact and easily  
20 secured to a test bench. The high thread ratio for the adjustment mechanism 210 allows the pressure to be precisely adjusted and maintained at a desired level, even under extremely high pressures. For example, adjustments of 0.01% can be made and maintained (1 PSI at 10,000 PSI).  
25 The use of a common valve fitting 260 makes the PPHA 200 versatile and easily incorporated into different test setups.

It will be appreciated by a person skilled in the art  
30 that numerous variations and/or modifications may be made to the present invention as shown in the specific embodiments without departing from the spirit or scope of

embodiments of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

**CLAIMS**

1. A Precision Pressure Hydraulic Adjuster (PPHA)  
5 comprising:

a housing;

a fluid orifice extending through said housing for  
providing a connection to an external fluid reservoir; and

an adjustment mechanism comprising a threaded section

10 having a first end threaded into an adjustment mechanism

chamber within said housing and a second end extending

outwardly from said housing, and a plunger coupled to said

first end of said threaded section, said threaded section

extending into a fluid chamber within said housing and

15 defining an effective volume within said fluid chamber,

said fluid chamber having a smaller cross-sectional area

than said adjustment mechanism chamber and being connected

to said fluid orifice;

wherein rotating said threaded section with respect to

20 said housing provides a linear movement of said plunger in

said fluid chamber to change said effective volume for

adjusting and maintaining a pressure in the external fluid

reservoir.

25 2. The Precision Pressure Hydraulic Adjuster as claimed

in claim 1, wherein said plunger is coupled to said

threaded section using two dowel pins such that said

plunger is rotationally independent of said threaded

section and wherein said plunger is fitted with at least

30 three seals, such that said pressurized liquid is contained

within said fluid chamber.

3. The Precision Pressure Hydraulic Adjuster as claimed in any one of claims 1 to 2, wherein said adjustment mechanism chamber has a cross-sectional area at least 10 times larger than a cross-sectional area of said fluid chamber.

4. The Precision Pressure Hydraulic Adjuster as claimed in any one of claims 1 to 3, wherein said pressure is in a range of 15 to 10,000 PSI, and said adjustment mechanism can adjust and maintain said pressure by 1 PSI.

5. The Precision Pressure Hydraulic Adjuster as claimed in any one of claims 1 to 4, wherein said adjustment mechanism can adjust said pressure within a 1,500 PSI range.

6. The Precision Pressure Hydraulic Adjuster as claimed in any one of claims 1 to 5, wherein said housing further comprises a cover plate, said threaded section being threaded through said cover plate, and said housing, said cover plate and said adjustment mechanism comprise stainless steel selected from a group consisting of SS304 or SS316.

7. The Precision Pressure Hydraulic Adjuster as claimed in any one of claims 1 to 6, wherein said external reservoir contains a corrosive liquid.

8. The Precision Pressure Hydraulic Adjuster as claimed in any one of claims 1 to 7, wherein said external reservoir contains a liquid which is selected from a group consisting of Skydrol (BMS3-11), Red Oil (MIL-H-83282),

Lubrication Oil (MIL-PRF-23699) and Jet Fuel (MIL-PRF-7024).

9. A system for hydraulic pressure testing comprising;

5 a fluid reservoir

a pressurization source for providing a pressure to a liquid in the reservoir

a device under test in fluid contact with the fluid reservoir;

10 a Precision Pressure Hydraulic Adjuster comprising a housing, a fluid orifice extending through said housing for providing a connection to said device under test and said pressurization source, and an adjustment mechanism comprising a threaded section having a first end threaded  
15 into an adjustment mechanism chamber within said housing, and a second end extending outwardly from said housing, and a plunger coupled to said first end of said threaded section, said threaded section extending into a fluid chamber within said housing and defining an effective  
20 volume within said fluid chamber, said fluid chamber having a smaller cross-sectional area than said adjustment mechanism chamber and being connected to said fluid orifice;

a pressure gauge for measuring said pressure; and

25 a valve disposed between said pressurization source and said device under test, said adjuster and said gauge;

wherein said device under test, said pressurization source, said adjuster, said valve and said pressure gauge are all in fluidic contact with each other by way of said  
30 reservoir, and wherein rotating said threaded section with respect to said housing provides a linear movement of said plunger in said fluid chamber to change said effective

volume for adjusting and maintaining the pressure in the reservoir.

10. The system as claimed in claim 9, wherein said device  
5 is hydraulic equipment.

11. The system as claimed in claims 9 or 10, wherein said  
pressurization source pressurizes said liquid to an  
approximate pressure, and said valve is then closed to  
10 maintain said approximate pressure in said system.

12. The system as claimed in claim 11, wherein said  
precision pressure hydraulic adjuster is then used to  
adjust said approximate pressure to said desired pressure.  
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13. The system as claimed in claims 11 or 12, wherein said  
valve can be opened to adjust said pressure to a lower  
desired pressure for testing said device.

20 14. The system as claimed in any one of claims 9 to 13,  
wherein said desired pressure is in a range of 15 to 10,000  
pounds per square inch (PSI) and said adjustment mechanism  
can adjust and maintain said pressure by 1 PSI.

25 15. The system as claimed in any one of claims 9 to 14,  
wherein said liquid is a corrosive liquid.

16. The system as claimed in any one of claims 9 to 15,  
wherein said liquid is selected from a group consisting of  
30 Skydrol (BMS3-11), Red Oil (MIL-H-83282), Lubrication Oil  
(MIL-PRF-23699) and Jet Fuel (MIL-PRF-7024).

17. The system as claimed in any one of claims 9 to 16, wherein said adjustment mechanism can adjust said pressure within a 1,500 PSI range.

18. The system as claimed in any one of claims 9 to 17, wherein said housing further comprises a cover plate, said threaded section being threaded through said cover plate, and said housing, said cover plate and said adjustment mechanism comprise stainless steel selected from a group consisting of SS304 or SS316.

19. In a system for hydraulic pressure testing, said system comprising a device under test; a pressurization source for providing a pressure to a liquid; a Precision Pressure Hydraulic Adjuster comprising a housing, a fluid orifice extending through said housing for providing a connection to said device under test and said pressurization source, and an adjustment mechanism comprising a threaded section having a first end threaded into an adjustment mechanism chamber within said housing and a second end extending outwardly from said housing, and a plunger coupled to said first end of said threaded section, said threaded section extending into a fluid chamber within said housing and defining an effective volume within said fluid chamber, said fluid chamber having a smaller cross-sectional area than said adjustment mechanism chamber and being connected to said fluid orifice; said system further comprising a pressure gauge for measuring said pressure, and a valve disposed between said pressurization source and said device, said adjuster and said gauge; a method for hydraulic testing of the device, the method comprising the steps of:

connecting the device, the pressurization source, the Precision Pressure Hydraulic Adjuster, the valve and the pressure gauge, such that the device, the pressurization source, the Precision Pressure Hydraulic Adjuster, the valve and the pressure gauge are all in fluidic contact with each other;

utilizing said pressurization source to provide an approximate desired pressure to said system;

adjusting said approximate desired pressure to said pressure by rotating said threaded section with respect to said housing; and conducting the test.

20. The method of claim 19, wherein said test is conducted at a plurality of desired pressures.

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21. The method of claim 19, further comprising a step of closing said valve after said utilizing step.

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22. The method of claim 21, further comprising the step of opening the valve to reduce said approximate pressure to a lower approximate desired pressure, and repeating said closing, adjusting and conducting steps.

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23. The method of claim 21, further comprising the steps of:

opening the valve;

utilizing said pressurization source to increase said approximate pressure to a higher approximate desired pressure; and

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repeating said closing, adjusting and conducting steps.

24. The method as claimed in any one of claims 19 to 23, wherein said desired pressure is in a range of 15 to 10,000 pounds per square inch (PSI) and said adjustment mechanism can adjust and maintain said pressure by 1 PSI.

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25. The method as claimed in any one of claims 19 to 24, wherein said liquid is a corrosive liquid.

26. The method as claimed in any one of claims 19 to 25, wherein said liquid is selected from a group consisting of Skydrol (BMS3-11), Red Oil (MIL-H-83282), Lubrication Oil (MIL-PRF-23699) and Jet Fuel (MIL-PRF-7024).

27. The method as claimed in any one of claims 19 to 26, wherein said connecting step further comprises the step of:  
15        setting said adjustment mechanism to a neutral position, such that said adjustment mechanism can be adjusted to a positive and a negative range from said neutral position.

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28. The method as claimed in any one of claims 19 to 27, wherein said adjusting step further comprises the step of:  
allowing said test pressure to stabilize.