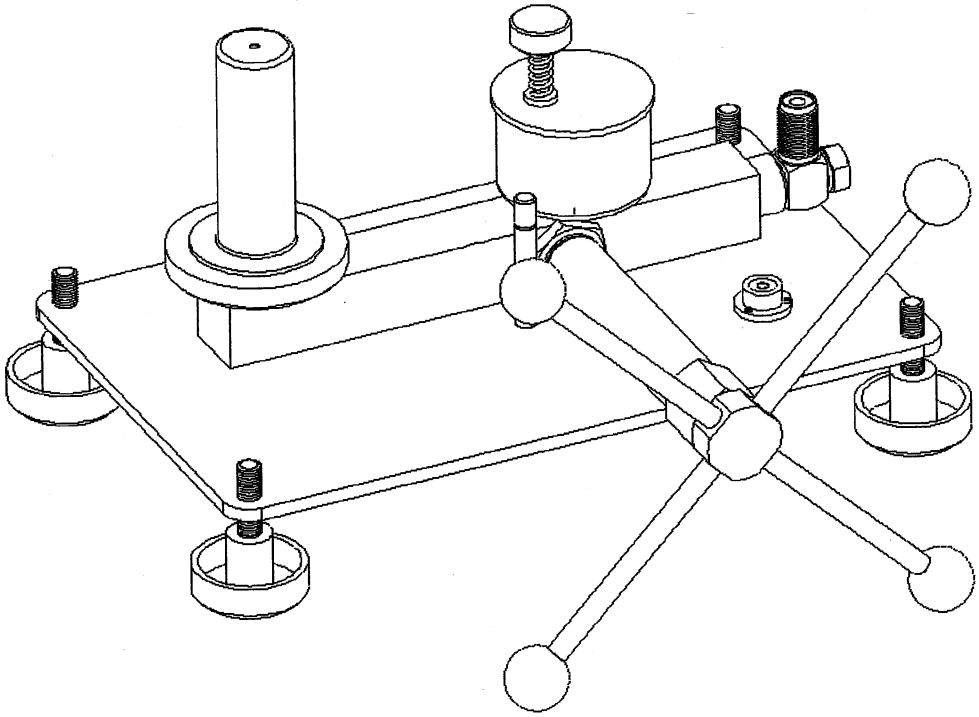
GE Infrastructure
Sensing

Models:
L1050; L1300; L1500; L1000
LW1050; LW1500

Hydraulic Deadweight Tester



imagination at work

HYDRAULIC DEADWEIGHT TESTER

MODELS: L1050; L1300; L1500; L1000 LW1050; LW1500

USER'S MANUAL

GE INFRASTRUCTURE SENSING
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REVISION NOTICE

RELEASE NUMBER	REVISION	DATE OF REVISION	DESCRIPTION
PMAN-102-1D01	A	11/18/03	Original release.
PMAN-102-1D01	B	03/04/05	Changes per DCRO 24642

TABLE OF CONTENTS

SECTION 1.0
GENERAL INFORMATION

Deadweight Testers are the primary standard for pressure measurement. Utilizing the well-proven Piston-Gage system, consisting of a vertically mounted, precision lapped Piston and Cylinder assembly, accurately calibrated weight masses (Force) are loaded on the piston (Area), which rises freely within its cylinder.

These weights balance the upward force created by the pressure within the system.

$$\text{PRESSURE} = \frac{\text{FORCE}}{\text{AREA}}$$

Each weight is marked with the tester serial number, and the pressure measured when placed on a correctly spinning and floating piston.

The total pressure measured is the summation of the weights plus the piston weight carrier assembly.

The deadweight tester has been calibrated to the Gravity, Temperature and Air Density stated on the certificate.

Equations and factors are given on the certificate to adjust for any variations in these environmental conditions.

Gravity varies greatly with geographic location, and so will the deadweight tester reading.

Due to the significant change in gravity throughout the world (0.5%), ensure that the tester has either been manufactured to your local gravity, or that you have applied the correction from the calibrated gravity.

Example:

Deadweight Tester calibrated gravity	980.665 cm/s²
(980.665 cm/s² is the International Standard Gravity)	
Gravity at site	981.235 cm/s²
Indicated Pressure	250 psi

$$\text{True Pressure} = \frac{981.235}{980.665} \times 250$$

$$= 1.0005812 \times 250$$

$$= \underline{250.1453 \text{ psi}}$$

Temperature and Air Density variations are less significant than gravity. Variations should be corrected for when maximum accuracy is required.

Temperature variation example:

Deadweight Tester calibrated temperature	20°C
Operating temperature	24°C
Percentage change per °C	0.002%
Indicated Pressure	250 psi

$$\text{True Pressure} = 250 + (20 - 24) \times \frac{0.002}{100} \times 250$$

$$= 250 - \frac{0.008}{100} \times 250$$

$$= 250 - 0.02$$

$$= \underline{249.98 \text{ psi}}$$

The pressure measured is at the top of the test station seal.

Vertical height difference between this datum line and the connection to the instrument under test should be corrected for. To correct for vertical heights above and below the datum line, either subtract or add respectively, the amount stated on the certificate.

To ensure accuracy is maintained, the piston and weights must be kept clean and undamaged. The tester is accurate when the piston and weights are floating and rotating freely.

SECTION 2.0
PREPARATION

The deadweight tester must be setup on a level, stable workbench or similar surface.

Remove spoke(s) from instrument case and refit to screw press.

Level the tester using the four adjustable feet to the bubble level attached to the top plate.

Rotate reservoir cover through 180° around valve stem and fill reservoir approximately ¾ full with the appropriate fluid [1].

Rotate cover back to avoid fluid contamination.

Fit the equipment under test (EUT) to the test station using the following method.

[1] Recommended Fluids:

Model	Pressure Range (Max.)	Fluid
L1050	500 psi / 35 bar	ST25 Oil
LW1050	500 psi / 35 bar	Distilled or De-ionized Water
L1300	2000 psi / 140 bar	ST25 Oil
L1500	5000 psi / 350 bar	ST25 Oil
LW1500	5000 psi / 350 bar	Distilled or De-ionized Water
L1000	10,000 psi / 700 bar	ST55 Oil

IMPORTANT: *To ensure correct operation of "Water" operated units, use only De-ionized or Distilled Water* – ***use of any other fluid will cause system contamination, and possible damage to the piston assembly.***

2.1 CONNECTIONS

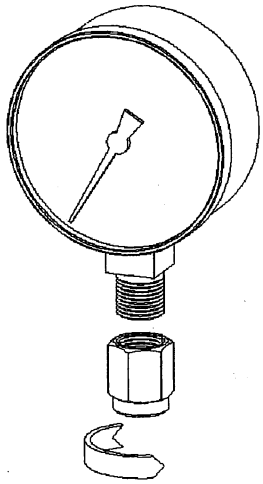
IMPORTANT: Ensure that all devices are internally clean and free from contamination before connecting to the tester. Particle contamination can damage the sensitive piston assemblies, valve seats and screw press.

WARNING: DO NOT use Teflon/PTFE tape on these connections, as this will prevent correct sealing.

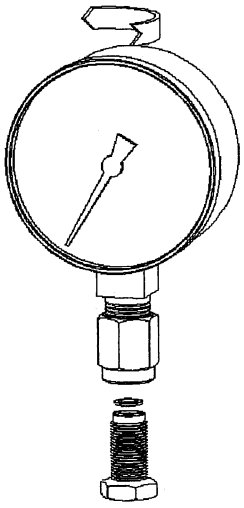
Before connection, ensure that there is a test seal fitted to the test station. Check that the sealing face of the device to be fitted is clean and undamaged, as scratches or dents can form leak-paths.

NOTE: The thread on the test station, and the lower part of the gage adaptors is LEFT-HANDED. The following procedure details the correct method for mounting devices using these adaptors: -

To calibrate panel-mounted gages with pressure connections in the rear, use a T3700 Angle Adaptor (see Ancillary Equipment).

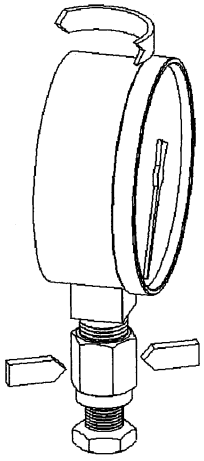


1. Screw the appropriate Gage Adaptor fully on to the instrument to be tested.

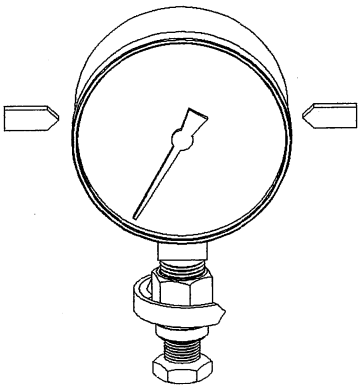


2. Screw assembly down COUNTER-CLOCKWISE on to Test Station.

Note: Hand-tight is sufficient; ensure that the bottom face contacts the Test Seal on the Test Station.



3. To adjust the position to face forward, hold the Gage Adaptor and turn the instrument COUNTER-CLOCKWISE so that it faces forwards.



4. Hold the instrument steady, whilst turning the Gage Adaptor COUNTER-CLOCKWISE until it pulls down onto the Test Seal.

SECTION 3.0
PRIMING

3.1 Open reservoir valve one turn counter-clockwise and turn capstan fully in.

3.2 Close valve [2] and turn capstan fully out.

3.3 Open valve and turn capstan fully in.

NOTE: During this operation, bubbles may appear in the reservoir, as trapped air is expelled. For large volumes, repeat steps 3.2 & 3.3 until no further bubbles appear.

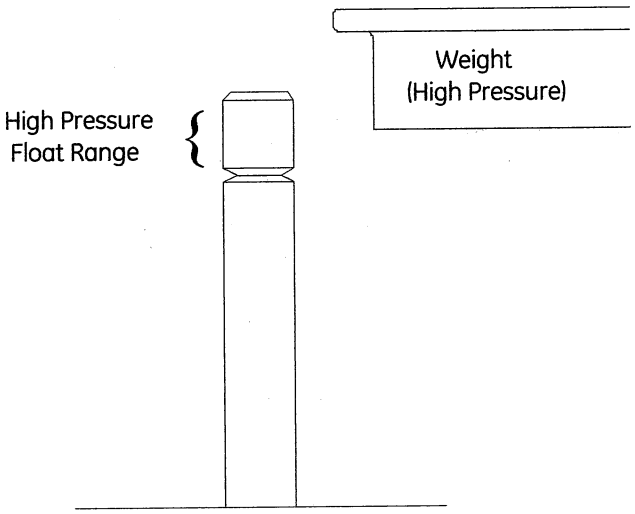
3.4 With valve open, turn capstan fully out and close valve. The tester is now ready for use.

[2] **WARNING**: Turning the capstan out with the reservoir valve closed will generate approximately 15 inHg / 0.5 bar vacuum. If the EUT is vacuum sensitive, leave valve open during priming operation.

SECTION 4.0
OPERATION

4.1 Select the required weights and stack them on the appropriate piston assembly. The pressure measured is the sum of the weights plus the piston/weight carrier.

4.2 Turn the capstan in (clockwise) to generate pressure. When the piston rises, ensure that the bottom face of the lowest weight is level with the top section of the indicator post.



NOTE: Models L1050 and LW1050 do not have an indicator post, as the piston's float position can be clearly seen.

4.3 Rotate the weight stack clockwise – *DO NOT rotate weights when the piston is against the top or bottom limits of travel.*

4.4 Allow a few moments for the system to stabilize before taking any readings, especially after large changes in system pressure.

NOTE: Large, sudden changes in pressure will cause the system temperature to rise or fall, which can cause instrument readings to change as the fluid in the system expands or contracts, thus increasing or decreasing the pressure. This is often interpreted as a leak.

4.5 For the next, higher calibration point, repeat from step 4.1 above.

4.6 To measure reducing pressures, remove the necessary weights, and turn the capstan out so that the weight stack floats at the correct height, then rotate clockwise.

4.7 Depressurize the system by turning the capstan FULLY OUT – Never release the system pressure without turning the capstan fully out, as sudden depressurization will cause the weight stack to fall quickly which may damage the piston assembly.

4.8 Remove weight stack.

SECTION 5.0
CALIBRATION IN DIFFERENT PRESSURE UNITS

The deadweight tester can be used to calibrate in different pressure units in either of two methods: -

5.1 CONVERSION WEIGHTS

A set of Conversion Weights can be supplied, marked in the required pressure unit, and adjusted to the correct mass for use with the existing piston(s).

The set includes (where applicable) a replacement low-pressure weight carrier table, and a replacement high-pressure weight carrier ring. These items are simply exchanged for the original items when using the conversion weights. Calibration is carried out as described above, with logical pressure increments throughout the operating range, avoiding the need to perform pressure unit conversion calculations.

5.2 SOFTWARE

PressCal software is available for use with deadweight testers, and will allow users to apply all necessary corrections (e.g. local gravity, temperature, pressure head, etc.) to enhance the pressure measurement accuracy of the instrument.

It will allow calibration in any of 12 different pressure units, using the existing weight set.

SECTION 6.0
MAINTENANCE AND SERVICING

IMPORTANT: *The piston / cylinder assembly is the most critical and sensitive part of the deadweight tester. To maintain accuracy, the piston must always slide freely in the cylinder, and the hydraulic fluid must remain clean.*

6.1 PCU ASSEMBLY (10 mm Nominal Diameter)

PISTON DISASSEMBLY:

6.1.1 Using a small pinhead hammer and a suitable flat-ended punch, tap lightly on the end of the piston (B), through the center of the weight carrier (F). Remove weight carrier.

6.1.2 Unscrew the cylinder (E) from LP piston adaptor (G); use the dowel hole if the cylinder is tight.

6.1.3 Carefully withdraw the piston from the cylinder.

6.1.4 If required, lift support ring (C) from around o-ring (D), the o-ring can now be withdrawn from the piston.

PISTON CLEANING:

6.1.5 Use "non-fluffing", non-abrasive, lint-free tissue or absorbent cloth. Hold the piston by the larger "head" end, and rub the tissue back and forth along its length.

6.1.6 To remove all traces of contamination (especially important with Water Operated Testers), the piston can be cleaned in a suitable solvent.

NOTE: O-ring seals (where fitted) are nitrile rubber, and should not be immersed in solvents, as they will become damaged. They should be wiped carefully with a new tissue

6.1.7 After removal from the solvent, using a NEW tissue, repeat the cleaning procedure in 6.1.5.

6.1.8 Place piston carefully on a NEW tissue where it will not be damaged while the cylinder is cleaned.

IMPORTANT: NEVER TOUCH THE WORKING SURFACE OF A CLEAN PISTON WITH BARE FINGERS – THE NATURAL OIL IN YOUR SKIN CAN CAUSE THE PISTON AND CYLINDER TO STICK.

6.1.9 Wipe excess fluid from the outside surfaces of the cylinder (E).

6.1.10 Roll a NEW tissue into a tapered rod of appropriate size. Force the tissue through the cylinder bore whilst rotating. Ensure that the tissue is a tight fit inside the bore so that dirt and contamination is removed.

6.1.11 Repeat 6.1.10, using a NEW tissue, but from the opposite end of the cylinder.

6.1.12 Immerse the cylinder in a suitable, clean solvent, see note in 6.1.6 above.

6.1.13 After removal from the solvent, using a NEW tissue, repeat the cleaning procedure in 6.1.10 & 11.

PISTON RE-ASSEMBLY:

6.1.14 Replace the clean support ring (C) over the tapered end of the piston, followed by the o-ring (D). Slide the o-ring to the bottom of the piston so that it holds the support ring in place.

6.1.15 Holding the piston by the larger "head" end, dip the other end into a container of clean operating fluid, and transfer to the bore in the underside (threaded end) of the cylinder. Allow the fluid to run through the bore. Repeat this 2 or 3 times to ensure a good film of clean operating fluid exists in the cylinder bore.

6.1.16 Carefully introduce the piston into the underside of the cylinder, and push gently through (the piston will normally slide freely through due to its own weight).

NEVER FORCE THE PISTON INTO ITS CYLINDER OR DAMAGE WILL RESULT. If resistance is felt, introduce more fluid. If resistance continues, re-clean piston, cylinder or both. If, after repeated cleaning, the piston still will not slide freely within the cylinder, then permanent damage may have occurred. In which case, the parts should be returned to the factory for evaluation or replacement.

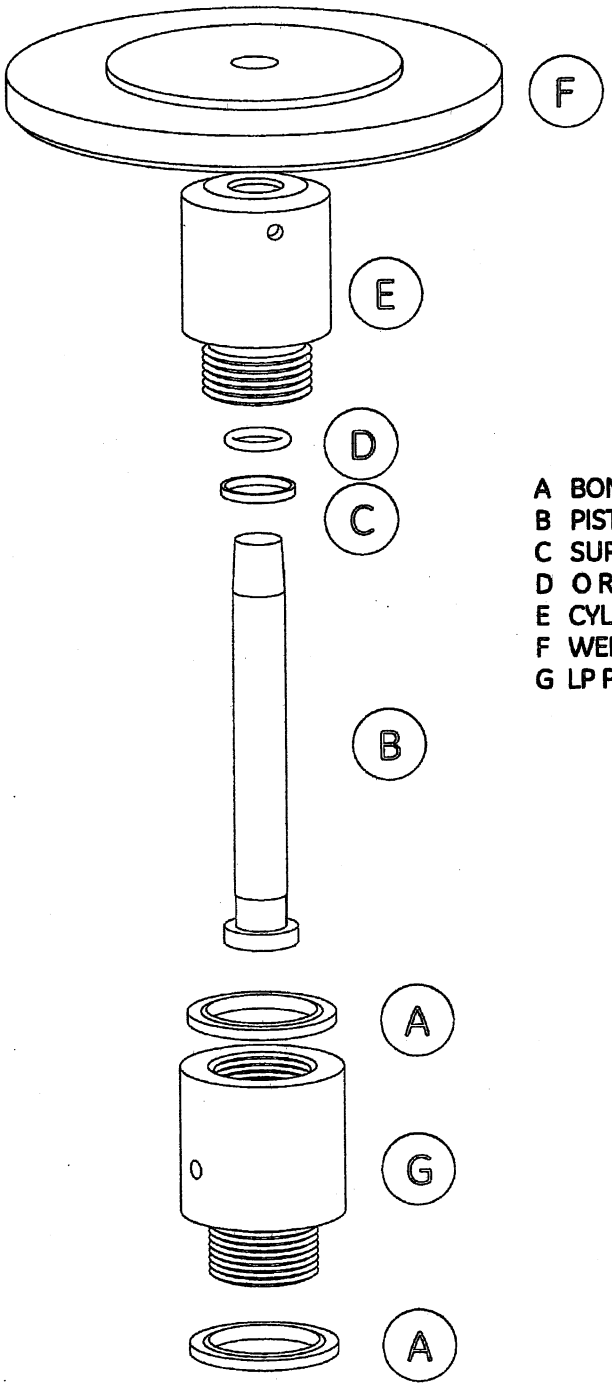
6.1.17 Stand assembly upright on a clean, hard, stable surface. Ensure that the o-ring (D) and support ring (C) are both located centrally around the piston. Push the cylinder down so that the o-ring is forced evenly inside the support ring.

6.1.18 Ensure that the weight carrier (F) is clean (especially the central mounting hole), and place on the tapered end of the piston. Tap lightly using the palm of the hand to locate on the taper.

6.1.19 Carefully screw the assembly into the piston adaptor (G), ensuring that the seal (A) is clean and undamaged, and correctly re-fitted.

REPLACEMENT PCU ASSEMBLY

NOTE: The piston and cylinder are a matched pair, which is calibrated and adjusted to a calculated mass figure. If, for any reason, the piston or cylinder becomes damaged, then the entire assembly must be replaced. The replacement assembly consists of the following components: - B through F.



A BONDED SEAL P101802
B PISTON
C SUPPORT RING P101820
D O RING P104118
E CYLINDER
F WEIGHT CARRIER TABLE
G LP PISTON ADAPTOR

10 mm PISTON CYLINDER ASSEMBLY

6.2 PCU ASSEMBLY (2 & 3 mm Nominal Diameters)

PISTON DISASSEMBLY:

6.2.1 Lift off the weight carrier assembly (A & B), and unscrew the piston nut (E). Use the dowel hole if the nut is tight. Remove the piston/cylinder assembly.

6.2.2 Loosen set screw (C) in piston cap (D), and gently pull the piston cap from the piston. DO NOT PULL IN SUCH A WAY THAT THE PISTON CAN BEND. The piston and cylinder assembly (H & F) can now be removed from the piston nut.

6.2.3 Gently withdraw the piston (H) from the cylinder (F).

PISTON CLEANING:

6.2.4 Use "non-fluffing", non-abrasive, lint-free tissue or absorbent cloth. Hold the piston by the larger "head" end, and rub the tissue back and forth along its length.

6.2.5 To remove all traces of contamination (especially important with Water Operated Testers), the piston can be cleaned in a suitable solvent.

NOTE: O-ring seals (where fitted) are nitrile rubber, and should not be immersed in solvents, as they will become damaged. They should be wiped carefully with a new tissue.

6.2.6 After removal from the solvent, using a NEW tissue, repeat the cleaning procedure in 6.2.5.

6.2.7 Place piston carefully on a NEW tissue where it will not be damaged while the cylinder is cleaned.

IMPORTANT: NEVER TOUCH THE WORKING SURFACE OF A CLEAN PISTON WITH BARE FINGERS – THE NATURAL OIL IN YOUR SKIN CAN CAUSE THE PISTON AND CYLINDER TO STICK.

6.2.8 Wipe excess fluid from the outside surfaces of the cylinder (F).

6.2.9 Roll a NEW tissue into a tapered rod of appropriate size. Force the tissue through the cylinder bore whilst rotating. Ensure that the tissue is a tight fit inside the bore so that dirt and contamination is removed.

6.2.10 Repeat 6.2.9, using a NEW tissue, but from the opposite end of the cylinder.

6.2.11 Immerse the cylinder in a suitable, clean solvent, see note in 6.2.5 above.

6.2.12 After removal from the solvent, using a NEW tissue, repeat the cleaning procedure in 6.2.9 & 10.

PISTON RE-ASSEMBLY:

6.2.13 Replace o-ring (G) in the counter-bore in the underside of the cylinder (F), ensuring that it is located correctly and evenly.

6.2.14 Holding the piston by the larger "head" end, dip the other end into a container of clean operating fluid, and transfer to the bore in the underside of the

cylinder. Allow the fluid to run through the bore. Repeat this 2 or 3 times to ensure a good film of clean operating fluid exists in the cylinder bore.

6.2.15 Carefully introduce the piston into the underside of the cylinder, and push gently through.

6.2.16 NEVER FORCE THE PISTON INTO ITS CYLINDER OR DAMAGE WILL RESULT. If resistance is felt, introduce more fluid. If resistance continues, re-clean piston, cylinder or both. If, after repeated cleaning, the piston still will not slide freely within the cylinder, then permanent damage may have occurred. In which case, the parts should be returned to the factory for evaluation or replacement.

6.2.17 Insert piston/cylinder assembly into piston nut (E) through the threaded end, such that the shoulder on the cylinder is located within the central bore of the nut.

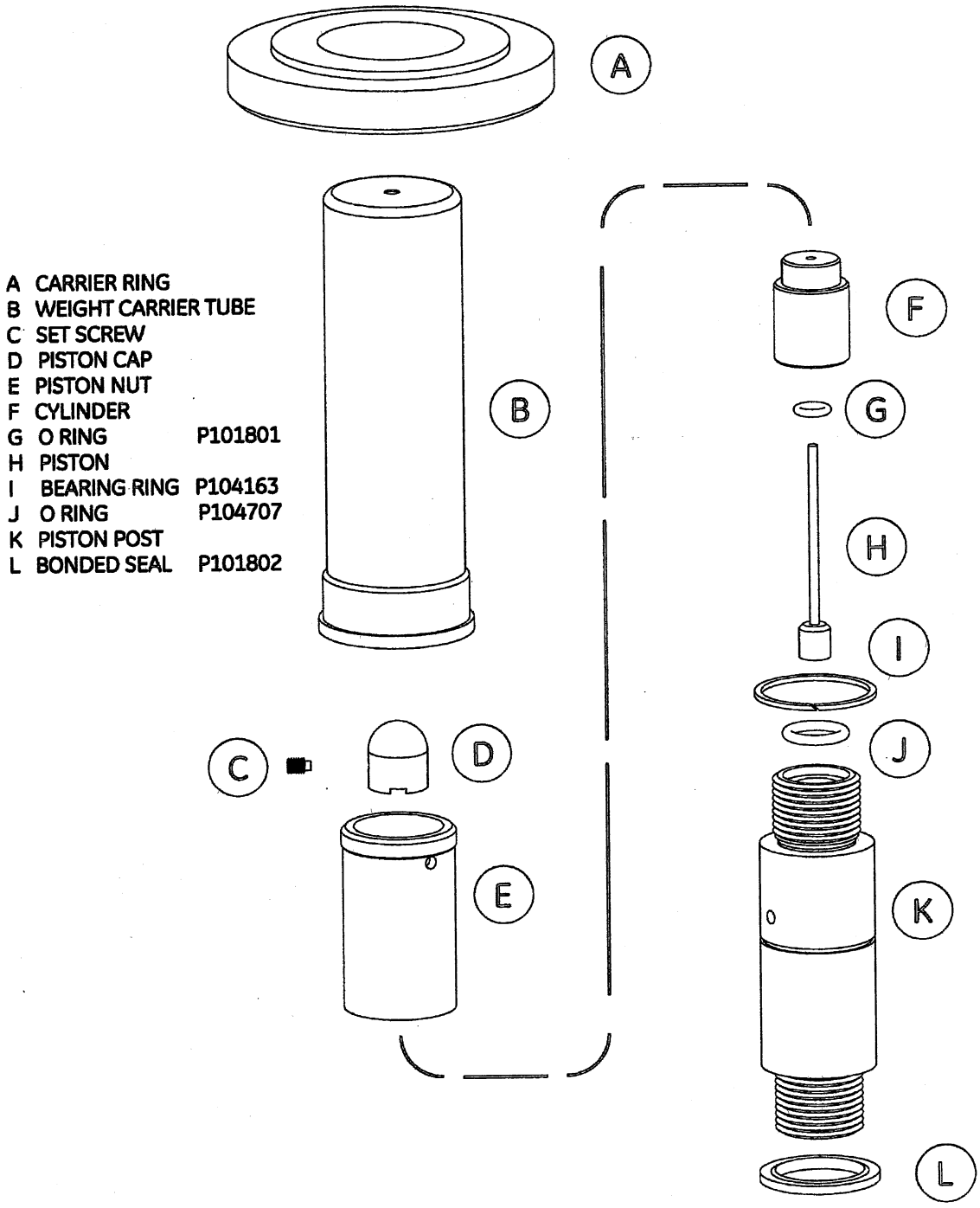
6.2.18 Replace piston cap (D), and secure with set screw (C) – DO NOT OVERTIGHTEN.

6.2.19 Carefully screw the assembly into the instrument, ensuring that the o-ring (J) is clean and undamaged, and correctly fitted to the piston post (K).

6.2.20 Replace weight carrier assembly (A & B), ensuring that it locates correctly on the piston cap.

REPLACEMENT PCU ASSEMBLY

NOTE: The piston and cylinder are a matched pair, which is calibrated and adjusted to a calculated mass figure. If, for any reason, the piston or cylinder becomes damaged, then the entire assembly must be replaced. The replacement assembly consists of the following components: - A through H.



A CARRIER RING
B WEIGHT CARRIER TUBE
C SET SCREW
D PISTON CAP
E PISTON NUT
F CYLINDER
G O RING P101801
H PISTON
I BEARING RING P104163
J O RING P104707
K PISTON POST
L BONDED SEAL P101802

2 & 3 mm PISTON CYLINDER ASSEMBLY

6.3 PCU ASSEMBLY (5 mm Nominal Diameter)

PISTON DISASSEMBLY:

6.3.1 Lift off the weight carrier assembly (A & B), and unscrew the piston nut (E). Use the dowel hole if the nut is tight. Remove the piston/cylinder assembly.

6.3.2 Loosen set screw (C) in piston cap (D), and gently pull the piston cap from the piston. DO NOT PULL IN SUCH A WAY THAT THE PISTON CAN BEND. The piston and cylinder assembly (G & F) can now be removed from the piston nut.

6.3.3 Gently withdraw the piston (G) from the cylinder (F).

PISTON CLEANING:

6.3.4 Use "non-fluffing", non-abrasive, lint-free tissue or absorbent cloth. Hold the piston by the larger "head" end, and rub the tissue back and forth along its length.

6.3.5 To remove all traces of contamination (especially important with Water Operated Testers), the piston can be cleaned in a suitable solvent.

NOTE: O-ring seals (where fitted) are nitrile rubber, and should not be immersed in solvents, as they will become damaged. They should be wiped carefully with a new tissue.

6.3.6 After removal from the solvent, using a NEW tissue, repeat the cleaning procedure in 6.3.5.

6.3.7 Place piston carefully on a NEW tissue where it will not be damaged while the cylinder is cleaned.

IMPORTANT: NEVER TOUCH THE WORKING SURFACE OF A CLEAN PISTON WITH BARE FINGERS – THE NATURAL OIL IN YOUR SKIN CAN CAUSE THE PISTON AND CYLINDER TO STICK.

6.3.8 Wipe excess fluid from the outside surfaces of the cylinder (F).

6.3.9 Roll a NEW tissue into a tapered rod of appropriate size. Force the tissue through the cylinder bore whilst rotating. Ensure that the tissue is a tight fit inside the bore so that dirt and contamination is removed.

6.3.10 Repeat 6.3.9, using a NEW tissue, but from the opposite end of the cylinder.

6.3.11 Immerse the cylinder in a suitable, clean solvent, see note in 6.3.5 above.

6.3.12 After removal from the solvent, using a NEW tissue, repeat the cleaning procedure in 6.3.9 & 10.

PISTON RE-ASSEMBLY:

6.3.13 Holding the piston by the larger "head" end, dip the other end into a container of clean operating fluid, and transfer to the bore in the underside of the cylinder. Allow the fluid to run through the bore. Repeat this 2 or 3 times to ensure a good film of clean operating fluid exists in the cylinder bore.

6.3.14 Carefully introduce the piston into the underside of the cylinder, and push gently through.

6.3.15 NEVER FORCE THE PISTON INTO ITS CYLINDER OR DAMAGE WILL RESULT. If resistance is felt, introduce more fluid. If resistance continues, re-clean piston, cylinder or both. If, after repeated cleaning, the piston still will not slide freely within the cylinder, then permanent damage may have occurred. In which case, the parts should be returned to the factory for evaluation or replacement.

6.3.16 Insert piston/cylinder assembly into piston nut (E) through the threaded end, such that the shoulder on the cylinder is located within the central bore of the nut.

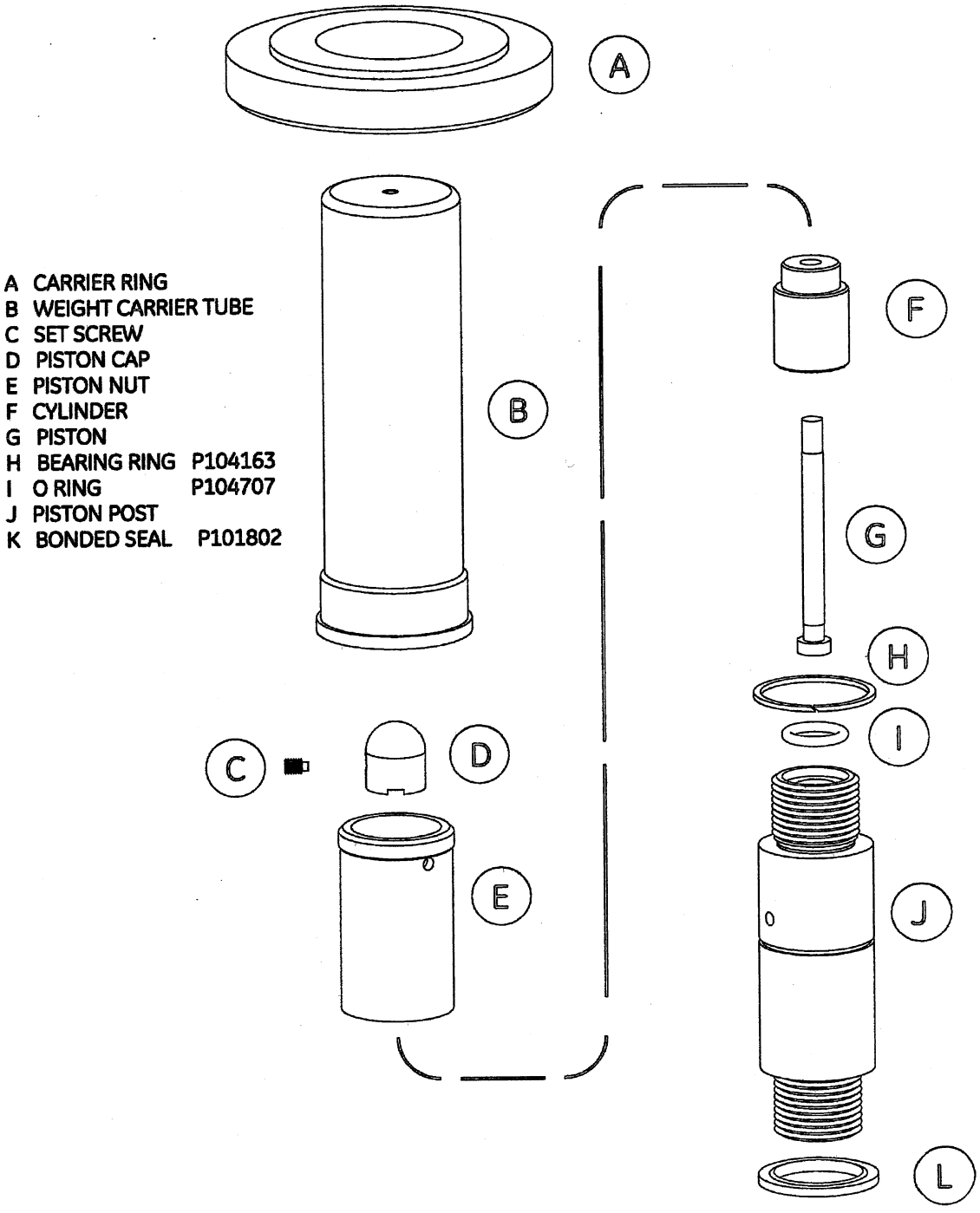
6.3.17 Replace piston cap (D), and secure with set screw (C) – DO NOT OVERTIGHTEN.

6.3.18 Carefully screw the assembly into the instrument, ensuring that the o-ring (I) is clean and undamaged, and correctly fitted to the piston post (J).

6.3.19 Replace weight carrier assembly (A & B), ensuring that it locates correctly on the piston cap.

REPLACEMENT PCU ASSEMBLY

NOTE: The piston and cylinder are a matched pair, which is calibrated and adjusted to a calculated mass figure. If, for any reason, the piston or cylinder becomes damaged, then the entire assembly must be replaced. The replacement assembly consists of the following components: - A through G.



A CARRIER RING
B WEIGHT CARRIER TUBE
C SET SCREW
D PISTON CAP
E PISTON NUT
F CYLINDER
G PISTON
H BEARING RING P104163
I O RING P104707
J PISTON POST
K BONDED SEAL P101802

5 mm PISTON CYLINDER ASSEMBLY

6.4 SCREW PRESS ASSEMBLY

6.4.1 Unscrew the large union nut (just behind the capstan hub) of the screw press assembly.

6.4.2 Withdraw the lead screw assembly from the barrel (C), taking care not to drop the rambler assembly (F).

6.4.3 The white, anti-extrusion ring (E) is a PTFE spiral, and can be removed by "unwinding" it from the rambler.

6.4.4 When removing the rambler seal (D), take care not to use any tool that may have a sharp edge that will scratch the surfaces of the rambler, otherwise it may leak when reassembled.

6.4.5 The replacement rambler seal can be eased over the front of the rambler, and into the groove.

6.4.6 Similarly, the new anti-extrusion ring can be "wound" into the groove in the rambler, behind the rambler seal.

6.4.7 If it is necessary to remove the barrel (C), the locknut (B) must be loosened approximately ½ turn. The barrel can then be unscrewed from the instrument manifold.

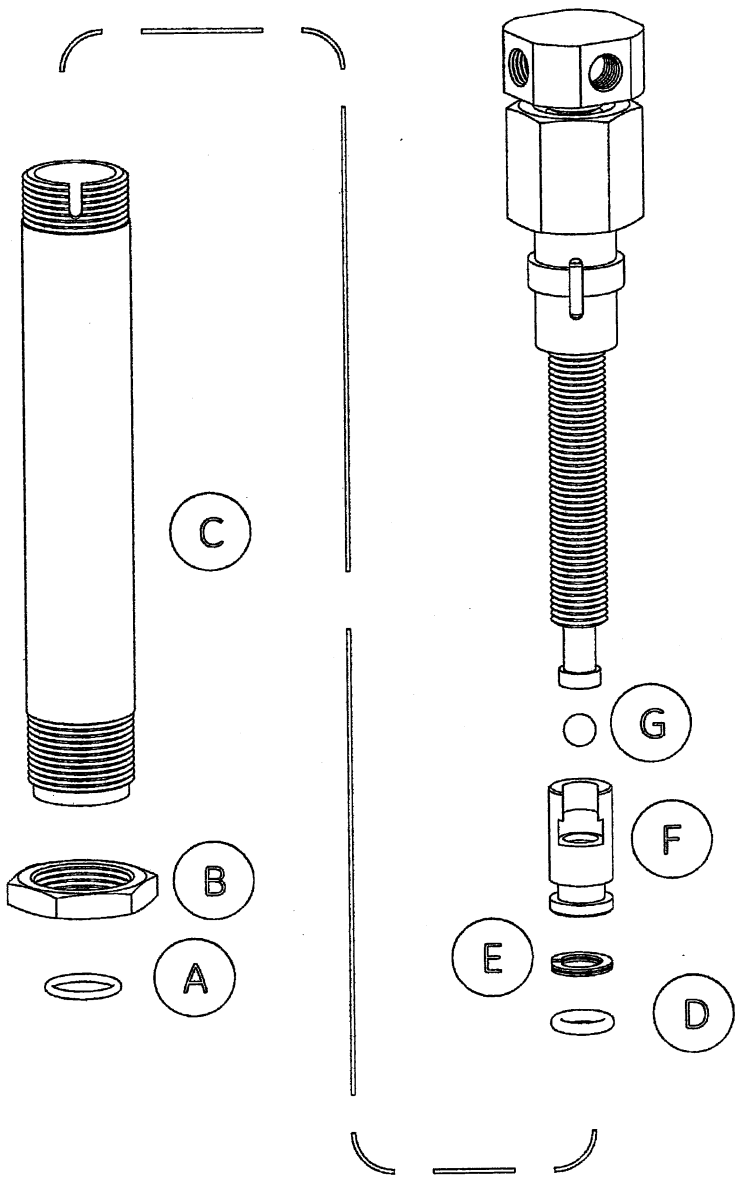
6.4.8 Before re-fitting the barrel, ensure that the barrel seal (A) is correctly located in the counter-bore in the front of the barrel. Screw the barrel fully into the manifold, and secure with the locknut.

6.4.9 Ensure that the rambler assembly is correctly located on the end of the lead screw assembly. Carefully introduce the rambler into the open end of the barrel; making sure that it does not tilt when entering the barrel.

6.4.10 Push the lead screw assembly fully in to the barrel, ensuring that the key in the nut locates correctly in the slot in the barrel.

6.4.11 Re-tighten the barrel union nut.

NOTE: If the lead screw assembly shows signs of excessive wear, then it is very likely that the associated components have worn also, therefore the screw press assembly is available as a spare part – see diagram for part numbers.



SCREW PRESS ASSY. (INCLUDES PARTS A TO G) PPA9317

A BARREL SEAL P101054
B LOCKNUT
C BARREL
D RAMBLER SEAL P104708
E ANTI-EXTRUSION RING P104707
F RAMBLER
G BALL

SCREW PRESS ASSEMBLY

SECTION 7.0
FAULT FINDING

7.1 POOR PCU SPIN/SENSITIVITY

GENERAL:

The weights floating on a clean PCU assembly will rotate freely, slowing down gradually to a complete stop. If the rotation stops quickly, then the PCU may be dirty and require cleaning. DO NOT ROTATE THE PISTON IF IT IS DIRTY AS PERMENANT DAMAGE CAN OCCUR.

If the spin/sensitivity of a recently cleaned PCU deteriorates quickly, then it is likely that the hydraulic system has become contaminated.

During the normal operation of a deadweight tester, the working fluid flows slowly through the tiny gap between the piston and its cylinder. If the hydraulic system has become contaminated, any particles will tend to move towards the PCU(s) and thus affect their performance, and possibly damage them.

If this is the case, the system must be completely dismantled, thoroughly cleaned and rebuilt before further calibration is carried out.

7.1.1 10 mm PCU Assembly:
Plug the test station to prevent leakage, and open the reservoir valve. Hold the weight carrier (F) and lift gently up and down, the piston should slide freely within its cylinder. If any resistance greater than fluid drag or a "gritty" sensation is detected, then the PCU must be removed and cleaned (see section 6.1).

7.1.2 2 & 3 mm PCU Assembly:
Pressurize the system with 1 large weight so that the piston is rotating and floating correctly. Gently push down on the rotating weight carrier (B) and release. This should result in a smooth, "bouncing" oscillation. If the piston does not rotate or "bounce" freely, it must be removed and cleaned (see section 6.2).

7.1.3 5 mm PCU Assembly:
Plug the test station to prevent leakage, and open the reservoir valve. Remove the weight carrier assembly (B). Hold the piston cap (D), and lift gently up and down, the piston should slide freely within its cylinder. If any resistance greater than fluid drag or a "gritty" sensation is detected, then the PCU must be removed and cleaned (see section 6.3).

Pressurize the system with 1 large weight so that the piston is rotating and floating correctly. If the piston does not rotate freely, it must be removed and cleaned (see section 6.3).

7.2 HIGH PCU FALL-RATE

GENERAL:

The piston will always fall slowly due to a small leak between the piston and cylinder. This fall rate will never be so fast that a stable reading cannot be made.

7.2.1 If the system has been pressurized quickly, then sufficient time must be allowed for the instrument to thermally stabilize. Continue re-floating the piston until the fall rate stabilizes, this should take no longer than one minute.

7.2.2 <u>If PCU has just been re-fitted after cleaning:</u>
Air pockets can be introduced when re-fitting a PCU. This will cause the piston to fall faster while the air bleeds between the piston and cylinder.

Continue to re-float the piston until the fall rate slows down. If the piston continues to fall quickly, then check for fluid leakage around the base of the PCU assembly. Check for loose/damaged/dirty seal under the PCU, tighten, clean or replace as necessary (see section 6).

7.2.3 Reservoir valve may be leaking.
Rotate reservoir cover through 180° and observe fluid level, it will rise slowly if the valve is leaking. This indicates that either the valve seal, or the seat itself, may be damaged or dirty. It should be disassembled, cleaned and inspected, then retested or replaced as necessary.

7.2.4 Rambler seal may be leaking.
Check lead screw in screw press for "wetness" when extended, the screw thread should be greased, not running with operating fluid. If lead screw is "wet", then replace rambler seal and anti-extrusion ring (see section 6).

7.3 SYSTEM WILL NOT PRIME

7.3.1 Check reservoir valve is closed.

7.3.2 Check for sufficient fluid in reservoir.

7.3.3 Check for damaged/missing/dirty test seal on test station.

7.3.4 Check that the face of the EUT is contacting the test seal, and that the surface is not scored or dented.

7.4 SYSTEM WILL NOT PRESSURIZE

7.4.1 Ensure correct valve operation during priming process.

7.4.2 Check EUT is not leaking.

7.4.3 Clean system externally, check for fluid leak by continually trying to pressurize. Wherever fluid appears, replace the seal – check sealing faces are clean and undamaged before re-assembly.

SECTION 8.0
STORAGE AND TRANSPORTATION

8.1 With the test station plugged, open the reservoir valve and turn capstan fully in, close reservoir valve.

8.2 Remove lower spoke from capstan, and store in compartment tray within storage case.

8.3 If fluid is to remain in the reservoir, ensure that the tester is kept level at all times to avoid spills. If not, drain the reservoir by means of a suction device, such as a tube fitted to a rubber bulb (an ordinary kitchen turkey baster works very well for this task).

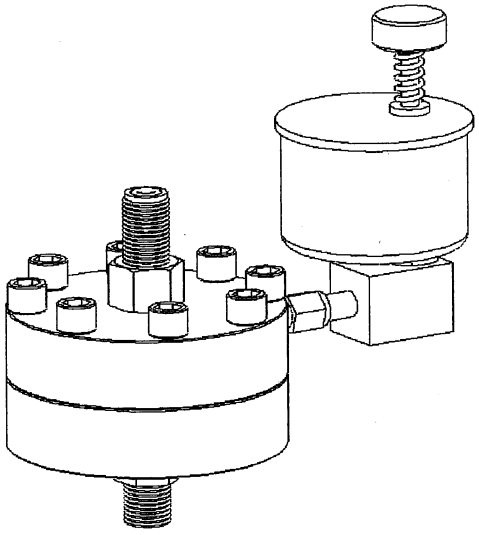
8.4 Place instrument inside storage case, use the adjustable feet to ensure that the case lid will close correctly. Secure with toggle clips.

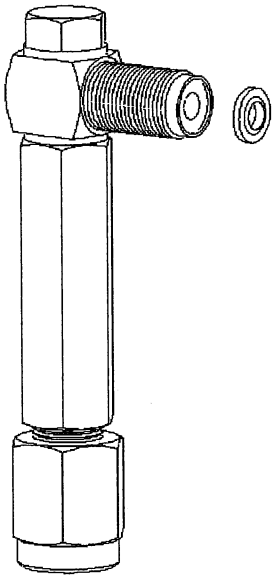
8.5 Stack all appropriate weights on the base of the wooden weight case, cover with lid, and secure by turning the handle fully down (clockwise). Ensure that handle is tight before attempting to lift the weight box.

SECTION 9.0
ANCILLARY EQUIPMENT

T3600 LIQUID SEPARATOR

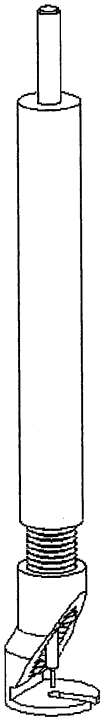
If there is any doubt that the instrument to be tested is not internally clean, then the addition of the T3600 Liquid Separator will protect the deadweight tester from contamination and possible damage. The T3600 is also particularly useful in applications where the instruments under test are used on systems that must not be contaminated by the operating fluid from the deadweight tester. The unit contains a flexible diaphragm that separates the two working fluids, preventing transfer either way.





T3700 ANGLE ADAPTOR

To calibrate gages with the pressure connection on the rear (e.g. panel-mount gages) in their correct position, an angle adaptor should be used. The angle adaptor fits directly onto the test station, converting it through 90 degrees, allowing the standard adaptors to be used.



T4600 POINTER REMOVER/PUNCH

To remove and refit the pointer of a pressure gage. This tool has a spring-loaded plunger to quickly and consistently refit the pointer.

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