

**Deadweight Testers  
and Gauges  
Instruction Manual**

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Appendix:

- Hydraulic Deadweight Test Certificate – 0.02% Accuracy (example)
- Deadweight Tester Ordering Guide
- MSDS for Hydraulic Oil
- SM 66 Oil-Water Separators (optional)

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# Description of Instrument

## General Information

Deadweight Testers are the basic primary standard for the accurate measurement of pressure. Chandler Testers are used to measure the pressure exerted by a gas or liquid and can also generate a test pressure for the calibration of pressure gauges, electronic pressure calibrators, transducers, transmitters, recorders, etc. No other device can match the stability, repeatability and accuracy of the Deadweight Tester.

## Measurement Principles

The most accurate instrument available for measurement of pressures above the range where manometers may be used is the Deadweight Tester. This type of tester operates on the principle of balancing a known mass against the force exerted by an unknown pressure on a piston of a known area.

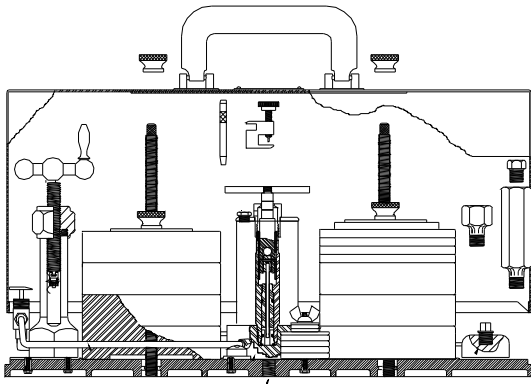
When an exact balance is achieved, the unknown pressure  $P$  is equal to mass  $M$  of the weights divided by the area  $A$  of the piston, according to the formula  $P = M/A$ .

## Tester Accuracy

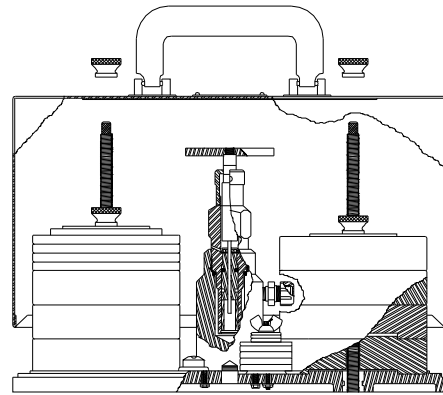
A Certificate of Calibration accompanies every new instrument, verifying that its accuracy will be 0.05% of reading or better. An optional certificate can be furnished when a 0.02% accuracy is required. A typical certificate is found in the Reference Section.

# Tester Models

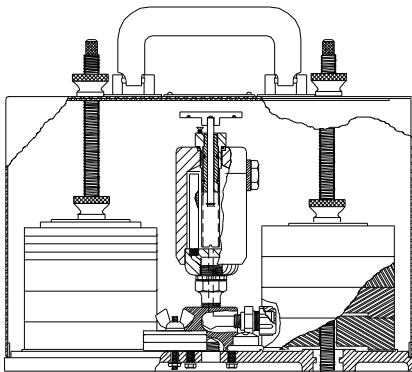
Numerous models are available to meet specific applications. Pressure ranges of the instruments vary from 3 to 400 psi, 50 to 15,000 psi and 100 to 30,000 psi. Dual-range instruments are available. Refer to the illustrations below and the reference guides found in the Appendix of this manual.



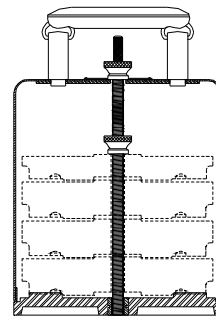
Model 2-1 Deadweight Tester



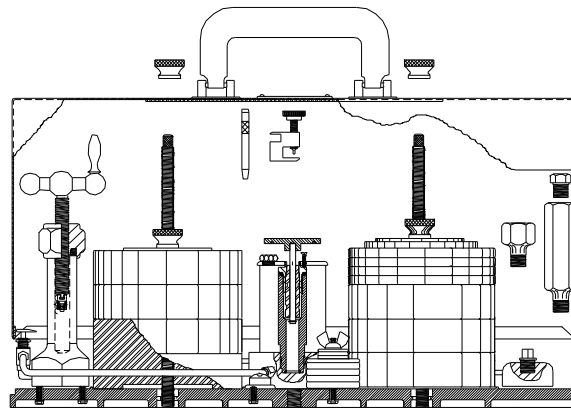
Model 5-1 Deadweight Gauge



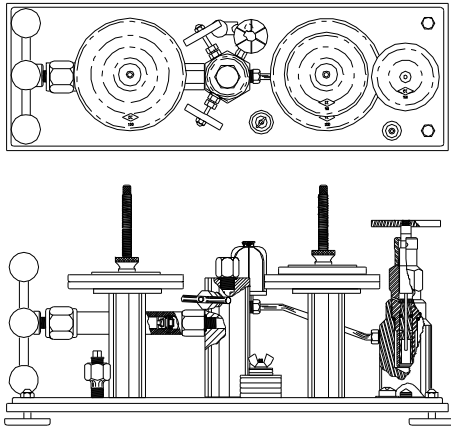
Model 15-1 Deadweight Gauge



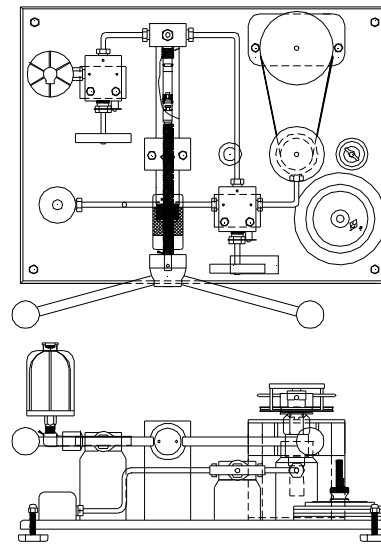
Model 15-63 Weight Case



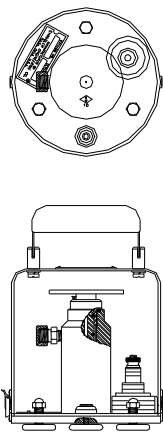
Model 23-1 Deadweight Tester



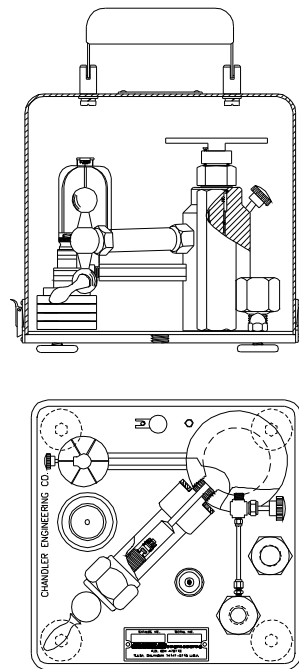
Model 55-1, 55-100 Deadweight Tester



Model 58-100, 58-200, 58-300 Precision Pressure Standard (PPS)



Model 59-1 Featherweight Gauge



Model 61-1, 61-30 Featherweight Gauge

### **Dual-Range Testers**

Dual-range Testers have interchangeable pistons and cylinder assemblies. The operator can change the assembly quickly, converting the range of the instrument. Dual-range instruments are calibrated in PSIG or in Metric (SI) Units.

Pistons in the dual-range units generally have an area ratio of 5:1, meaning that maximum pressure for the tester is five times the pressure selected for the low range. Their weights are common. The weights are double-stamped; the smaller number representing the pressure produced on the low pressure piston.

## **Tester Components and Accessories**

A typical Deadweight Tester consists of the same components comprising a Deadweight Gauge, in addition to a hand-operated, self-contained pump for the generation of pressure. Included are a piston, cylinder, table, weights, associated plumbing, and an oil reservoir.

Tester components are mounted on a base and are protected by a carrying case. Connecting adapters, pointer drivers and a hand jack (for working on gauges) accompany each instrument.

Tester specifications and lists of replacement parts are provided for the specific instruments described by this manual.

### **Motor Drive Accessory**

To achieve optimum sensitivity, friction between the piston and the cylinder of the tester must be minimized while these parts are sliding vertically to indicate a pressure/weight imbalance. If the piston is slowly rotated, frictional forces are reduced, and balance sensitivity is increased. Normally, rotation of the piston is initiated by hand.

(For optimum sensitivity, a slow, consistent rotation of the table is desired. The consistency is achieved with Model 58 by connecting a fractional horsepower electric motor and flexible drive, which contribute negligible vertical force to the spinning weights. The motor is driven by 115 volt, 50/60 Hz power. A transformer is furnished when the voltage is 230 volts.)

### **Tripod Accessory**

Optional Tripods are available as supports for testers in the field. Order Chandler p/n 09-0020.

### Oil-water Separators

Model 05-0202: Oil-Water Separator is rated for 10,000 psi (69,000 kPa). It is similar to the Model 05-0194 and is supplied complete with valves and stainless steel tubing.

Model 05-0194: Oil-Water Separator used with any Chandler Deadweight Gauge or Tester. It is rated for 5,000 psi (34,500 kPa) and is a stand-alone unit. It comes complete with inlet valve, outlet valve, drain valve, and 10 feet of 1/8" diameter stainless steel tubing to connect it to the deadweight instrument.

Model 02-0071: The 02-0071 Oil-Water separator is rated for a Pressure of 5,000 psi (34,500 kPa) and is designed for use with the Model 02-001 and Model 23-001 Deadweight Testers. It will fit inside the tester case for transportation.

Model 55-0036: Oil-Water Separator specifically designed for use with the Model 55-100 Deadweight Tester. It can be mounted on the side of the tester case for transportation. The pressure rating is 6000 psi (41400 kPa).

See SL 66 in *Reference Section* of this manual for pictorial view of the above describe options.

## Instrument Specification Sheet

Specification	Value
<b>Maximum Pressure:</b>	Up to 30,000 psi (or 206.8MPa) depending on range.
<b>Minimum Pressure:</b>	3 to 50 psi depending on range (table must be spinning to achieve indicated pressure).
<b>Accuracy:</b>	0.05% of indicated pressure (optional 0.02% of indicated pressure).
<b>Certificate of Calibration:</b>	Accuracy 0.05%. Optional 0.02% Certificate available upon request.
<b>Calibration Temperature:</b>	See calibration sheet for oil temperature at which your instrument was calibrated.
<b>Gravity:</b>	Calibration based on standard gravity of 980.665 cm/sec <sup>2</sup> Calibration may be referenced to user specified gravity (Contact Chandler Engineering)
<b>Recommended Operating Range:</b>	40 to 120°F (4 to 48°C)
<b>Humidity:</b>	0 to 95% RH
<b>Vibration:</b>	Small amplitude, high frequency only.
<b>Environment:</b>	Minimize dust and corrosive atmosphere
<b>Typical Shipping weight:</b>	50 lb (18 kg) to 250 lb (115 kg) depending on pressure range Model 58, 120 lb (58 kg) to 325 lb (146 kg) depending on range
<b>Piston Material:</b>	Hardened stainless steel
<b>Pressure Tubing Material:</b>	Stainless steel
<b>Weight Materials:</b>	Brass or stainless steel
<b>Pressurizing Fluid:</b>	Hydraulic <b>oil</b> (Chandler p/n 23-0070), standard (Chandler p/n P-1169 synthetic oil optional for special requirements)
<b>Input Connector:</b>	1/4 in. NPT
<b>Seal Material:</b>	Buna-N (other materials available – Contact Chandler Engineering)
<b>Carrying Case:</b>	Metal case with handles.

## Accuracy of Chandler Engineering Deadweight Instruments

1. All Chandler Engineering Deadweight instruments are calibrated with traceability to a National Institute of Standards and Technology (*NIST*). Pressure standards are referenced on the certificate supplied with the instrument.
2. The instrument calibrations performed for temperature are based on Standard Gravity 980.665 cm/sec<sup>2</sup>. The temperature and pressure coefficients are found on the certification sheet supplied with each deadweight instrument.

3. If accuracy greater than 0.05% is desired, a Certificate of Calibration is furnished. If the "actual psi" values on the certificate are used, the instrument will have an accuracy of 0.05% or better. Reference the equations for correcting for the effects of temperature, pressure, buoyancy and elevation.

## Correction Equations for use with Deadweight Testers

If a deadweight gage tester is to be used in work for which an accuracy of 0.05% is adequate, then the nominal pressure (sum of the mass values loading the piston) may be taken as the correct pressure.

A deadweight tester is capable of measuring pressures with much higher accuracy, provided the user applies corrections for the errors inherent in the device.

The deadweight tester supplied by Chandler Engineering provides pressures that are referenced to standard gravity (980.665 cm/sec<sup>2</sup>) at ambient oil temperature. In most cases, standard gravity should be used, eliminating the need to correct for local gravity. The output pressure from the deadweight tester is affected by a difference in local gravity as compared to standard gravity. Similarly, the effects of buoyancy, ambient temperature, elevation of the transducer relative to the piston, and the pressure effect on the piston effective area must be considered.

Use the following equations to apply correction factors to the pressure output for different ambient temperatures, output pressures, and reference elevations.

$$P_{corr} = \frac{1}{1000} \left( \frac{M_{app}}{A_{cyl}} F_{gravity} F_{buoyancy} F_{temp} F_{press} \right) \pm P_{head}$$

$$F_{buoyancy} = 1 - \frac{D_{air}}{D_{mass}}$$

$$P_{head} = D_{oil} (H - H_{ref})$$

$$F_{press} = \frac{1}{1 + bP}$$

$$F_{temp} = \frac{1}{1 + (a_{cyl} + a_{piston})(T - T_{ref})}$$

$$F_{gravity} = \frac{G}{G_s}$$

where,

- $M_{app}$  = total of the masses from the test certificate, grams
- $A_{cyl}$  = piston area at reference temperature and pressure,  $cm^2$
- $G$  = local gravity,  $cm/sec^2$
- $G_s$  = standard gravity,  $980.665 cm/sec^2$
- $D_{air}$  = density of air at reference temperature and pressure,  $gram/cm^3$
- $D_{air}$  =  $0.0012 gm/cm^3$  at  $25^\circ C$  and atmospheric pressure
- $D_{mass}$  = density of mass weights,  $gram/cm^3$
- $D_{mass}$  =  $8.39 gm/cm^3$  (unless specified otherwise)
- $D_{oil}$  = density of oil,  $gm/cm^3$
- $D_{oil}$  =  $0.83 gm/cm^3$  (unless specified otherwise)
- $a_{cyl}$  = thermal expansion coefficient of the cylinder,  $1/^\circ C$
- $a_{piston}$  = thermal expansion coefficient of the piston,  $1/^\circ C$
- $a_{cyl} + a_{piston}$  =  $2.59 \times 10^{-5} 1/^\circ C$  (unless specified otherwise)
- $T$  = ambient temperature,  $^\circ C$
- $T_{ref}$  = reference temperature (see calibration sheet for temperature, provided with instrument)
- $b$  = pressure coefficient of the effective area,  $cm^2/kg$
- $b$  =  $9.39 \times 10^{-7} cm^2/kg$  (unless specified otherwise)
- $P$  = nominal pressure,  $kg/cm^2$
- $H$  = transducer elevation above or below the base plate,  $cm$
- $H_{ref}$  = distance from the top of the base plate to the bottom of the piston,  $cm$  (with piston level between scribed lines)

**Example of Use of the Deadweight Formulas**

An operator wishes to check a transducer calibration with a pressure source accuracy of 0.02% referenced to local gravity instead of standard gravity. The calibration is to be performed at Peoria, Illinois, with a tester temperature of  $27^\circ C (80.6^\circ F)$ , at an indicated pressure of  $17.6 kg/cm^2 (250 psi)$ . The transducer is located  $7.62 cm (3 in)$  above the base plate of a Model 5-1 tester.

The operator finds, from the U.S. Coast and Geodetic Survey, that the value of local gravity is  $980.17 cm/sec^2$ . The piston area listed on the test certificate is  $0.39669 cm^2 (0.06149 in^2)$ . He uses the following weights, with their respective masses, obtained from the test certificate:

Nominal Pressure, P (psi)	Mass, $M_{app}$ (grams)
200	5580.09
20 A	558.055
20 B	558.191
10 Piston	278.869
250 psi ( $17.6 kg/cm^2$ )	6975.205 grams

Using the formulas,

$$F_{gravity} = \frac{980.17}{980.665} = 0.99950$$

$$P_{head} = \frac{(0.83)(7.6^2 - 6.4)}{1000} = 0.00101 \text{ kg/cm}^2$$

$$F_{press} = \frac{1}{1 + (9.39E-07)(17.6)} = 0.99998$$

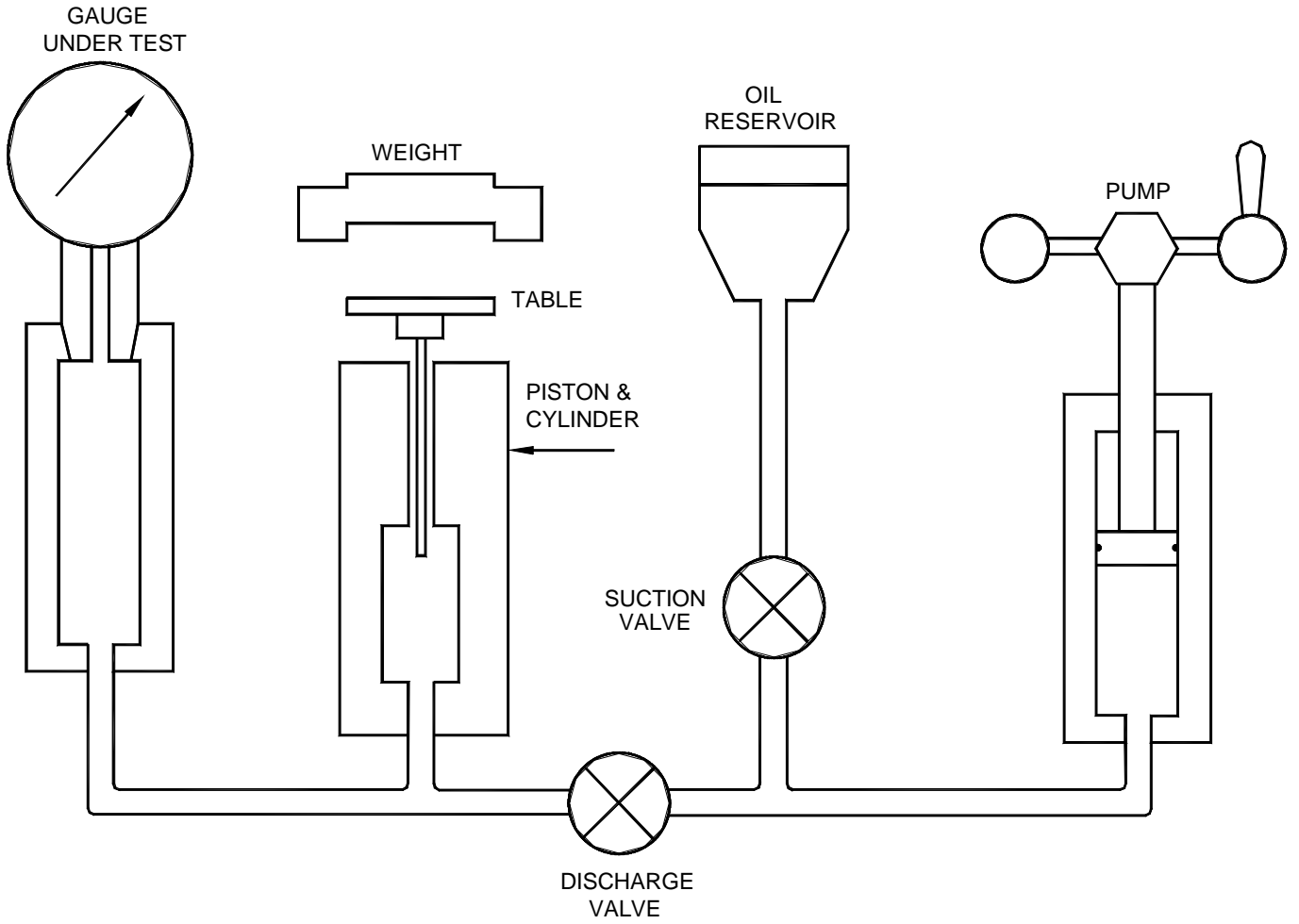
$$F_{buoyancy} = 1 - \frac{0.0012}{8.39} = 0.99986$$

$$P_{corr} = \frac{6.975205}{0.39669} (0.99950)(0.99986)(0.99995)(0.99998) - 0.00101 = 17.570 \text{ kg/cm}^2$$

Note that all previous calculations are performed using metric units. The following table will assist users in converting the results into other units of pressure.

Piston Height above the top of the Base plate		
Model Numbers	Height, cm	Height, in
5-1, 55-1, 58-1	6.4	2.5
23-1, 23-145	7.9	3.1
2-1	3.1	1.2
61-10, 61-30	6.6	2.6
15-1	10.9	4.3

Pressure Conversion Factors		
From	to	Multiply by
kg/cm <sup>2</sup>	psi	14.223343
kg/cm <sup>2</sup>	kPa (kN/m <sup>2</sup> )	98.0665
kg/cm <sup>2</sup>	Bar	0.980665
kg/cm <sup>2</sup>	Dynes/cm <sup>2</sup>	980665.0
kg/cm <sup>2</sup>	N/cm <sup>2</sup>	9.80665
psi	kPa (kN/m <sup>2</sup> )	6.894757
psi	Bar	0.06894757
kPa	Bar	0.01



Basic Hydraulic Schematic of a Typical Deadweight Tester

# Section 1 - Quick Start

## Unpacking the Deadweight Tester

The Chandler Engineering Deadweight Tester or Gauge and its accessories were tested and inspected before the unit was shipped from Chandler Engineering.

Carefully uncrate and inspect the instrument and its accessories. If the unit is received in a damaged condition, immediately notify Chandler Engineering in writing, and file a claim with the carrier.

## Where to Find Help

In the event of problems, the local sales representatives will be able to help or the personnel at Chandler Engineering can be contacted.

- Telephone number: 918-250-7200
- Fax number: 918-459-0165
- E-mail address: [chandler@chandlereng.com](mailto:chandler@chandlereng.com)
- Website: <http://www.chandlereng.com>

## Tools/Equipment Required

- High pressure tubing (must be rated for use at the maximum pressure of the instrument)
- Suitable high pressure fittings or adapter fittings (must be rated for use at the maximum pressure of the instrument)
- Adjustable wrench or suitable open-end wrench
- A supply of proper oil

## Safety Requirements

Read and observe the following precautions:

- *Do not attempt to substitute common pipe fittings in place of original high pressure fittings used in the plumbing systems on these instruments. Common pipe fittings are not rated for high operating pressure used in these instruments, and the use of such fittings will void the warranty and may create a potentially dangerous condition. Use OEM fittings listed in the replacement parts section of this manual, available through Chandler Engineering.*
- *Always wear safety glasses when operating instrument. A high pressure oil leak can cause permanent eye damage.*
- *Do not attempt to operate the instrument in excess of the maximum pressure noted on the instrument. Before a dual-range tester is operated, verification of the device's pressure range is essential. Caution labels are attached to the instrument. These must be followed for operator safety.*

- *"NO SMOKING" signs are to be displayed in laboratories and on laboratory doorways whenever testers are being used for instrument calibration. Because a leak in the tester's high-pressure line can release an explosive mist of oil, proper fire extinguishers should be immediately available.*
- *Pre-load the tester's piston with weights before applying pressure to the gauge. Otherwise, shock from the pressure can dislodge the piston retainer ring, allowing the piston to fly out of the tester at high velocity. The operator could be seriously injured if standing directly over the instrument.*
- *Spinning the table counterclockwise and failing to load the table with weights before introducing pressure into the instrument can cause the Table to spin off on some models, and the pressure nut to blow off, allowing the piston to become a dangerous projectile.*
- *When a tester is used to test a gas or liquid line pressure, connecting tubing and fittings should be rated at a pressure that is higher than the line pressure.*
- *If the test fluid or gas (oxygen) will be reactive with the oil in the tester's reservoir, testing must be performed with an instrument supplied with P-1169 synthetic oil. Before hydraulic oil is replaced with part P-1169, the tester must be thoroughly cleaned, and the seals should be replaced to insure proper cleaning.*
- *Before bleeding pressure from the tester, the valve at the pressure source should be closed. The instrument's pressure should then be slowly bled to atmosphere. If a vent valve is unavailable, the fitting at the tester should be carefully and slowly loosened. This procedure is to create a small leak, minimizing the volume of oil that will enter the interconnecting tubing.*
- *Hydraulic Fluid, such as: Shock absorber, brake fluid, or transmission fluid may **not** be substituted for the hydraulic oil specified for the instrument.*

*Note: Only approved oils are to be used as tester oils: Chandler p/n 23-0070 Hydraulic Oil, or equivalent, and Chandler p/n P-1169 Synthetic Oil.*

## Setting Up and Operating the Deadweight Tester

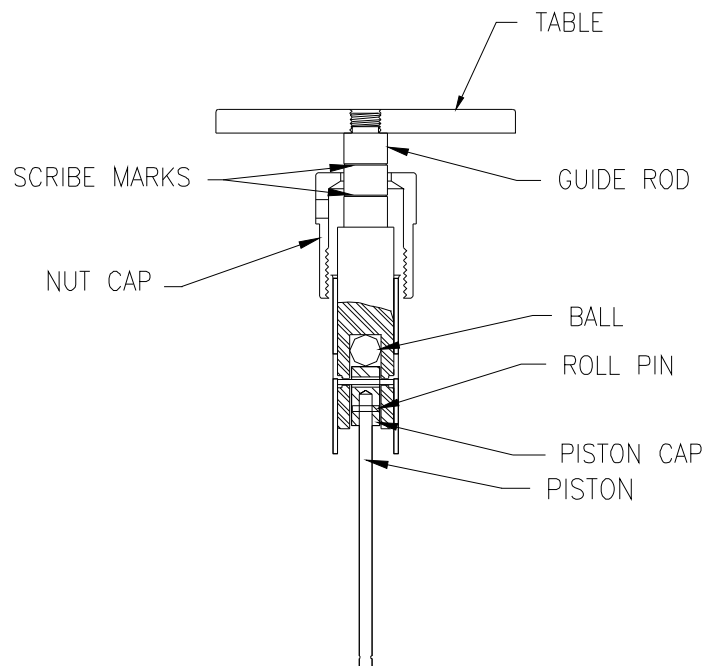
### Procedure for Calibrating a Gauge

1. Position instrument on table. The weight table of the Deadweight Tester must be level and stable before a gauge is calibrated with the tester. A level is mounted on the tester's base plate for leveling the instrument.
2. Remove the carrying case cover, weight rods, and weights from the tester's base.
3. Fill reservoir with oil.

4. Connect the gauge to be calibrated to the tester, using one of the adapters supplied with the tester.
5. Apply pressure. Close the suction line valve, open the discharge valve, and use the hand-operated oil pump to generate pressure applied to both the piston and the gauge being calibrated.
6. Float the table. When the table, while loaded with appropriate weights, "floats" while being rotated, the known pressure is being applied to the gauge being calibrated, and its indication or dial can be observed.

*Note: Maintain pressure by keeping the guide rod positioned between the two scribe marks on the guide rod, increasing or decreasing pressure as necessary.*

7. If the reading of the gauge being calibrated is in error, the gauge can be adjusted while pressure is still applied from the tester.

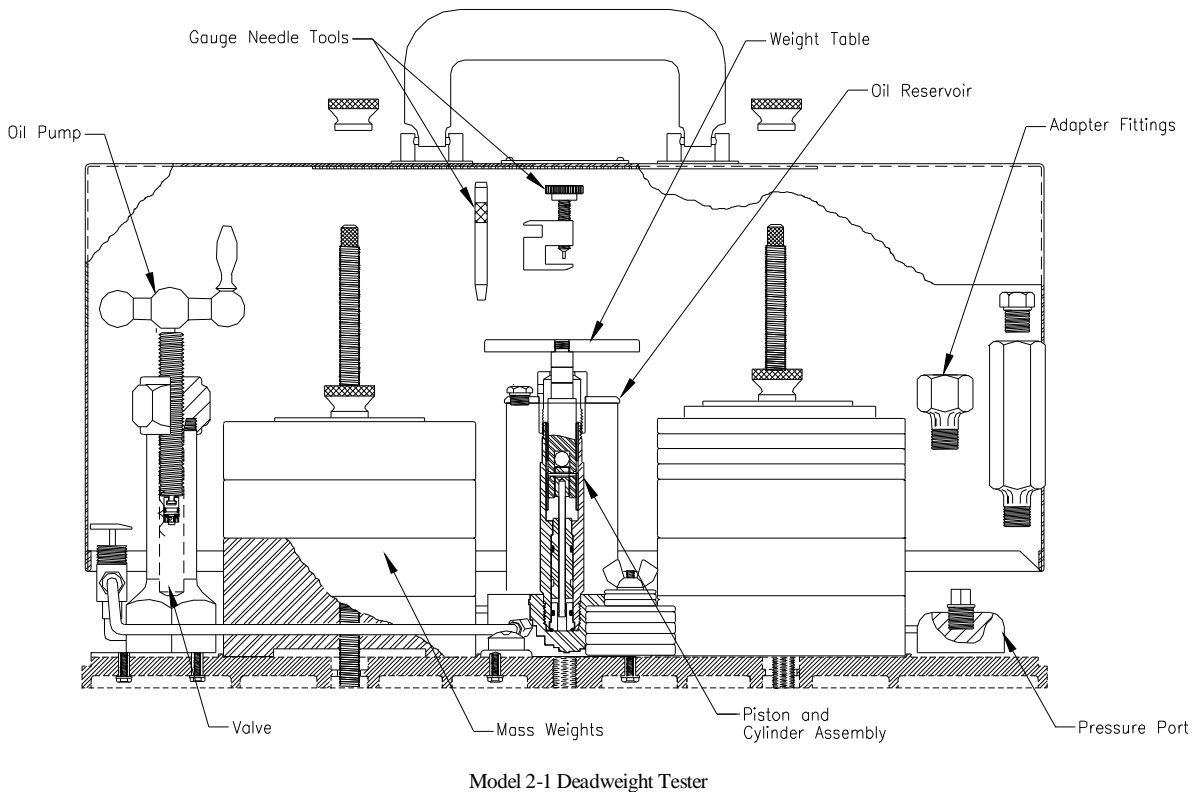


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# Section 2 - Operating Instructions

## Operating Instructions

An illustration showing an assembly of a Model 2-1 tester is shown below:



### **Procedure for Calibrating the Gauge**

The weight table of the Deadweight Tester must be level and stable before a gauge is calibrated with the tester (or if the tester is used as a gauge to determine an unknown pressure). A level is mounted on the tester's base plate for leveling the instrument. In the field, a tripod provides a stable support for the device.

After the carrying case cover, weight rods, and weights are removed from the tester's base, the gauge to be calibrated is connected to the tester, using one of the adapters supplied with the tester. When the gauge is connected to the tester, the gauge becomes part of the tester's pressure chamber. To apply pressure, the suction line valve is closed, the discharge valve opened, and the oil pump is hand-operated to generate pressure applied to both the piston and the gauge being calibrated.

*NOTE: On models using retaining rings: If weight in excess of the expected pressure is not placed on the table, and the ring sustains shock, examine the ring to ensure that it is still tight in its groove. The ring should fit securely and not be*

*easy to turn with the finger. If the ring is removed for piston cleaning or piston and cylinder replacement, the ring should be checked for tightness after it is reinstalled.*

When the piston, loaded with appropriate weights, "floats" while being rotated, the known pressure is being applied to the gauge being calibrated, and its indication or dial can be observed.

If the reading of the gauge being calibrated is in error, the gauge can be adjusted while pressure is still applied from the tester.

### **Adjusting Test Gauges**

Calibration of this type of instrument will normally consist of removing the pointer from its shaft and then reattaching it to the shaft at the proper indication. Two tools are furnished with the tester to aid in this corrective procedure. One is a hand jack that assists in removal of the pointer from its shaft. The other is a pointer driver that can be used as a drift punch to tap the pointer back onto its shaft without damage to the gauge.

**NOTE:** *Both accessories are attached to the base of a new tester. The technician should make certain to store them after their use, using the mounting screws that are provided in the tester's base.*

### **Preparing Tester for Transport**

After the test gauge has been calibrated, the oil in the tester's piston should be pumped back onto the tester's reservoir and the test gauge removed from the tester. Then the weights, weight rods, and tester cover are replaced, preparing the tester for the next job.

### **Using Tester as a Deadweight Gauge**

When an unknown pressure is to be measured by a tester, the tester's chamber is filled with oil, and the unknown pressure is applied through a valve and a tube or hose and then through the connector that is mounted on the tester's base.

The **Deadweight Tester** measures applied pressures using the same principle as the **Deadweight Gauge**. The only differences are the parts that comprise the pressure chambers. In either configuration, the external pressure is applied to the bottom of the piston and is balanced by the mass of the weights that are added to the table.

### ***Single valve instrument***

1. When an unknown pressure is to be measured by a tester, the tester's chamber is filled with oil, and the unknown pressure is applied through a valve and a tube or hose and then through the connector that is mounted on the tester's base.
2. To move oil from the reservoir into the chamber, open the valve by turning the valve handle until the pointed end is facing in the direction of "Suction Valve" on the pump. The pump handle is turned counterclockwise to pull oil into the pump.

3. Turn the valve to the discharge position by turning the pump handle clockwise to force the oil out of the pump and into the pressure chamber.
4. To transfer another pump load of oil, the valve is placed in the suction position, and the process is repeated.
5. When using the Tester to measure unknown pressure, the valve should be closed (center position).
6. After the unknown pressure has been measured by the tester, the oil is returned to the reservoir by reversing this procedure.

### ***Two valve instrument***

1. When an unknown pressure is to be measured by a tester, the tester's chamber is filled with oil, and the unknown pressure is applied through a valve and a tube or hose and then through the connector that is mounted on the tester's base.
2. To move oil from the reservoir into the chamber, the discharge line valve is closed, and suction line valve is opened. The pump handle is turned counterclockwise to pull oil into the pump. Then, the suction line valve is closed, and discharge line valve is opened.
3. Turn the pump handle clockwise to force the oil out of the pump and into the pressure chamber.
4. To transfer another pump load of oil, the discharge line valve is closed, the suction line valve opened, and the process is repeated.
5. When using the Tester to measure unknown pressure, both valves should be closed.
6. After the unknown pressure has been measured by the tester, the oil is returned to the reservoir by reversing this procedure.

### **Testing Gauges and Pressure Transducers with Air**

Air or inert gas may be used to calibrate a gauge (or pressure transducer) whenever contamination of the gauge with oil is unacceptable. An adapter is installed in all Models 55 and 61 to ensure that the air or gas from the supply tank and oil from the tester's reservoir are segregated.

1. Screw Reservoir Adapter into connector of tester's base plate.
2. Install the optional manifold (refer to drawing 23-0071) consisting of stainless steel tube, tee, valves, and fittings into top of Reservoir Adapter.
3. Pump oil from reservoir to Reservoir Adapter, filling Adapter approximately 1/3 full. Close both pump valves.

4. Attach supply line from tank regulator (refer to drawing 23-0071) to manifold tee.
5. Screw gauge to be tested into top of manifold.
6. Place weight on weight table equal to gauge's first increment (number to be read).
7. Open tank's regulator valve to pressure represented by weight on table until piston floats.
8. Read gauge and record error.
9. Repeat procedure for each, next-higher calibration increment on gauge, making certain that additional weight is placed on weight table before regulator is opened farther.
10. Reverse calibration steps after highest reading of gauge is recorded, making certain that regulator is backed off before each weight is removed from table.

### **Use Of Chandler Deadweight Instruments With Water**

All Chandler Deadweight Instruments can be used with water as the media. Trouble free operation, giving the sensitivity of which the instrument is capable, is assured if a fluid with better lubricity than water is in contact with the piston and cylinder. Chandler's p/n P-1169 inert Synthetic Oil is recommended. This fluid is chemically inert and safe for use with reactive gases. It has twice the density of water and will not emulsify. Alternatively, an oil-water separator accessory can be attached, providing oil is used to lubricate the piston and cylinder. Separators illustrated in Data Sheet SL 66 are shown in the *Reference Section* of this manual.

Typical applications, where the P-1169 Synthetic Oil is advantageously used, follow:

1. Hydrostatic testing, where water is the media supplied to the Deadweight Gauge or Tester;
2. Testing of Indicating Spring Gauges, for use with reactive gases, where it is desired to have a non-combustible fluid contact the gauge. In this case, a new instrument should be ordered "Cleaned for Reactive Gas Service," or if an existing instrument is used, it should be cleaned by the operator, using a suitable cleaning agent.

# Section 3 - Maintenance Schedule

## Tools Required

- Adjustable wrench or suitable open-end wrenches
- Snap ring pliers

## Cleaning and service tips

To ensure accuracy of DEADWEIGHTS, care must be taken to:

1. TRANSPORT THE INSTRUMENT WITH THE COVER IN PLACE. If the cover becomes damaged, it should be replaced.
2. Firmly tighten the knurled nut on the weight rod before transport to avoid abrasion of the weights and loss of their mass.
3. If the weights are abraded in transport or are damaged by being dropped, they should be replaced.
4. Clean the weights with a soft brush rather than with a coarse or soiled cloth to avoid altering the mass of the weights.
5. Avoid contaminating the instrument with dust and grit, preventing unnecessary wear of moving parts. Contamination of the oil in the system will accelerate piston and cylinder wear and degrade instrument accuracy.
6. Fill the oil reservoir through the filler cap with Chandler p/n 23-0070 supplied by the factory before an instrument is used for the first time. The oil level must be maintained above the lower end of the cylinder, or the gas will bypass the oil. When field temperatures are extremely cold, fill the reservoir with SAE 10 non-detergent motor oil. Maximum sensitivity of the instrument to pressure requires that the oil be "light" at the time of measurement.
7. For the instrument to be sensitive, the metal-to-metal interface of its piston and cylinder is designed to allow for the minor escape of oil past the piston to minimize friction and lubricate the piston. Therefore, some leakage past the piston is normal and necessary. A moderate escape of oil can be controlled by adding heavier oil. Excessive leakage or "blowing" of oil past the piston indicates excessive wear of the assembly and requires replacement of the assembly. If the model and serial numbers of the instrument are furnished, the piston and cylinder assembly and the weights can be replaced without need for factory calibration.
8. Replace hydraulic **oil** (*do not use brake fluid, shock absorber, or transmission fluid*) in the reservoir with Synthetic Oil (p/n P-1169 available from the factory) when the test fluid or gas (oxygen) will be reactive with the hydraulic oil. Before use with oxygen, clean and purge the system, and replace all seals.

9. Ensure that high-pressure fittings of the instrument are tight when operating the instrument indoors.
  
10. Remove the piston and cylinder for cleaning by unscrewing the adapter nut. If the nut is sealed to the body with an O-Ring, it should only be finger tightened when replaced.

## Certification procedures

The Chandler Engineering deadweight tester or gauge is a precision device that will require periodic re-certification due to wear of the piston area and weights.

To re-certify the deadweight, ship the instrument to Chandler Engineering. Trained personnel will repair any damaged components and perform a “cross-float” with the Chandler Engineering NIST Master deadweight. Once completed, an updated certificate is issued that included the new piston area and the mass of each weight (referenced to 980.665 standard gravity unless a local gravity is requested).

## Oil changes

Replace the oil if any contamination is suspected. Corrosive contaminants in the oil may damage the piston and cylinder assembly.

## Maintenance Schedule

Action	Time Interval
Inspect condition and safety of instrument	After each use
Change oil	Every 6 months or as necessary
Re-certify	Every 1 – 2 years

# Section 4 – Troubleshooting Guide

PROBLEM	REMEDY
<p>Gas escapes past piston when used to determine unknown gas pressure.</p>	<p>Insufficient oil in Reservoir Adapter. Shut off and bleed pressure from tester. Pump oil to adapter until reservoir is full.</p> <p>Damaged Cylinder O-Ring. Unscrew cap nut. Remove guide rod and piston. Use wrench to unscrew cylinder adapter. Push cylinder from adapter with pencil and replace O-Ring.</p>
<p>Gas bubbles or blows into oil of center reservoir when determining unknown gas pressure.</p>	<p>Damaged adapter O-Ring. Unscrew cap nut. Remove guide rod and piston. Use wrench to unscrew cylinder adapter. Push cylinder from adapter with pencil and replace O-Ring.</p>
<p>Not sensitive to small weight changes when used to determine unknown gas pressure.</p>	<p>Over-tightened cylinder cap nut. Unscrew cap nut. Re-tighten only until snug.</p> <p>Dirty oil. Remove oil. Clean reservoir with solvent. Fill reservoir with clean oil.</p> <p>Damaged Piston. Remove piston &amp; cylinder as per above "Damaged O-Ring" Clean with solvent. If "Binding" is evident, replace with new part 2-0009 Piston and Cylinder Assembly.</p> <p>Cold weather makes standard oil too viscous. Replace standard oil with P-1484, low temperature pour-point oil.</p>
<p>Pressure cannot be maintained when calibrating another pressure gauge.</p>	<p>Air is drawn into pump because of insufficient oil in center reservoir. Unscrew 2-0007 Cap and check oil level in reservoir. Add oil if necessary.</p> <p>Damaged cylinder adapter O-Ring. Unscrew cap nut. Remove guide rod and piston. Use wrench to unscrew cylinder adapter. Push cylinder from adapter with pencil and replace O-Ring.</p> <p>Leakage through valve.</p>

**4-2 SECTION 4 - TROUBLESHOOTING GUIDE**

---

PROBLEM	REMEDY
Excessive oil leakage at piston.	<p>Damaged cylinder O-Ring. Replace P-0062 O-Ring.</p> <p>Oil too light. Check and remove fluid in reservoir if it is shock absorber or brake fluid. Replace with Hydraulic <b>Oil</b> (Chandler p/n 23-0070 or equivalent)</p> <p>Worn piston &amp; cylinder assembly. Replace with new part 2-0009 Piston &amp; Cylinder Assembly.</p>
Not sensitive and/or inaccurate operation during hydrostatic testing.	<p>Water emulsifying with tester oil. <u>Best</u> - Use P-1169 synthetic oil instead of standard mineral oil.</p> <p><u>Satisfactory</u> - Use part 02-0071 oil water separator.</p>





Part Number	Description	2-1	5-1	5-100	5-300	15-1	23-1	55-1	55-100	55-200	58-1	58-100	58-200	58-300	59-1	61-1	61-30
55-0016	Adapter, 1/2" FP to Gauge Connector							X							X		
55-0018	Rod, Weight							X							X		X
55-0020	Assembly, Piston and Cylinder		X					X									
55-0029	Nipple, Oil Reservoir							X									
55-0030	Tube, Body to Gauge Connector							X									
55-0033	Retainer, Valve Bonnet							X									
55-0034	Kit, Replacement Seal							X									
57-0002	Plate, Name	X	X	X	X	X	X	X							X	X	X
57-0003	Plate, Serial	X	X	X	X	X	X	X							X	X	X
58-0013	Assembly, Pump Plunger										X						
58-0015	Ring, Backup										X						
58-0024	Assembly, Piston Pulley										X						
58-0025	Assembly, Piston and Cylinder	X									X						
58-0055	Assembly, Piston and Cylinder										X		X				
58-0074	Kit, Replacement Seal							X									
58-0311	Body	X	X	X				X	X	X			X	X			
58-0339	Assembly, Piston and Cylinder	X	X	X	X			X	X		X		X	X			
59-0002	Base														X		
59-0003	Body														X		
59-0004	Assembly, Cover														X	X	X
59-0006	Assembly, Piston and Cylinder														X	X	X
59-0013	Case, Base Weight														X	X	X
59-0015	Assembly, Weight Case (less weights)														X	X	X
59-0040	Assembly, Piston and Cylinder														X		X
59-0068	Kit, Replacement Seal														X		
61-0002	Body															X	X
61-0003	Base Plate															X	X
61-0004	Pump Cylinder															X	X
61-0005	Gauge Connector															X	X
61-0006	Reservoir Connector															X	X
61-0007	Assembly, Cover, Case															X	X
61-0014	Kit, Replacement Seal															X	X
C09539	Handle Loop	X	X	X	X	X	X										
P-0060	O-Ring, Nylon Swivel														X	X	X
P-0062	O-Ring, Cylinder (included in 5-0210 Kit)	X	X	X	X	X	X	X									
P-0063	O-Ring, Cylinder and Pump	X					X										
P-0065	O-Ring, Pump Cylinder							X									
P-0066	O-Ring, Cylinder Nut					X	X									X	X
P-0067	O-Ring, Gauge Connector							X									
P-0070	O-Ring, Piston (included in 5-0210 Kit)		X	X	X			X									
P-0087	Belt, Pulley										X						
P-0092	Gasket, Filler Plug					X											
P-0093	Gasket, Lower Spud					X											
P-0167	Plug, Filler					X											
P-0179	Adapter, 1/8MP x 9/16-18					X									X		



<i>Part Number</i>	<i>Description</i>	2-1	5-1	5-100	5-300	15-1	23-1	55-1	55-100	55-200	58-1	58-100	58-200	58-300	59-1	61-1	61-30
P-1479	Oil Reservoir										X						
P-1480	Nipple, Hex, SS, 1/4"MP										X						
P-1506	Valve, Reservoir Suction, 1/8"FP															X	
P-1545	Reducer, 1/4" Tube x 1/2"FP										X						
P-2192	Valve, Suction										X						
P-2199	Valve, Pressure, 3-Way										X						

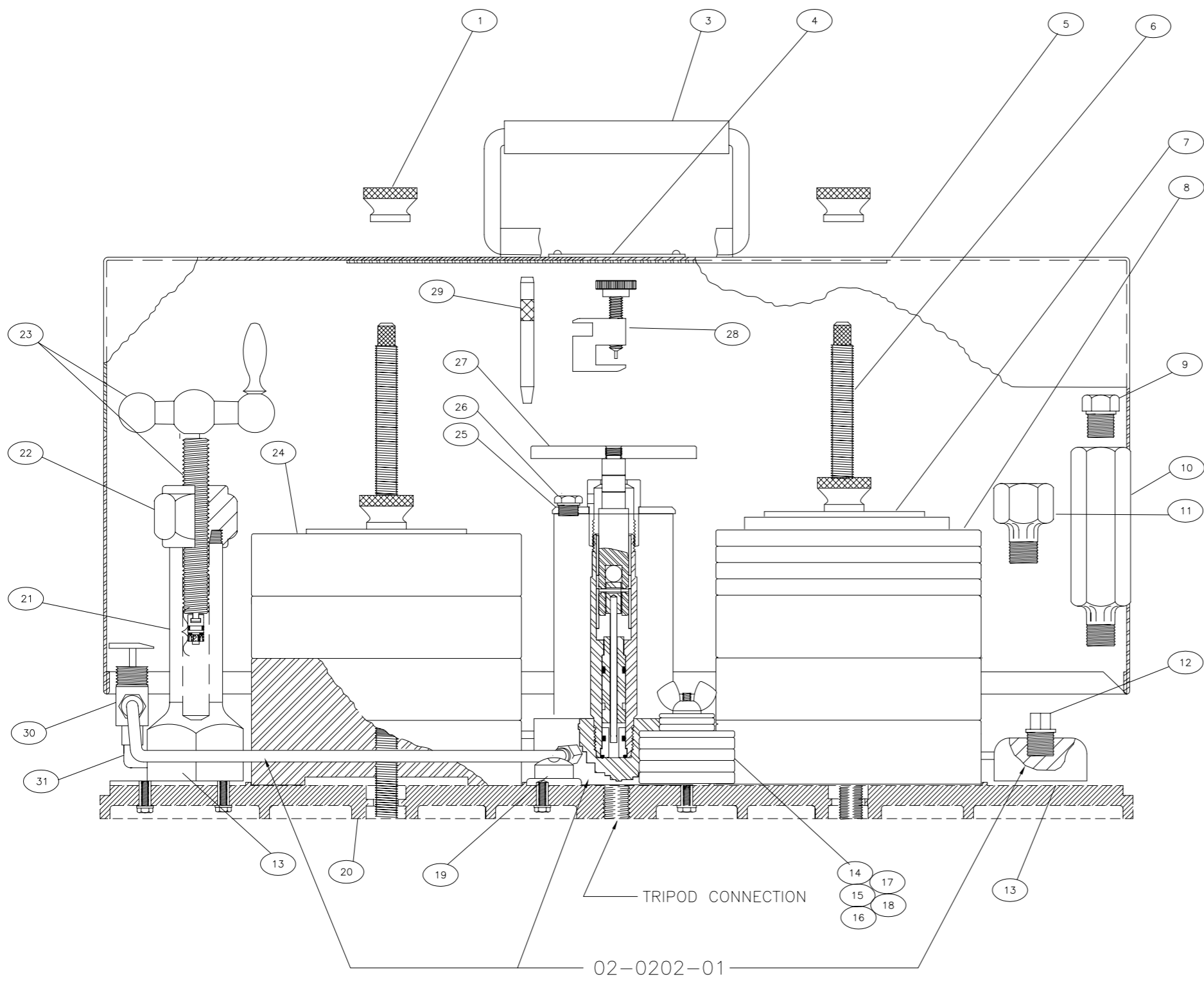
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# Section 6 - Drawings and Schematics

<b>Part Number</b>	<b>Description</b>
2-0001	Assembly - High Pressure Deadweight Tester
2-0075	Schematic – Oil-Water Separator
5-0001	Assembly – High Pressure Deadweight Gauge
5-0100	Assembly – Super Pressure Deadweight Gauge
5-0300	Assembly – Hyper Pressure Deadweight Gauge
9-0020	Tripod Assembly
15-0001	Assembly – Standard Deadweight Gauge
15-0063	Assembly – Carrying Case
23-0001	Assembly – Standard Deadweight Tester
23-0071	Schematic – Testing Gauge with Water
55-0100-B	Assembly – Super Pressure Tester – Brass Weights
55-0100-S	Assembly – Super Pressure Tester – Stainless Weights
58-0095	Assembly – Precision Pressure Standard (PPS)
58-0200	Assembly – Precision Pressure Standard (PPS) – Dual Hyper
58-0300	Assembly – Precision Pressure Standard (PPS) – Dual Hyper
59-0001	Assembly – Featherweight Gauge
59-0015	Assembly – Weight Case
61-0001	Assembly – Featherweight Tester
61-0030	Assembly – Featherweight Tester



REVISIONS				
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS
	E	ECN# 7304, CHANGE HANDLE	10/23/01	JAC JH
	F	ECN 8393, CHANGE ITEM 3, ITEM 5	03/31/03	TC AMH



2-1 HIGH PRESSURE DEAD WEIGHT TESTER  
 NET WEIGHT: 2000 PSI TESTER = 53 lbs.  
 5000 PSI TESTER = 95 lbs.

\* FOR WEIGHTS USED ON STANDARD SST UNITS USED PART NUMBERS LISTED IN DESCRIPTION COLUMN.  
 PART NUMBERS SHOWN (IN THE PART NUMBER LOCATION) ARE FOR BRASS UNITS.

REF	DESCRIPTION	MATERIAL	QTY
02-0202-01	BASE UNIT ASSEMBLY		43
02-0105	RESERVOIR (OPTIONAL)	ACRYLIC	42
57-0003	PLATE, SERIAL NUMBER (NOT SHOWN)		41
36-0038	TUBE ASSEMBLY, 10" (NOT SHOWN)	SST	40
35-0239	DECAL, "DISCHARGE VALVE" (NOT SHOWN)		39
35-0238	DECAL, "SUCTION VALVE" (NOT SHOWN)		38
35-0016	PLATE, DATA CALIBRATION (NOT SHOWN)		37
35-0015	PLATE, "INSTRUCTIONS" (NOT SHOWN)		36
35-0011	DECAL, "WARNING..." (NOT SHOWN)		35
35-0005-51	DECAL, "ROTATION CW" (NOT SHOWN)		34
35-0005-6	DECAL, "DO NOT EXCEED 5KPSI" (NOT SHOWN)		33
35-0005-2	DECAL "WEIGHT ON TABLE" (NOT SHOWN)		32
P-1477 (REF)	ELBOW, BRASS, 1/8 X 1/8	BRASS	31
C08653 (REF)	VALVE, 3-WAY		30
P-0530	DRIVER, POINTER		29
P-0531	JACK, HAND		28
02-0009	ASSY, PISTON & CYLINDER - FOR SST UNITS USE 58-0326 TABLE		27
P-0760	PLUG, 3/8-24	PLASTIC	26
02-0007	CAP, RESERVOIR		25
05-00 18	WEIGHT, 500 PSI - FOR SST UNITS USE 05-0107	BRASS	24
23-0013	PUMP SCREW W/ HANDLE		23
23-0006	CAP, OIL PUMP		22
02-0010	PUMP PLUNGER ASSEMBLY		21
02-0059	BASEPLATE		20
P-0984	LEVEL, CIRCLE		19
05-0015	WEIGHT, 10 PSI - FOR SST UNITS USE 05-0119	BRASS	18
05-0014	WEIGHT, 5 PSI - FOR SST UNITS USE 05-0118	BRASS	17
05-0013	WEIGHT, 2 PSI - FOR SST UNITS USE 05-0117	BRASS	16
05-0012	WEIGHT, 1 PSI - FOR SST UNITS USE 05-0116	BRASS	15
P-1121	STUD, ALLTHREAD, W/WING NUT	SST	14
02-0201	CYLINDER PUMP		13
P-0972	PLUG, PIPE, RED POLTHN, 25MP		12
36-0040	ADAPTER, GAUGE		11
36-0044	ADAPTER, RESERVOIR		10
P-0256	BUSHING, PIPE, BRASS, 5 X .25		9
05-0017	WEIGHT, 100 PSI - FOR SST UNITS USE 5-121	BRASS	8
05-0016	WEIGHT, 50 PSI, - FOR SST UNITS USE 05-0120	BRASS	7
05-0020	ROD, WEIGHT		6
02-0204	CASE, CARRYING		5
57-0002	NAMEPLATE		4
C10636	HANDLE,W/METAL BASE		3
15-0018	NUT, KNURLED		1

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]		<b>CHANDLER ENGINEERING</b>	
TOLERANCES:			
1 PLACE	+0.030 [.76]	TITLE MODEL 02-0001 DEAD WEIGHT TESTER	
2 PLACE	+0.010 [.25]		
3 PLACE	+0.005 [.127]	DRAWN: <i>CEL</i> 08/13/70	
ANGLES	±1/2°	CHECKED: <i>ARX</i> 08/13/70	
SURF. FINISH	63	ENGR.: <i>ARX</i> 08/13/70	
NEXT ASSY	USED ON	APPROVALS	DATE
APPLICATION		DATE	
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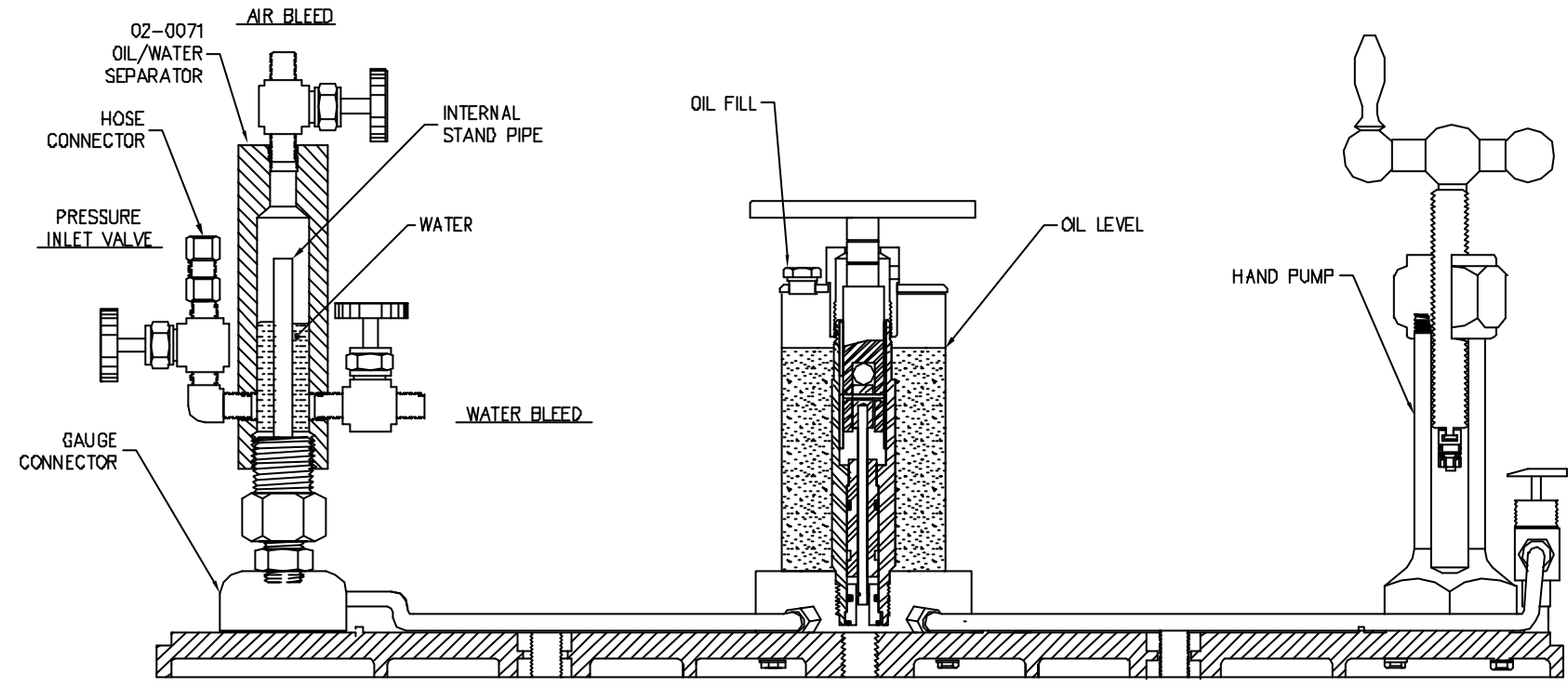
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REVISIONS				
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS
	A	ISSUED	5/5/69	GCR ARK
	B	ECN 6734	08/23/00	AEB BD



PROCEDURE FOR USE OF  
O2-0071 OIL/WATER SEPARATOR

TO PREVENT WATER FROM ENTERING PISTON AND CYLINDER DURING HYDROSTATIC TEST:

1. SCREW O2-0071 SEPARATOR INTO GAUGE CONNECTOR.
2. FILL WITH OIL FROM TESTOR RESERVOIR, USING HAND PUMP.
3. VENT AIR THROUGH AIR BLEED VALVE;
4. CONNECT LINE TO PRESSURE INLET VALVE USING PRESSURE HOSE.
5. DURING TEST, TO SEE IF WATER HAS FILLED SEPARATOR:
  - A. CLOSE INLET VALVE AND DRAIN OFF ANY WATER THROUGH WATER BLEED VALVE
  - B. REFILL BY PUMPING OIL FROM RESERVOIR TO SEPARATOR.

-04	-03	-02	-01	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
QTY. REQD.				PARTS LIST			
				UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]			
				TOLERANCES:			
				1 PLACE ±0.030			
				2 PLACE ±0.010			
				3 PLACE ±0.005			
				ANGLES ±1/2°			
				SURF. FINISH 63/			
NEXT ASSY				USED ON			
APPLICATION				APPROVALS		DATE	
				DRAWN: <i>BCA</i>		5/5/69	
				CHECKED: <i>ARK</i>		5/5/69	
				ENGR.: <i>ARK</i>		5/5/69	
		TITLE		SIZE		S.O. NO.	
		SCHEMATIC OIL/WATER SEPARATOR		A4			
				DWG NO.		REV.	
				02-0075		B	
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38 CM WIDE X 17 CM DEEP  
15" WIDE X 6 1/2" DEEP

\* FOR STANDARD BRASS UNITS, USE PARTS LISTED AS PARTS NUMBER  
FOR STAINLESS STEEL UNITS, USE PARTS LISTED AS - FOR SST UNITS -

27 CM  
10 1/2"

1/4-20 WING NUT

TRIPOD CONNECTION

SERIAL NO. ON  
BASE PLATE

### 5-1 HIGH PRESSURE DEAD WEIGHT GAUGE

NET WT. 2000 PSI GAUGE = 46 LBS  
5000 PSI GAUGE = 98 LBS

QTY. REQD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
1	P-1121	ALTHREAD, 1/4-20		25
1	05-0016	WEIGHT, BRASS, 50 PSI - FOR SST UNITS USE 5-120		24
1	05-0017	WEIGHT, BRASS, 100 PSI - FOR SST UNITS USE 5-121		23
1	P-0062	O-RING		22
1	P-0070	O-RING		21
1	P-0984	LEVEL, CIRCLE		20
1	P-1009	RING, RETAINING, CARBON STEEL		19
1	05-0138	BASE PLATE		18
4	05-0015	WEIGHT, BRASS, 10 PSI - FOR SST UNITS USE 5-119		17
1	05-0014	WEIGHT, BRASS, 5 PSI - FOR SST UNITS USE 5-118		16
2	05-0013	WEIGHT, BRASS, 2 PSI - FOR SST UNITS USE 5-117		15
1	05-0012	WEIGHT, BRASS, 1 PSI - FOR SST UNITS USE 5-116		14
1	P-0907	GASKET, NPN, .5156 X NO HOLE		13
1	P-0683	CAP, PIPE, PLASTIC, YELLOW		12
1	36-0035	ADAPTER, SST		11
1	58-0311	BODY		10
5	05-0018	WEIGHT, BRASS, 500 PSI - FOR SST UNITS USE 5-109		9
2	05-0020	ROD, WEIGHT		8
1	58-0338	PISTON & CYLINDER ASSEMBLY		7
1	05-0008	TABLE, WT, BRASS, FOR SST UNITS USE 58-326 TABLE		6
1	05-0022	COVER, CARRYING CASE		5
4	15-0018	NUT, KNURLED		4
1	57-0002	PLATE, NAME		3
1	C10636	HANDLE,W/METAL BASE & CAP		2
				1

QTY. REQD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
		PARTS LIST		
		UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]		
		TOLERANCES:		
		1 PLACE	+0.030 [.76]	
		2 PLACE	+0.010 [.25]	
		3 PLACE	+0.005 [.127]	
		ANGLES	+1/2°	
		SURF. FINISH	32	
		NEXT ASSY	USED ON	
		APPLICATION		
		TITLE		
		CHANDLER ENGINEERING		
		HIGH PRESSURE DEADWEIGHT GAUGE		
		SIZE	S.O. NO.	DWG. NO.
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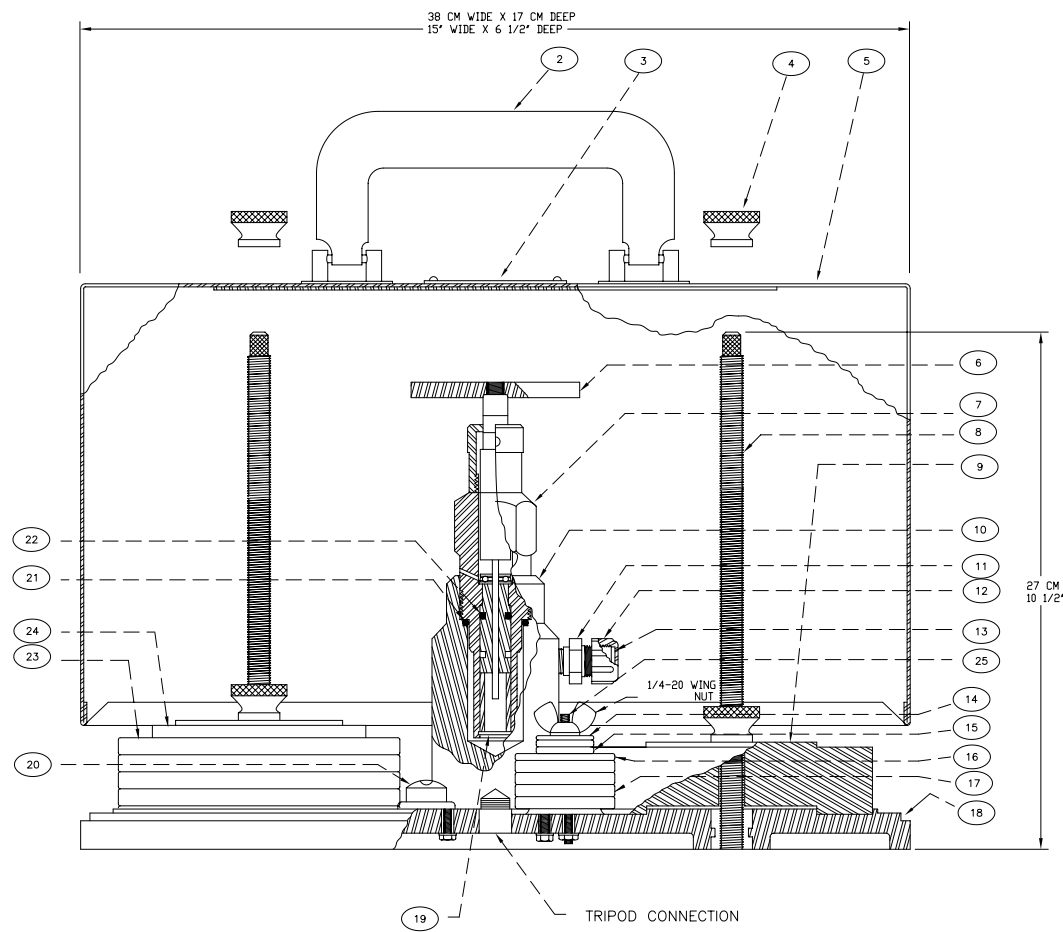
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5-100 SUPER PRESSURE DEAD WEIGHT GAUGE

- 1.) INSTRUMENT SUPPLIED WITH #7.00 WEIGHTS AND TWO 7-1/2 X 7-1/2 TALL CARRYING CASES
- 2.) NET WEIGHT OF 10000 PSI GAUGE = 167 lbs

SERIAL NO. ON BASE PLATE

FOR STANDARD BRASS UNITS, USE PARTS LISTED AS PART NUMBERS.  
FOR STAINLESS STEEL UNITS, USE PARTS LISTED AS - FOR SST UNITS-

QTY.	RECD.	-04	-03	-02	-01	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
							PARTS LIST		
							UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES (mm)		
							TOLERANCES:		
							1 PLACE	+0.030 [-76]	
							2 PLACE	+0.010 [-25]	
							3 PLACE	+0.005 [-127]	
							ANGLES	1/2°	
							SURF. FINISH	12/	
							TITLE		
							CHANDLER ENGINEERING		
							DEADWEIGHT ASSEMBLY		
							APPLICATION		
							USED ON		
							NEXT ASSY		

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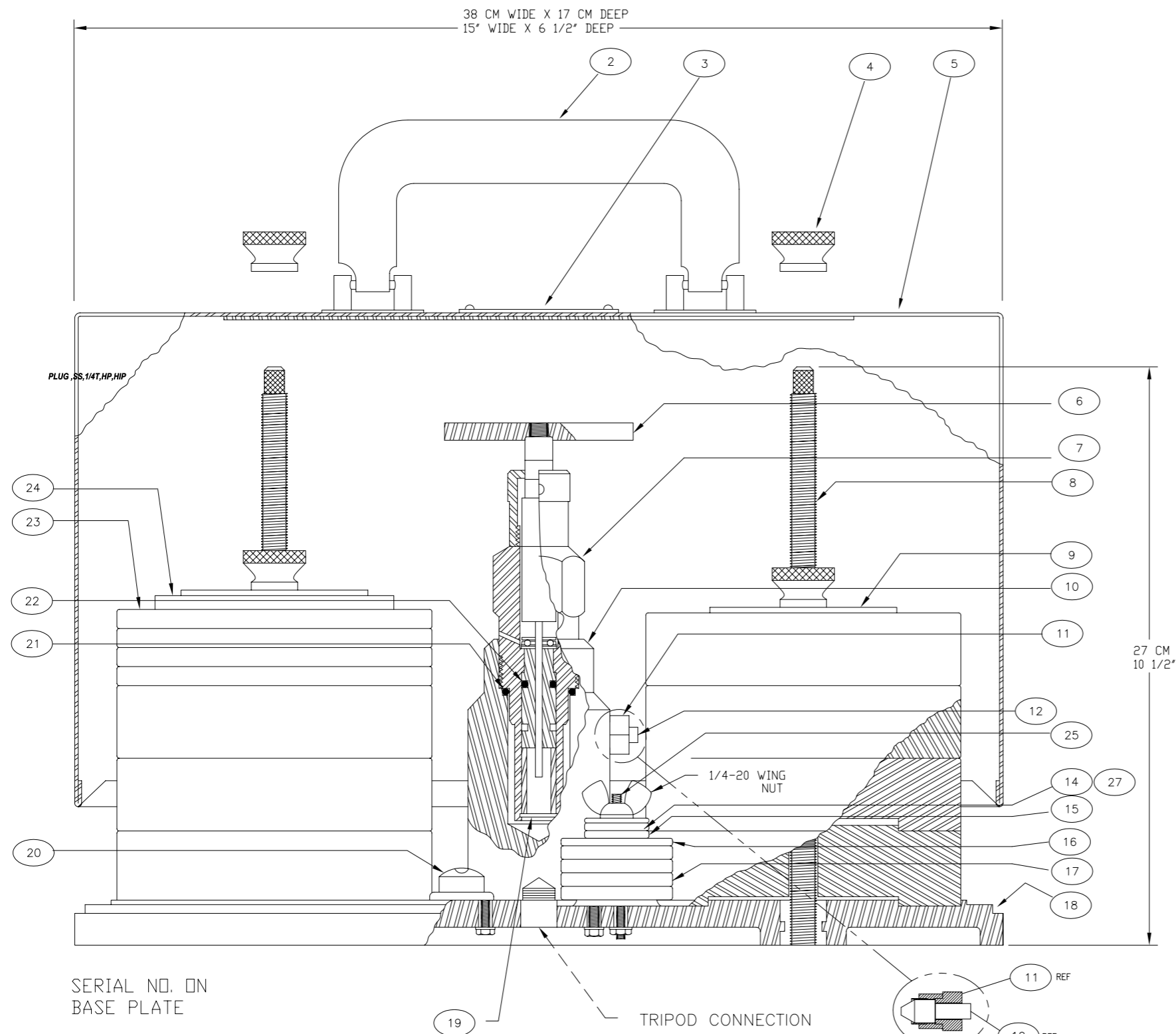
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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ISSUE	11/11/87	GDJ
	B	ECN 6734	08/23/00	AEB/BD



27 CM  
10 1/2"

SERIAL NO. ON  
BASE PLATE

TRIPOD CONNECTION

### 5-300 HYPER PRESSURE DEAD WEIGHT GAUGE

NOTE: 1. INSTRUMENT SUPPLIED WITH  $\phi 7.00$   
WEIGHTS AND 7 1/2 X 7 1/2 X 11 TALL  
CARRYING CASE  
2. NET WEIGHT OF 30,000 PSI GAUGE = 170 lbs.

QTY.	REQD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
28	1	05-0479	WEIGHT, .5 PSI		
27	1	05-0047-03	WEIGHT, .5 PSI		
26	14	05-0027	WEIGHT, 1000 PSI		
25	1	P-1121	ALTHREAD, 1/4-20		
24	1	05-0016	WEIGHT, BRASS, 50 PSI		
23	1	05-0017	WEIGHT, BRASS, 100 PSI		
22	1	P-0062	O-RING		
21	1	P-0070	O-RING		
20	1	P-0984	LEVEL, CIRCLE		
19	1	P-1009	RING, RETAINING, CARBON STEEL		
18	1	05-0138	BASE PLATE		
17	4	05-0015	WEIGHT, BRASS, 10 PSI		
16	1	05-0484	WEIGHT, BRASS, 5 PSI		
15	2	05-0013	WEIGHT, BRASS, 2 PSI		
14	1	05-0012	WEIGHT, BRASS, 1 PSI		
13					
12	1	P-0915	PLUG ,SS,1/4T,HP,HIP		
11	1	P-0193	GLAND,SST,TUBE,1/4TX9/16-18R		
10	1	58-0311	BODY		
9	5	05-0018	WEIGHT, BRASS, 500 PSI		
8	2	05-0020	ROD, WEIGHT		
7	1	58-0339	PISTON & CYLINDER ASSEMBLY		
6	1	58-0336	TABLE, WT, BRASS,		
5	1	05-0022	COVER, CARRYING CASE		
4	4	15-0018	NUT, KNURLED		
3	1	57-0002	PLATE, NAME		
2	1	C09539	HANDLE, VINYL, BLACK		
1					

PARTS LIST		UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]		TOLERANCES:		CHANDLER ENGINEERING	
1	PLACE	+0.030	[.76]	1	PLACE	+0.010	[.25]
2	PLACE	+0.005	[.127]	2	PLACE	+0.005	[.127]
3	PLACE	+0.005	[.127]	3	PLACE	+0.005	[.127]
ANGLES		+1/2'		SURF. FINISH		32/	
NEXT ASSY		USED ON		APPROVALS		DATE	
APPLICATION		APPROVALS		DATE		TITLE	
DRAWN: AEB		6/20/97		SIZE		S.O. NO.	
CHECKED: 0977				DWG NO.		05-0300	
ENGR: 0977				SCALE: .5X		DO NOT SCALE DRAWING	
				SHEET:		1 of 1	

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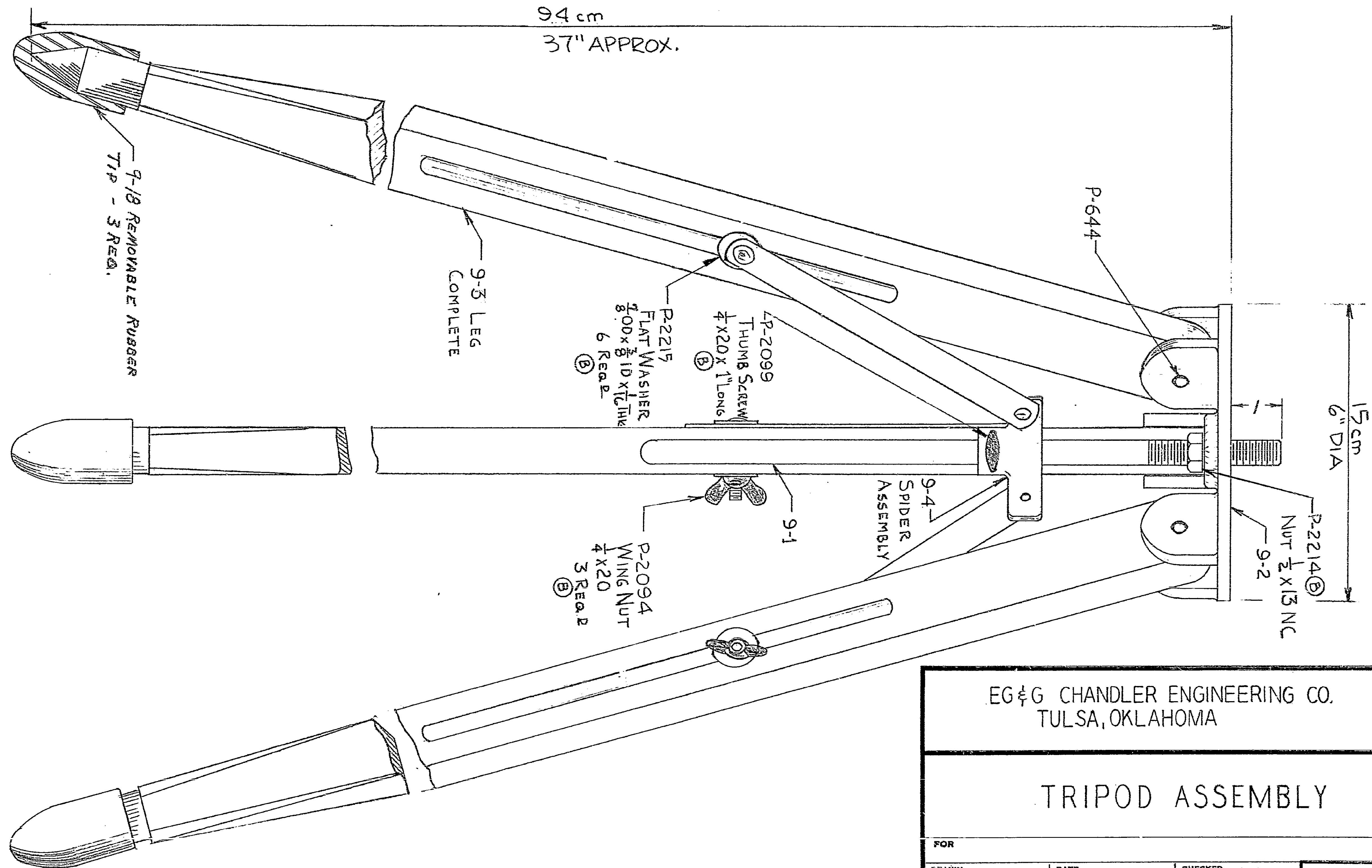
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1



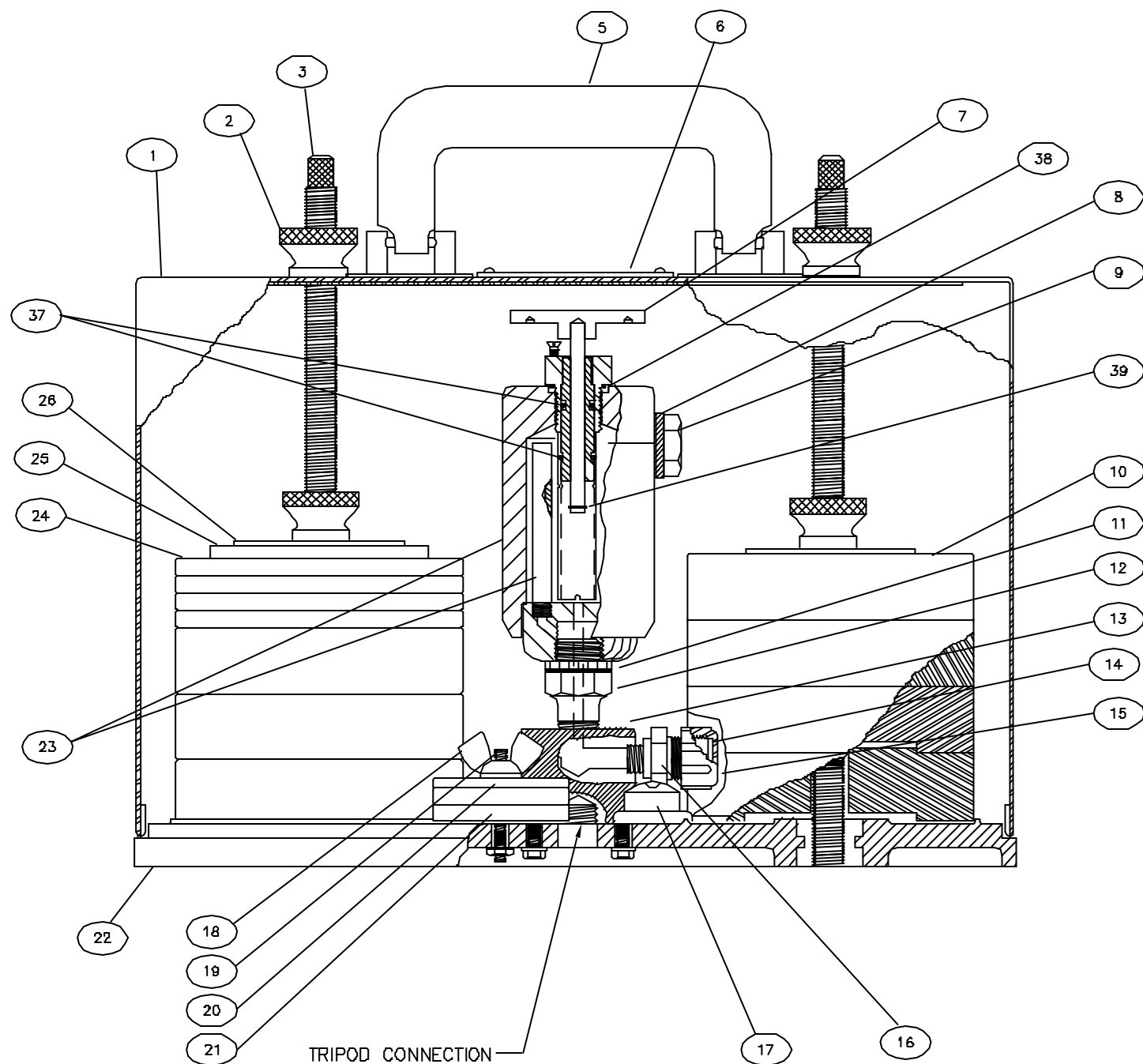
EG & G CHANDLER ENGINEERING CO.  
TULSA, OKLAHOMA

TRIPOD ASSEMBLY

FOR			
DRAWN	4-13-54	DATE	K.C.
REVISION	03-07-83	SCALE	NONE
CHECKED	ARK	APPROVED	AWC
			9-20 (B)

© 8-18-60 Added 9-18 TIP - RCB

REVISIONS				
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS
	L	ECN 3438	12/17/92	AEB GDJ
	M	ECN 5095	3/19/97	AEB JJM
	N	ECN 8734	08/23/00	AEB BD



15-1 STANDARD DEAD WEIGHT GAUGE  
NET WEIGHT: 500 PSI GAUGE = 26 LBS.  
1000 PSI GAUGE = 41 LBS.

**NOTE**  
RANGES ABOVE 1200 PSI ALSO SUPPLIED WITH  
7" DIAMETER WEIGHTS AND 7-1/2" X 7-1/2" X 11"  
TALL CARRYING CASE.

\*FOR STANDARD UNITS WITH BRASS WEIGHTS, USE PARTS LISTED AS PARTS NUMBER.  
FOR STAINLESS STEEL UNITS, SUBSTITUTE PARTS LISTED - FOR SST UNITS-

ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION
39	1	P-1038	RETAINING RING
38	1	P-66	O-RING, BUNA
37	1	P-0062	O-RING, BUNA
36	1	57-0003	PLATE, SERIAL NO (NOT SHOWN)
35	1	35-0016	PLATE, CALIBRATION (NOT SHOWN)
34	1	35-0015	PLATE, INSTRUCTIONS, OPERATING (NOT SHOWN)
33	1	35-0011	DECAL, WARNING (NOT SHOWN)
32	1	35-0005-51	DECAL, ROTATION, CW (NOT SHOWN)
31	1	35-0005-04	DECAL, "DO NOT EXCEED 2000PSI" (NOT SHOWN)
30	1	35-0005-02	DECAL, "WEIGHT ON TABLE..." (NOT SHOWN)
29	1	15-009-03	WEIGHT, .5 PSI (NOT SHOWN)
28	2	15-009-02	WEIGHT, .2 PSI (NOT SHOWN)
27	1	15-009-01	WEIGHT, .1 PSI (NOT SHOWN)
* 26	1	15-0013	WEIGHT, 2 PSI - FOR SST UNITS USE 15-112
* 25	1	15-0014	WEIGHT, 10 PSI - FOR SST UNITS USE 15-111
* 24	4	15-0016	WEIGHT, 20 PSI - FOR SST UNITS USE 15-109
23	1	15-0003	ASSEMBLY, BODY
22	1	15-0087	PLATE, BASE
* 21	2	15-0011	WEIGHT, 2 PSI - FOR SST UNITS USE 15-113
* 20	1	15-0010	WEIGHT, 1 PSI - FOR SST UNITS USE 15-114
19	1	P-791	STUD, ALL-THD, SST, .25-20 X 2.25
18	1	H-25-005	NUT, WING, 1/4-20, SST
17	1	P-0984	LEVEL, CIRCLE
16	1	P-0179	ADAPTER, HOSE, .125MP X .5625-18 RH
15	1	P-0683	CAP, PIPE, PLASTIC, YEL
14	1	P-0907	GASKET, NEOP, .5156 X NO HOLE, X .0625
13	1	15-0002	BODY, BASE, SUPPORTING
12	1	15-0031	SPUD, LOWER
11	1	P-0093	GASKET, RED FIBER, .875 X .625 X .0625
* 10	4	15-0017	WEIGHT, 100 PSI - FOR SST UNITS USE 15-108
9	1	P-0167	SCREW, HEX, .375-24 X .50
8	1	P-0092	GASKET, GREY FIBER, .625 X .375 X .0625
* 7	1	15-0006	PISTON AND CYLINDER ASSEMBLY - FOR SST UNITS USE 15-150
6	1	57-0002	NAME PLATE
5	1	C09539	HANDLE, VINYL, BLACK, 251
4			
3	2	15-0007	ROD, WEIGHT
2	4	15-0018	NUT, KNURLED
1	1	15-0022	COVER, CARRYING CASE

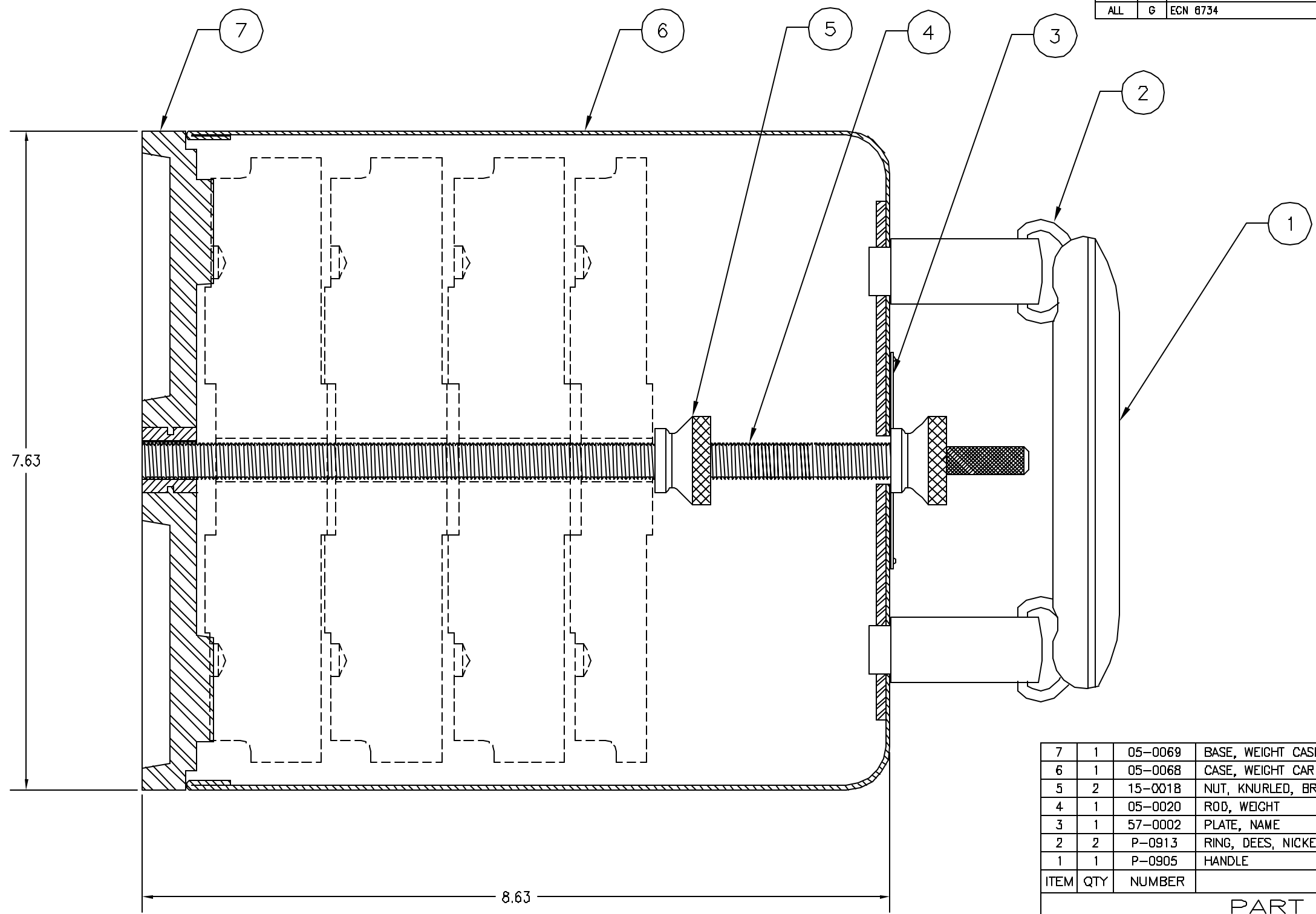
ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]			
TOLERANCES:			
1 PLACE +0.030 [.76]			
2 PLACE +0.010 [.25]			
3 PLACE +0.005 [.127]			
ANGLES ±1/2°			
SURF. FINISH 32/			
NEXT ASSY	USED ON	APPROVALS	DATE
		APPROVALS	DATE
APPLICATION		APPROVALS	DATE
DRAWN: AEB		DB/23/00	SIZE
CHECKED: AB		D1/02/01	S.D. NO.
ENGR.: CDJ		09/22/70	DWG NO.
Copyright by Chandler Engineering Company LLC		SCALE: 1 = 1	DO NOT SCALE DRAWING
<b>CHANDLER ENGINEERING</b>			TITLE
<b>STANDARD DEADWEIGHT GAUGE</b>			REV. N
15-0001			SHEET: 1 of 1

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8 7 6 5 4 3 2 1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	E	ADD "CM" AND SECTION LINES	4-12-85	CEL
ALL	F	ECN 5281	6-27-97	JJM
ALL	G	ECN 6734	08/23/00	AB\BD

F  
E  
D  
C  
B  
A



7	1	05-0069	BASE, WEIGHT CASE
6	1	05-0068	CASE, WEIGHT CARRYING
5	2	15-0018	NUT, KNURLED, BRASS
4	1	05-0020	ROD, WEIGHT
3	1	57-0002	PLATE, NAME
2	2	P-0913	RING, DEES, NICKEL
1	1	P-0905	HANDLE
ITEM	QTY	NUMBER	DESCRIPTION

PART LIST

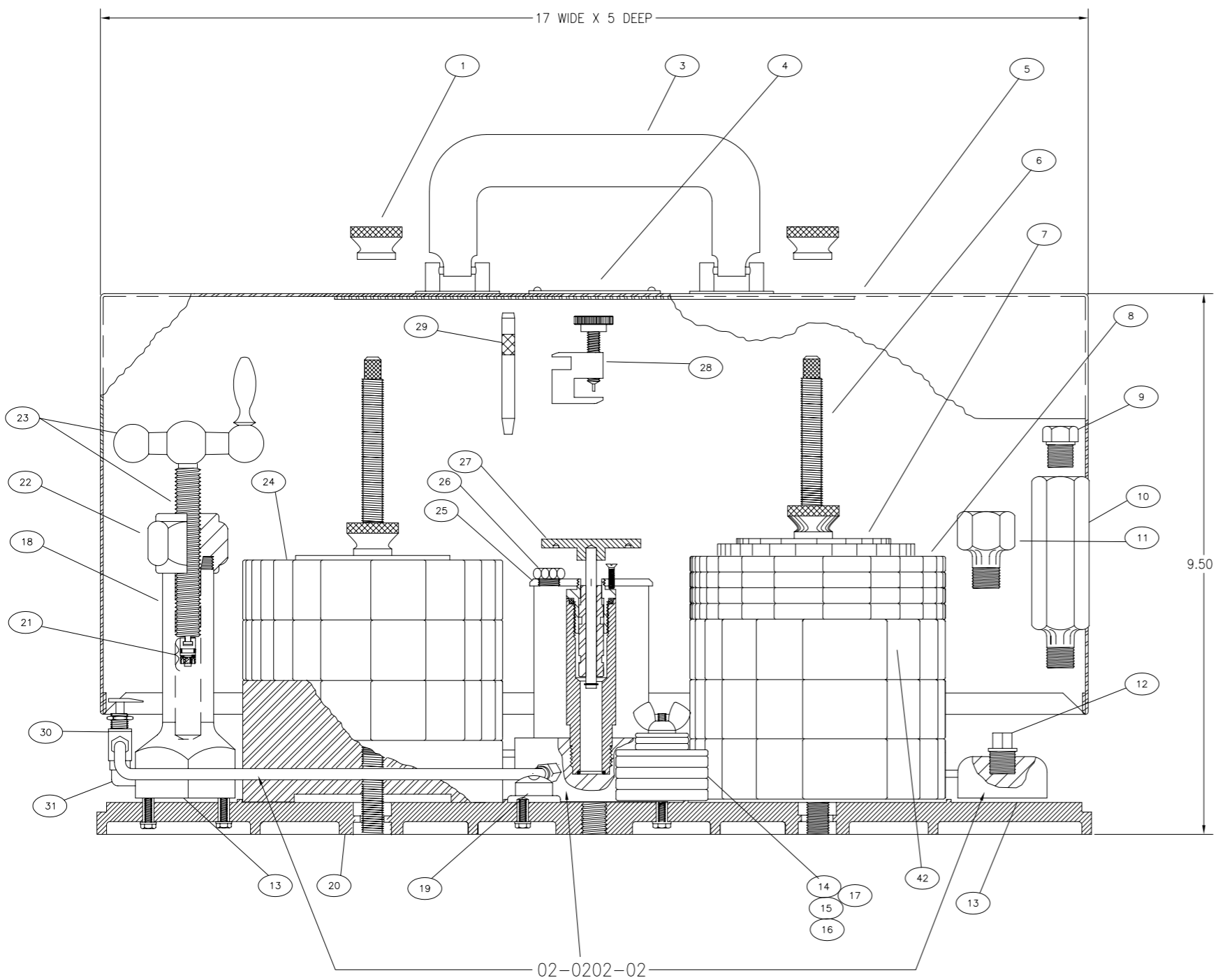
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]	
15-83	FOR 7" WEIGHTS
NEXT ASSY	USED ON
APPLICATION	APPROVALS

<b>CHANDLER ENGINEERING</b>	
TITLE	
ASSEMBLY, WEIGHT CASE	
SIZE	S.D. NO.
C	
DWG NO.	REV.
15-0063	G
SCALE: 1 = 1	DO NOT SCALE DRAWING
SHEET:	1 of 1

DRAWN: *AB* 3-28-84  
 CHECKED: *JJM* 6-27-97  
 ENGR.: *JJM* 6-27-97  
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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	M	REDRAW FOR MANUAL	3-29-94	GDJ
	N	ECN 6734; ADD ACRYLIC RES. OPTION	03/14/00	JAC/BD
	P	ECN# 7304, CHANGE HANDLE	10/24/01	JAC/JH



NET WEIGHT: 500 PSI TESTER = 34 lbs.  
 1000 PSI TESTER = 49 lbs.  
 CARRYING CASE.

**NOTE**  
 RANGES ABOVE 1200 Psi ALSO SUPPLIED WITH 7"  
 DIA. WEIGHTS AND 7 1/2 X 7 1/2 X 11 TALL

REF.	QTY	PART NUMBER	DESCRIPTION
		02-0202-02	BASE UNIT ASSY.
43	1	23-0094	RESERVOIR, ACRYLIC (OPTIONAL)
42	3	15-0016	WEIGHT, 20 PSI, BRASS
41	1	57-0003	PLATE, SERIAL NO.,(NOT SHOWN)
40	1	36-0038	TUBE ASSEMBLY, SST, 10',(NOT SHOWN)
39	1	35-0239	DECAL,"DISCHARGE VALVE", (NOT SHOWN)
38	1	35-0238	DECAL,"SUCTION VALVE", (NOT SHOWN)
37	1	35-0016	PLATE, DATA CALIBRATION,(NOT SHOWN)
36	1	35-0015	PLATE, "INSTRUCTIONS", (NOT SHOWN)
35	1	35-0011	DECAL,"WARNING...", (NOT SHOWN)
34	1	35-5-51	DECAL, "ROTATION CW", (NOT SHOWN)
33	1	35-5-6	DECAL, " DO NOT EXCEED 5KPSI", (NOT SHOWN)
32	1	35-5-2	DECAL,"WEIGHT ON TABLE", (NOT SHOWN)
31	1	C08654 (REF)	ELB,SS,1/8MPTX1/8MPT,CA
30	1	P-2298 (REF)	VALVE, 3-WAY
29	1	P-0530	DRIVER, POINTER
28	1	P-0531	JACK, HAND
27	1	23-0008	ASSEMBLY, PISTON & CYLINDER - FOR SST UNITS USE 58-326 TABLE
26	1	P-0760	PLUG, PLASTIC, 3/8-24
25	1	23-0012	CAP, RESERVOIR
24	5	15-0017	WEIGHT, 100 PSI
23	1	23-0013	PUMP SCREW W/ HANDLE
22	1	23-0006	CAP, OIL PUMP
21	1	23-0009	PUMP PLUNGER ASSEMBLY (23-62, P-66, P-1036)
20	1	23-0063	BASEPLATE
19	1	P-0984	LEVEL, CIRCLE
18	1	23-0010	PUMP, CYLINDER AND BASE
17	2	15-0011	WEIGHT, 2 PSI
16	2	15-0010	WEIGHT, 1 PSI
15	1	15-0009	WEIGHT SET, 1/10 PSI
14	1	P-0791	STUD, ALLTHREAD, SST, W/WING NUT
13	1	02-0201	CYL. PUMP
12	1	P-0972	PLUG, PIPE, RED POLTHN,.25MP
11	1	36-0040	ADAPTER, GAUGE
10	1	36-0044	ADAPTER, RESERVOIR
9	1	P-0256	BUSHING, PIPE, BRASS, .5 X .25
8	4	15-0014	WEIGHT, 10 PSI
7	1	15-0013	WEIGHT, 5 PSI, BRASS
6	2	15-0007	ROD, WEIGHT
5	1	23-0022	CASE, CARRYING
4	1	57-0002	NAMEPLATE
3	1	C09539	HANDLE,W/METAL BASE & CAP
2			
1	4	15-0018	NUT, KNURLED

ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION
PARTS LIST			

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]		<b>CHANDLER ENGINEERING</b>	
TOLERANCES:			
1 PLACE	+0.030 [.76]	TITLE <b>ASSEMBLY, DEADWEIGHT TESTER</b>	
2 PLACE	+0.010 [.25]		
3 PLACE	+0.005 [.127]		
ANGLES	+1/2°		
SURF. FINISH		32	
APPLICATION		APPROVALS	DATE
23-1	DWT TESTER	AB	3-29-94
NEXT ASSY USED ON		CHECKED: <i>GDJ</i>	3-29-94
		ENGR.: <i>GDJ</i>	3-29-94
SIZE	S.O. NO.	DWG NO.	REV.
C		23-0001	P
SCALE:	1:2	DO NOT SCALE DRAWING	SHEET: 1 of 1

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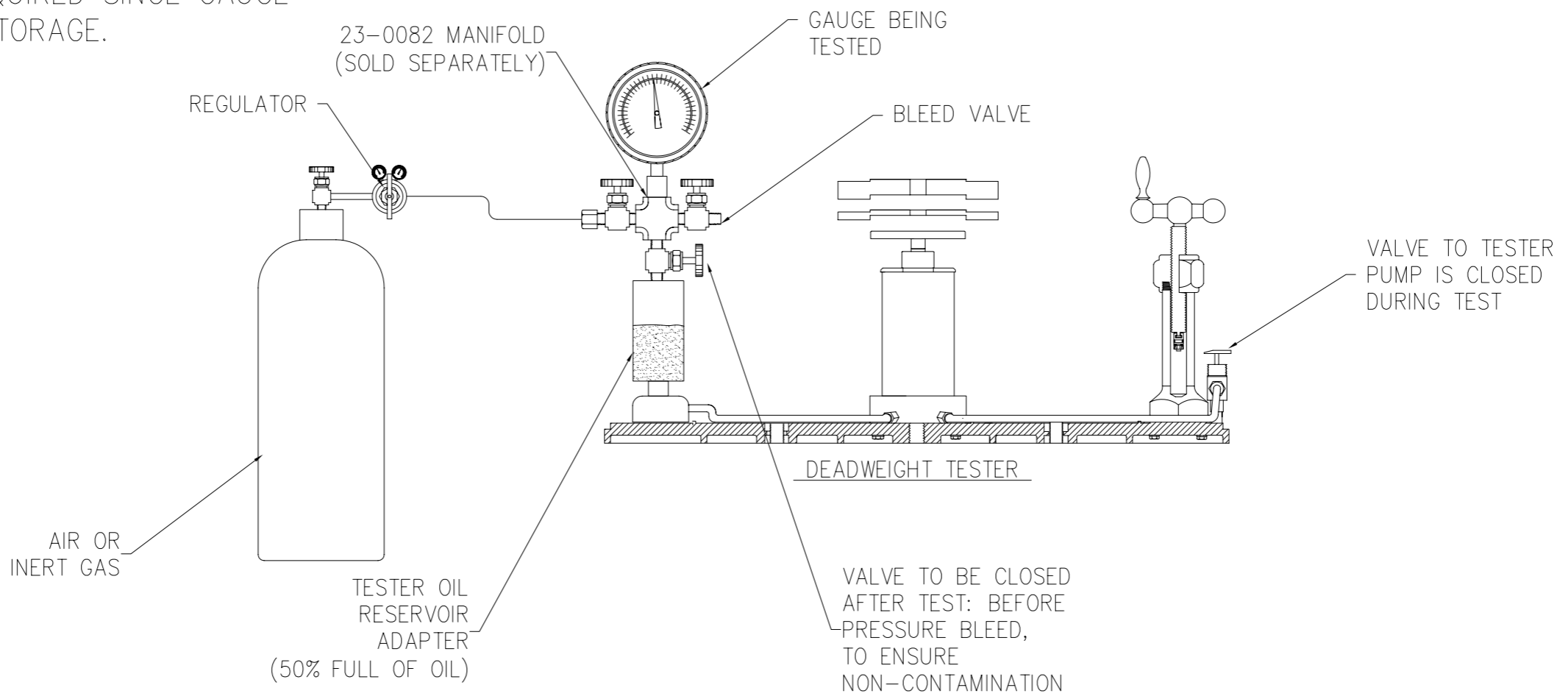
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2

1

NOTE: IF DEAD WEIGHT GAUGE IS USED, STATIONARY CONNECTION WILL BE REQUIRED FOR CONNECTION TO MANIFOLD AND DEAD WEIGHT. THE OIL RESERVOIR WILL NOT BE REQUIRED SINCE GAUGE BODY HAS OIL STORAGE.

REVISIONS				
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS
	A	ISSUED	5/5/69	GCR ARK
	B	ECN 6734	08/23/00	AEB BD



-04	-03	-02	-01	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
QTY. REQD.				PARTS LIST			
				UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]			
				TOLERANCES:			
				1 PLACE ±0.030			
				2 PLACE ±0.010			
				3 PLACE ±0.005			
				ANGLES ±1/2°			
				SURF. FINISH 63/			
NEXT ASSY		USED ON		APPROVALS		DATE	
APPLICATION				DRAWN: <i>GCR</i>		8/12/69	
This document and the drawings and technical data contained hereon are the property of Chandler Engineering Company LLC. Reproduction or dissemination in any form except as expressly authorized by the owner is forbidden. The holder agrees to return this document to the owner on _____.				CHECKED: <i>ARK</i>		8/12/69	
Copyright by Chandler Engineering Company LLC				ENGR.: <i>ARK</i>		8/12/69	
TITLE		SIZE		S.O. NO.		DWG NO.	
TESTING GAUGE WITH AIR USING DEADWEIGHT TESTER		A4				23-0071	
DO NOT SCALE DRAWING		SCALE:		SHEET:		1 OF 1	
REV. B		REV. B		REV. B		REV. B	

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C

B

A

C

B

A

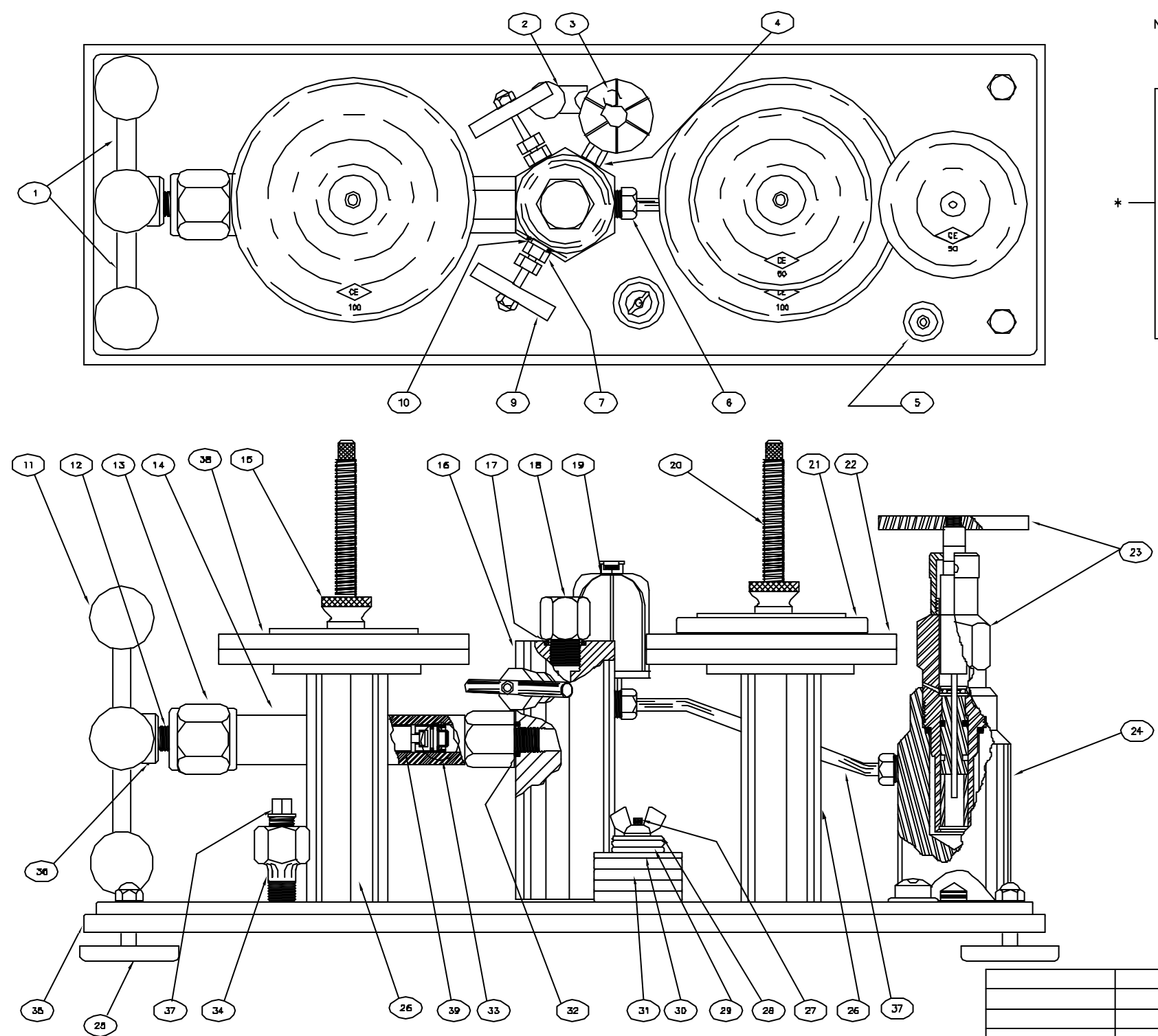
8 7 6 5 4 3 2 1

REVISIONS				
ZDNE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS
	A	ISSUED	1/3/93	AEB GDJ
	B	ECN 6734	08/24/00	AEB BD

NOTE: USE P-1011 - 1/4NPT TRU-SEAL WITH 55-15 ADAPTER  
 USE P-1012 - 1/2NPT TRU-SEAL WITH 55-18 ADAPTER

\* NOT SHOWN

55	1	609539	HANDLE, VINYL, BLACK		
54	1	55-0033	RETAINER		
53	1	57-0003	PLATE, SERIAL NUMBER		
52	1	57-0002	PLATE, NAME		
51	1	36-0045	ASSEMBLY, TUBE, SST, 10R.		
50	1	35-0239	DECAL, DISCHARGE VALVE		
49	1	35-0238	DECAL, SUCTION VALVE		
48	1	35-0016	PLATE, DATA CALIBRATION		
47	1	35-0015	PLATE, INSTRUCTION, OPERATION		
46	1	35-0011	DECAL, WARNING		
45	1	35-0005-51	DECAL, "ROTATION"		
44	1	35-0005-07	DECAL, "DO NOT EXCEED 15000 psi"		
43	1	35-0005-02	DECAL, "WEIGHT ON TABLE..."		
42	1	02-0013	COVER, CARRYING CASE		
41	3	15-0083	CASE, WEIGHT CARRYING		
40	14	05-0027	WEIGHT, BRASS, 1000 PSI		
38	1	05-0018	WEIGHT, BRASS, 500 PSI		
37	1	P-0872	PLUG, PIPE, PLASTIC, RED		
36	1	P-0852	PIN, ROLL		
35	1	55-0003	PLATE, BASE		
34	1	55-0016	ADAPTER		
33	1	02-0010	ASSEMBLY, PLUNGER, PUMP		
32	1	P-0065	O-RING, NPN, .6875 X .50		
31	4	05-0015	WEIGHT, BRASS, 10 psi		
30	1	05-0014	WEIGHT, BRASS, 5 psi		
29	2	05-0013	WEIGHT, BRASS, 2 psi		
28	1	05-0012	WEIGHT, BRASS, 1 psi		
27	1	P-1121	STUD, ALL-THREAD, .25-20 X 2.75 Lg.		
26	2	55-0023	SUPPORT, PUMP (55-26,55-27)		
25	4	P-0855	SLIDER, W/ 5/16 CAP NUT		
24	1	55-0002	BODY		
23	1	55-0025	PISTON & CYLINDER ASSEMBLY W/ 5/8-32& SST TABLE		
22	4	05-0007	WEIGHT, BRASS, 100 psi		
21	1	05-0016	WEIGHT, BRASS, 50 psi		
20	2	55-0018	ROD, WEIGHT		
19	1	P-1478	RESERVOIR, OIL, 4 Oz.		
18	1	55-0015	ADAPTER		
17	2	P-0067	O-RING, 90 DUR		
16	1	55-0004	CONNECTOR, GAUGE		
15	4	15-0018	NUT, KNURLED		
14	1	55-0008	CYLINDER, PUMP		
13	1	55-0007	CAP, PUMP		
12	1	55-0009	SCREW, PUMP		
11	4	P-0861	KNOB, BALL		
10	2	80-0007	BASKET, COPPER		
9	1	55-0048	HANDLE, VALVE, "DISCHARGE", GOLD		
8	1	55-0047	HANDLE, VALVE, "SUCTION", RED		
7	2	P-0709	BONNET, VALVE		
6	2	P-0193	NUT, GLAND, W/ P-855 COLLAR		
5	1	P-0984	LEVEL, CIRCLE		
4	1	55-0029	NIPPLE, PIPE, RESERVOIR W/ P-246 ELBOW		
3	1	P-0630	DRIVER, POINTER		
2	1	P-0531	JACK, HAND		
1	1	55-0010	ASSEMBLY, HANDLE, PUMP		



UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]
TOLERANCES:
1 PLACE +0.030 [.76]
2 PLACE +0.010 [.25]
3 PLACE +0.005 [.127]
ANGLES ±1/2°
SURF. FINISH 63/

**CHANDLER ENGINEERING**

TITLE: ASSEMBLY SUPER PRESSURE TESTER, W/BRASS WTS.

APPROVALS	DATE	SIZE	S.D. NO.	DWG NO.	REV.
DRAWN: AEB	D1/13/93	A2		55-0100-B	B
CHECKED: BDB	D1/13/93	SCALE: 1 = 1	DO NOT SCALE DRAWING	SHEET: 1 of 1	
ENGR.: BDB	D1/13/93				

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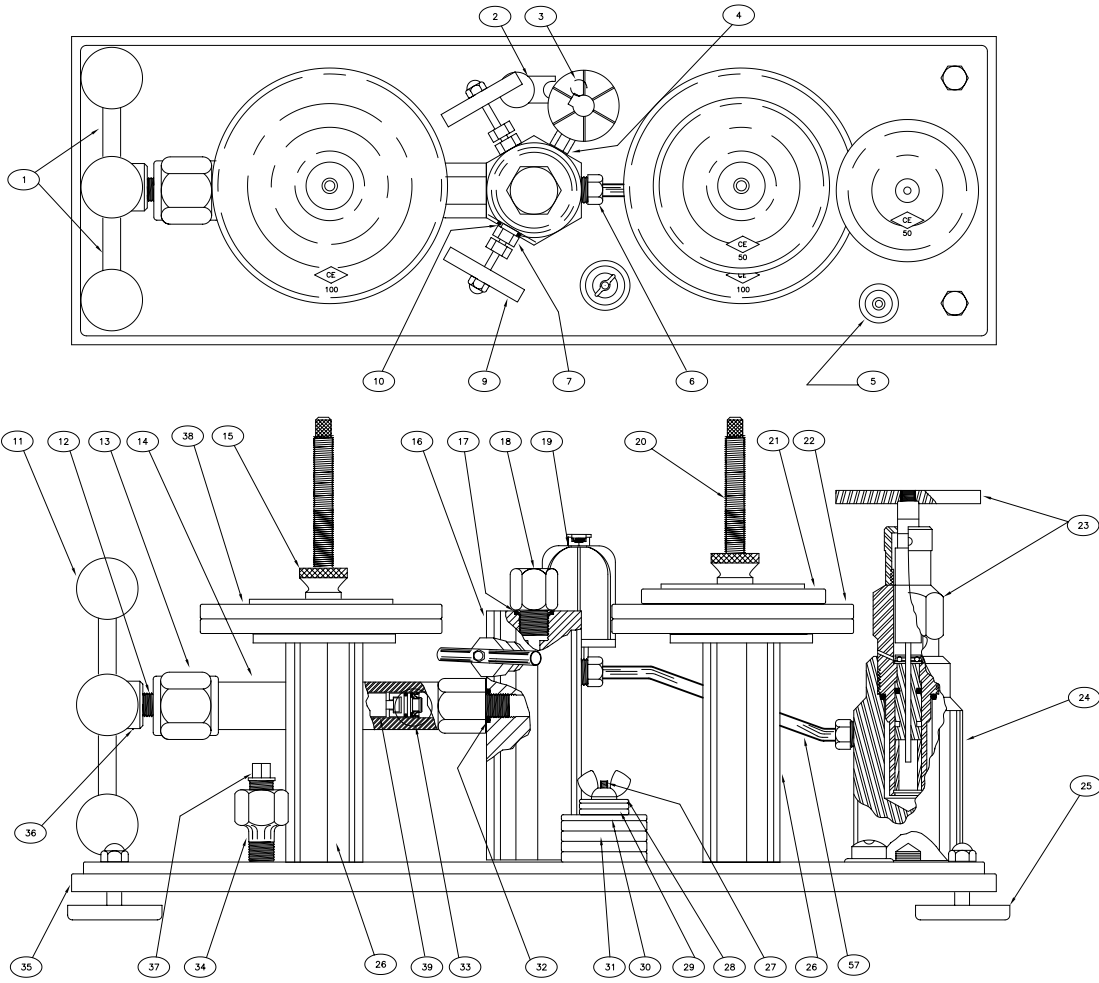
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8 7 6 5 4 3 2 1

NOTE: USE P-1011 - 1/4NPT TRU-SEAL WITH 55-15 ADAPTER  
 USE P-1012 - 1/2NPT TRU-SEAL WITH 55-16 ADAPTER

\* NOT SHOWN

ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION
57	1	55-30	TUBE, HP, SST, .25 O.D.
56			
55	1	C09539	HANDLE,W/METAL BASE
54	1	55-33	RETAINER
53	1	57-3	PLATE, SERIAL NUMBER
52	1	57-2	PLATE, NAME
51	1	36-45	ASSEMBLY, TUBE, SST, 10H.
50	1	35-239	DECAL, DISCHARGE VALVE
49	1	35-238	DECAL, SUCTION VALVE
48	1	35-16	PLATE, DATA CALIBRATION
47	1	35-15	PLATE, INSTRUCTION, OPERATION
46	1	35-11	DECAL, WARNING
45	1	35-5-51	DECAL, "ROTATION"
44	1	35-5-7	DECAL, "DO NOT EXCEED 15000 psi"
43	1	35-5-2	DECAL, "WEIGHT ON TABLE..."
42	1	02-0013	COVER, CARRYING CASE
41	3	15-0063	CASE, WEIGHT CARRYING
40	14	05-0124	WEIGHT, SST, 1000 PSI
39	1	55-0019	PLUNGER, PUMP
38	1	05-0107	WEIGHT, SST, 500 PSI
37	1	P-0972	PLUG, PIPE, PLASTIC, RED
36	1	P-0852	PIN, ROLL
35	1	55-0003	PLATE, BASE
34	1	55-0016	ADAPTER
33	1	02-0010	ASSEMBLY, PLUNGER, PUMP
32	1	P-0065	O-RING, NPN, .6875 X .50
31	4	05-0119	WEIGHT, SST, 10 psi
30	1	05-0118	WEIGHT, SST, 5 psi
29	2	05-0117	WEIGHT, SST, 2 psi
28	1	05-0116	WEIGHT, SST, 1 psi
27	1	P-1121	STUD, ALL-THREAD, .25-20 X 2.75 Lg.
26	2	55-0023	SUPPORT, PUMP (55-26,55-27)
25	4	P-0655	CLIPPER, W/ 5/16 CAP NUT
24	1	58-0311	BODY
23	1	58-0339	PISTON & CYLINDER ASSEMBLY W/ 58-326 SST TABLE
22	4	05-0121	WEIGHT, SST, 100 psi
21	1	05-0120	WEIGHT, SST, 50 psi
20	2	55-0018	ROD, WEIGHT
19	1	P-1478	RESERVOIR, OIL, 4 Oz.
18	1	55-0015	ADAPTER
17	2	P-0067	O-RING, 90 DUR
16	1	55-0004	CONNECTOR, GAUGE
15	4	15-0018	NUT, KNURLED
14	1	55-0006	CYLINDER,PUMP
13	1	55-0007	CAP, PUMP
12	1	55-0009	SCREW, PUMP
11	4	P-0861	KNOB, BALL
10	2	60-0007	GASKET, COPPER
9	1	55-0048	HANDLE, VALVE, "DISCHARGE", GOLD
8	1	55-0047	HANDLE, VALVE, "SUCTION", RED
7	2	P-0709	BONNET, VALVE
6	2	P-0193	NUT, GLAND, W/ P-855 COLLAR
5	1	P-0984	LEVEL, CIRCLE
4	1	55-0029	NIPPLE, PIPE, RESERVOIR W/ P-246 ELBOW
3	1	P-0530	DRIVER, POINTER
2	1	P-0531	JACK, HAND
1	1	55-0010	ASSEMBLY, HANDLE, PUMP



UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]
TOLERANCES:
1 PLACE +0.030 [.76]
2 PLACE +0.010 [.25]
3 PLACE +0.005 [.127]
ANGLES ±1/2°
SURF. FINISH 63

APPLICATION

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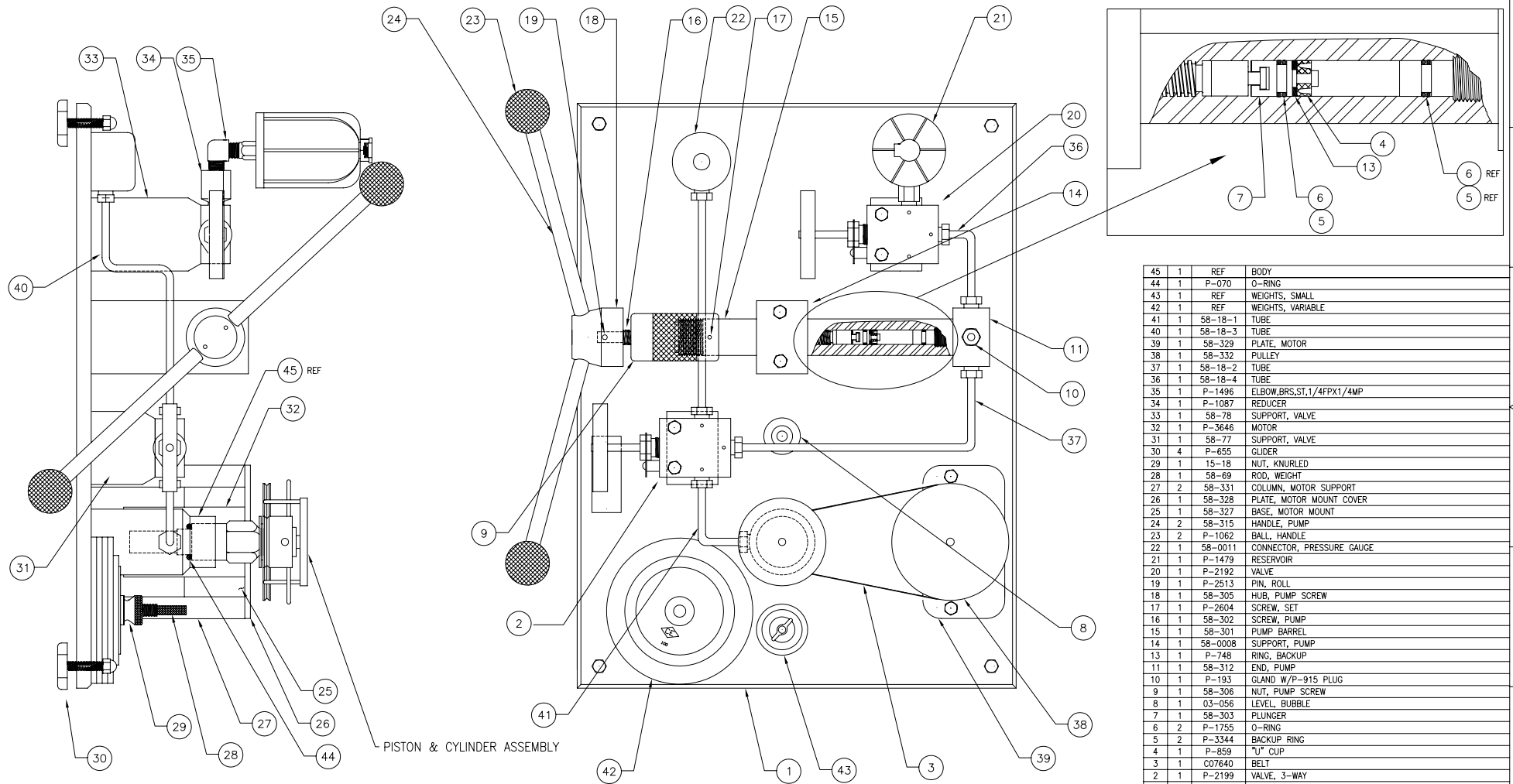
**CHANDLER ENGINEERING**

TITLE  
**ASSEMBLY  
 SUPER PRESS. TESTER W/SS WTS.**

SIZE A2	S.O. NO.	DWG NO. 55-0100-S	REV. D
SCALE: 1 = 1		DO NOT SCALE DRAWING SHEET: 1 of 1	

12 11 10 9 8 7 6 5 4 3 2 1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
G	ECN 6734		08-24-00	JAC/
H	ECN 122, CHANGED P-0259 TO P-1496		9/21/06	JB/TC



PISTON & CYLINDER ASSEMBLY

- NOTE:
- 1) PISTON & CYLINDER ASS'Y, SMALL WEIGHTS, LARGE WEIGHTS, AND BODY WILL BE LISTED ON FINAL ASSEMBLY.
  - 2) SEE B.O.M. OR PARTS LIST FOR ITEMS NOT REFERENCED ON DRAWING.

45	1	REF	BODY
44	1	P-070	O-RING
43	1	REF	WEIGHTS, SMALL
42	1	REF	WEIGHTS, VARIABLE
41	1	58-18-1	TUBE
40	1	58-18-3	TUBE
39	1	58-329	PLATE, MOTOR
38	1	58-332	PULLEY
37	1	58-18-2	TUBE
36	1	58-18-4	TUBE
35	1	P-1496	ELBOW,BRS,ST,1/4FPX1/4MP
34	1	P-1087	REDUCER
33	1	58-78	SUPPORT, VALVE
32	1	P-3646	MOTOR
31	1	58-77	SUPPORT, VALVE
30	4	P-655	GLIDER
29	1	15-18	NUT, KNURLED
28	1	58-69	ROD, WEIGHT
27	2	58-331	COLUMN, MOTOR SUPPORT
26	1	58-328	PLATE, MOTOR MOUNT COVER
25	1	58-327	BASE, MOTOR MOUNT
24	2	58-315	HANDLE, PUMP
23	2	P-1062	BALL, HANDLE
22	1	58-0011	CONNECTOR, PRESSURE GAUGE
21	1	P-1479	RESERVOIR
20	1	P-2192	VALVE
19	1	P-2513	PIN, ROLL
18	1	58-305	HUB, PUMP SCREW
17	1	P-2604	SCREW, SET
16	1	58-302	SCREW, PUMP
15	1	58-301	PUMP BARREL
14	1	58-0008	SUPPORT, PUMP
13	1	P-748	RING, BACKUP
11	1	58-312	END, PUMP
10	1	P-193	GLAND W/P-915 PLUG
9	1	58-306	NUT, PUMP SCREW
8	1	03-056	LEVEL, BUBBLE
7	1	58-303	PLUNGER
6	2	P-1755	O-RING
5	2	P-3344	BACKUP RING
4	1	P-859	"U" CLIP
3	1	C07640	BELT
2	1	P-2199	VALVE, 3-WAY
1	1	58-002	BASEPLATE

ITEM	QTY	NUMBER	DESCRIPTION
<b>PART LIST</b>			
<b>CHANDLER ENGINEERING</b>			
TITLE: SUB-ASSEMBLY, PPS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES (mm)		DATE: 9-27-03		S/O. NO.		DWG. NO.		REV.	
TOLERANCES:		SIZE		D		58-0095		H	
1 PLACE		+0.00 (-0)							
2 PLACE		+0.01 (-0.01)							
3 PLACE		+0.00 (-0.00)							
ANGLES		1/2°							
SURF. FINISH		32/							
NEXT ASSY		USED ON		APPROVALS:		ENGR. 5/5		DATE	
				DRAWN: 4/8		CHECKED: 5/5		SCALE: NONE	
				DO NOT SCALE DRAWING		SHEET: 1 of 1			

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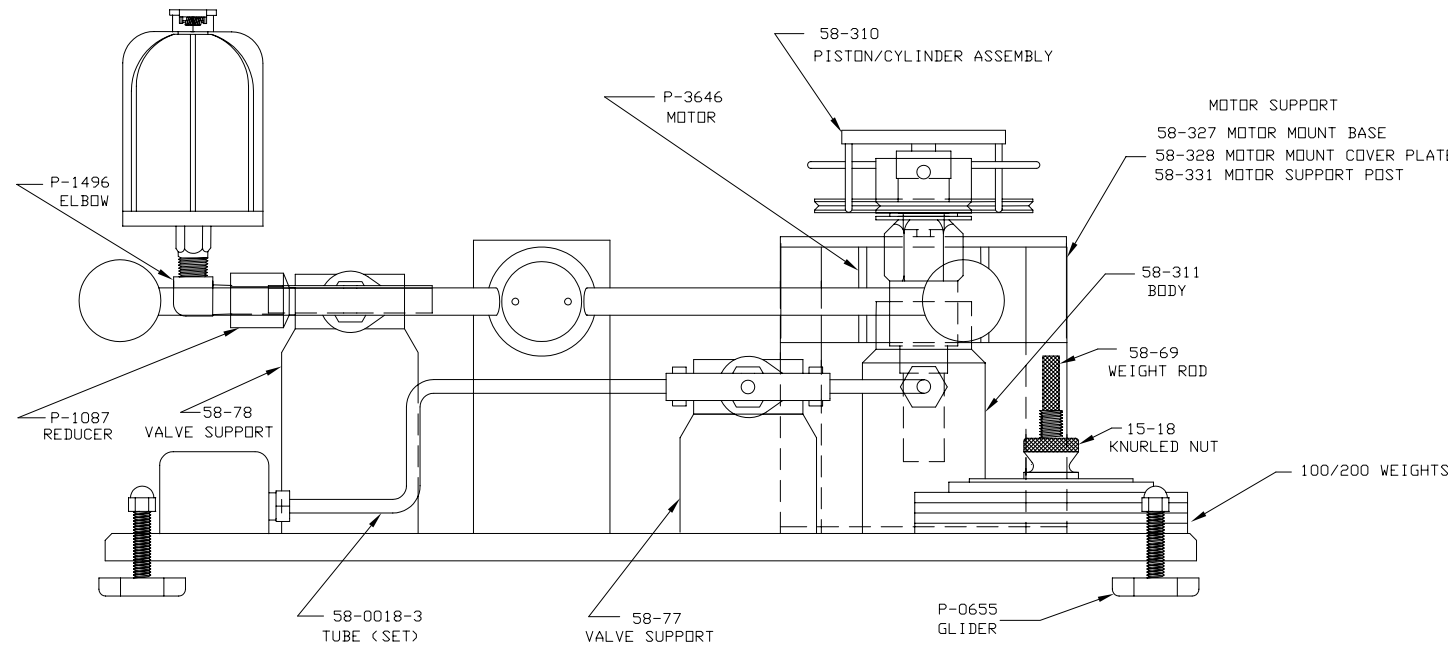
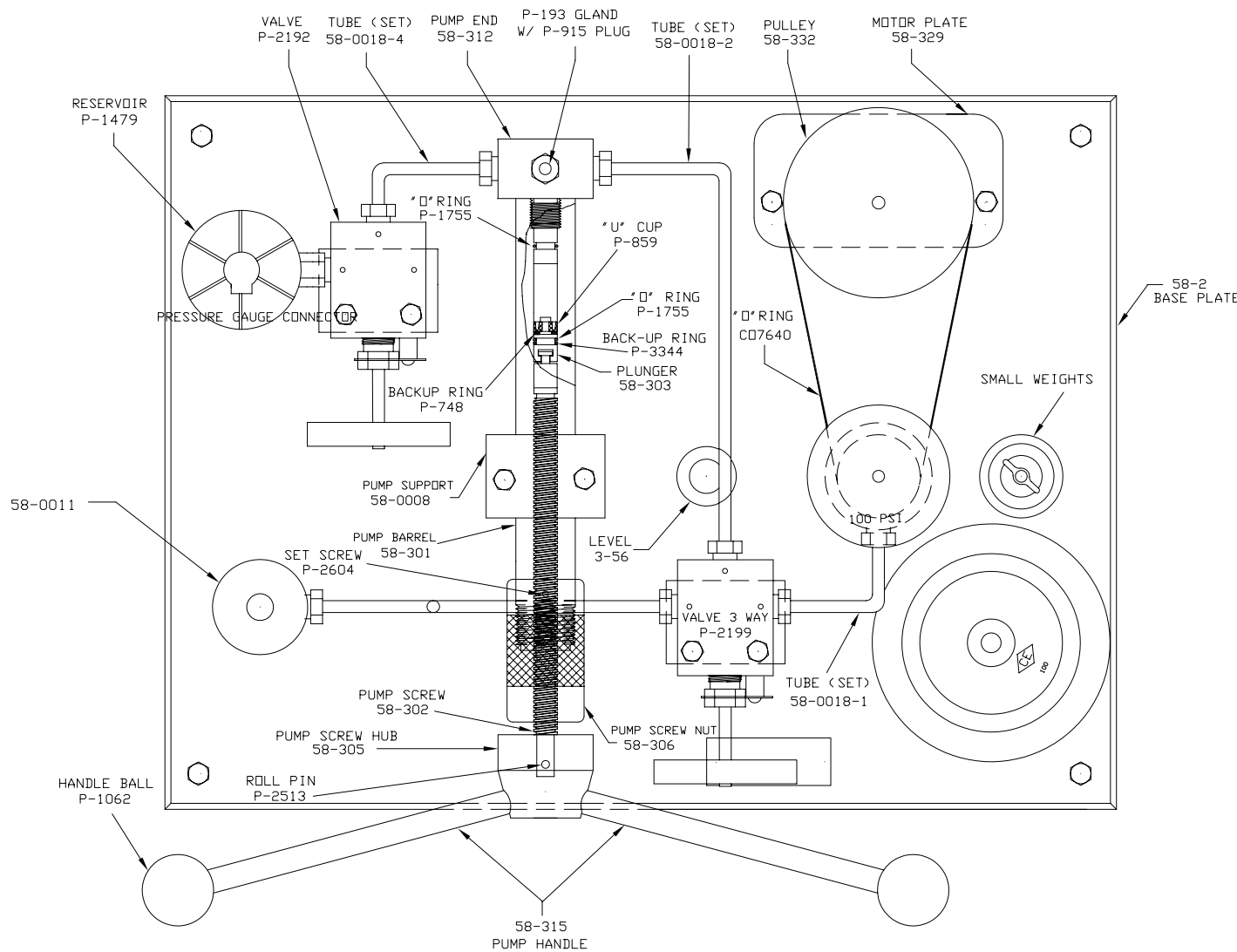
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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	E	ISSUED ECN# 8491, CHANGES PER ECN	7/28/03	PJA/JAC
	F	ECN 122, CHANGED P-0259 TO P-1496	9/27/06	JB/TC



QTY.	REQD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
PARTS LIST					
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]					
TOLERANCES:					
1 PLACE +0.030					
2 PLACE +0.010					
3 PLACE +0.005					
ANGLES 1/2°					
SURF. FINISH 63					
APPROVALS			DATE		
DRAWN: JCS			5-9-90		
CHECKED: JBJ			5-9-90		
ENGR.: JBJ			5-9-90		
<b>CHANDLER ENGINEERING</b> TITLE: DUAL HYPER PPS TESTER RANGE: 10/100-2000/20,000 PSI SCALE: 1 = 1 DO NOT SCALE DRAWING SHEET: 1 of 1					

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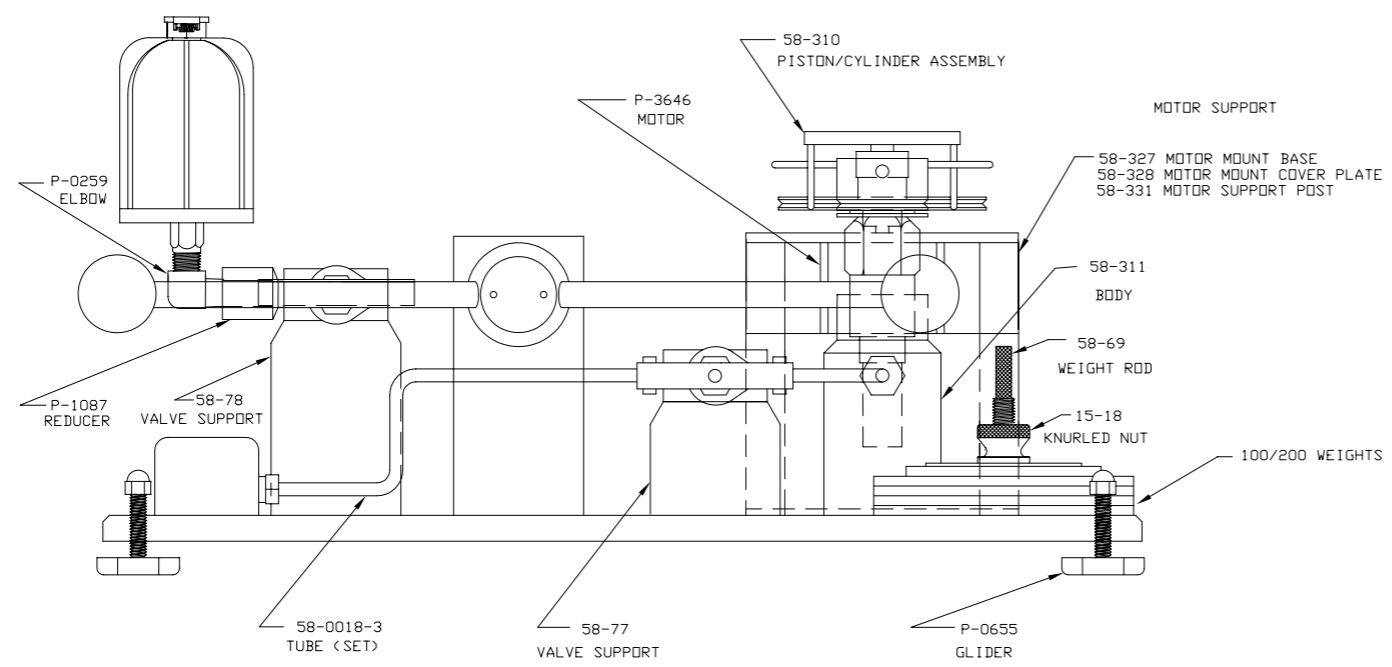
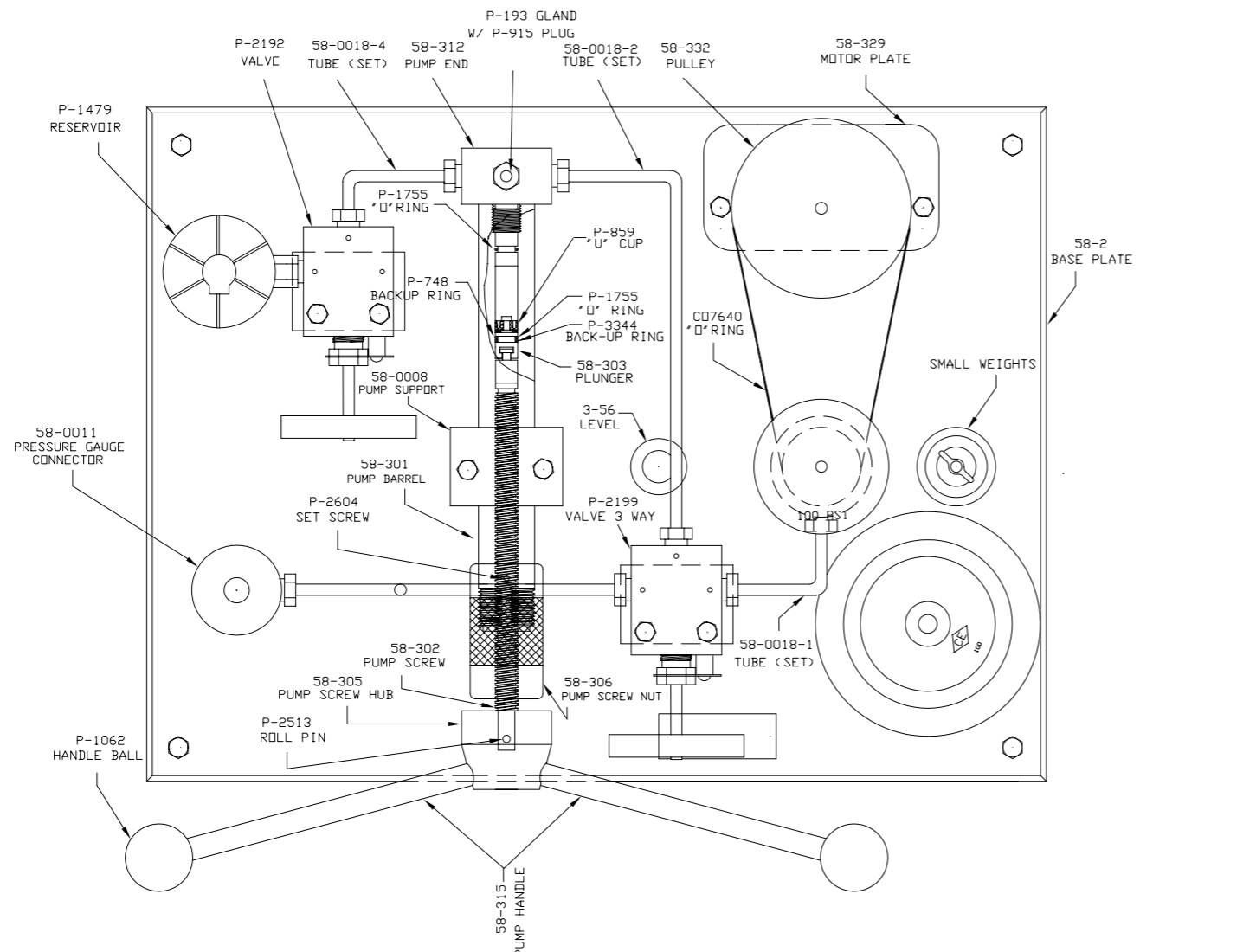
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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ISSUED - ECN 6734	08-24-00	AEB/BD
9F	B	ISSUED ECN# 8491, CHANGES PER ECN	7/28/03	PJA/JAC



QTY.	REQD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
PARTS LIST					
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]					
TOLERANCES:					
1 PLACE +0.030					
2 PLACE +0.010					
3 PLACE +0.005					
ANGLES ±1/2°					
SURF. FINISH 63					
NEXT ASSY			USED ON		
APPROVALS			DATE		
DRAWN: JCB			5-9-90		
CHECKED: JCB			5-9-90		
ENGR: JCB			5-9-90		
SIZE		S.O. NO.		DWG. NO.	
1/2"				58-0300	
SCALE: NONE		DO NOT SCALE DRAWING		SHEET: 1 of 1	

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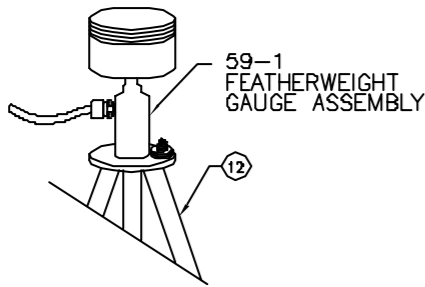
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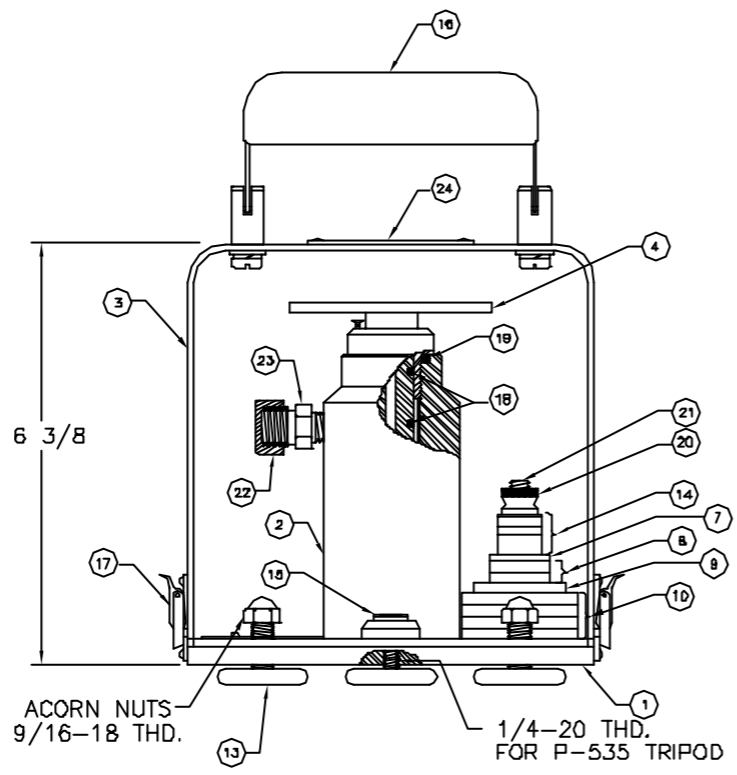
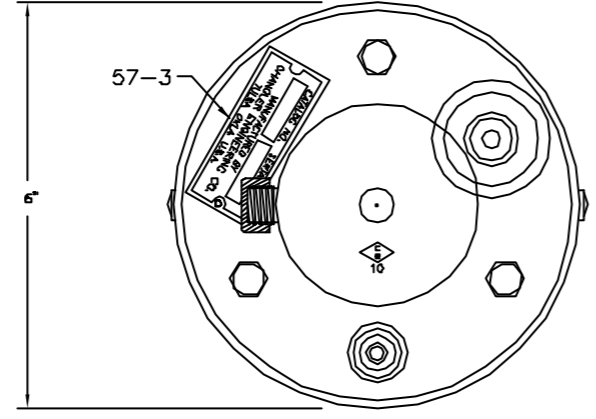
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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ECN 5261	6-26-97	



**SPECIFICATIONS**

- 1. FURNISHED COMPLETE WITH
  - ⑥ 59-15 WEIGHT CASE
  - ⑪ 36-50 NYLON HOSE ASSEMBLY
- 500 PSI = 13 LBS  
 1000 PSI = 19 LBS  
 1500 PSI = 25 LBS  
 2000 PSI = 31 LBS



ITEM	QTY	NUMBER	DESCRIPTION
24	1	57-00002	PLATE, NAME
23	1	P-179	ADAPTER, 1/8MP X 9/16-18 RH
22	1	P-683	PLASTIC CAP FOR ADAPTER
21	1	P-1121	SMALL WEIGHT STUD
20	1	P-1120	KNURL NUT, SMALL WEIGHTS
19	1	P-1112	O-RING, CYLINDER NUT
18	1	P-1111	O-RING, CYLINDER
17	2	P-1110	CATCH
16	1	P-1109	HANDLE
15	1	P-984	LEVEL, BULLSEYE
14	1	05-00047	WEIGHT SET, 1/10 PSI
13	3	P-655	LEVELING SCREWS
12	1	P-535	TRIPOD ASSEMBLY
11	1	36-00050	HOSE, ASSEMBLY, 36-50
10	1	05-00015	WEIGHT, 10 PSI
9	1	05-00014	WEIGHT, 5 Psi
8	1	05-00013	WEIGHT, 2 PSI
7	1	05-00012	WEIGHT, 1 PSI
6	1	59-00015	WEIGHT CASE
5	1	59-00013	BASE WEIGHT CASE
4	1	59-00006	PISTON AND CYLINDER ASSEMBLY
3	1	59-00004	COVER ASSEMBLY
2	1	59-00003	BODY
1	1	59-00002	BASE

**PART LIST**

NONE		ASSEMBLY	
NEXT ASSY		USED ON	
APPLICATION		APPROVALS	DATE

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS IN INCHES (mm)

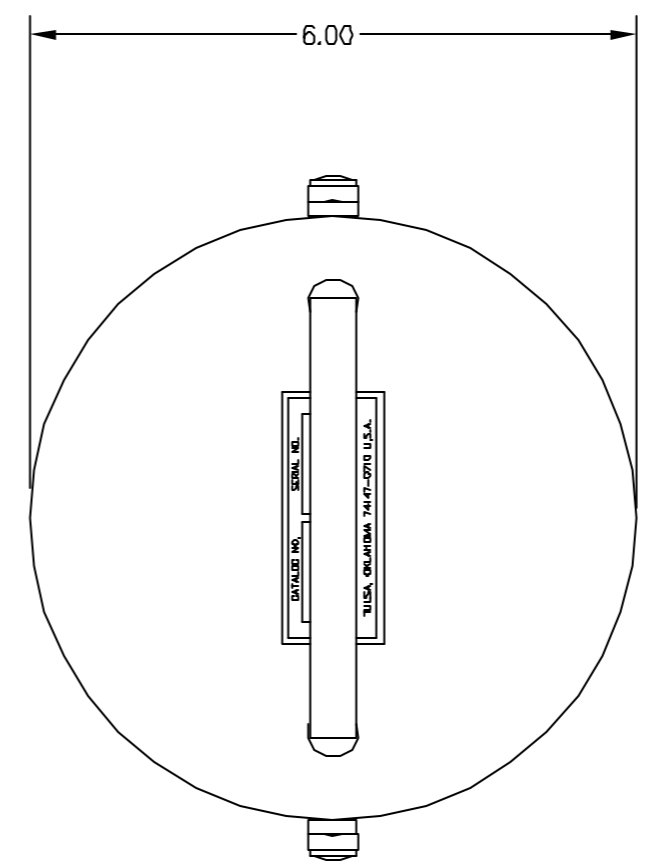
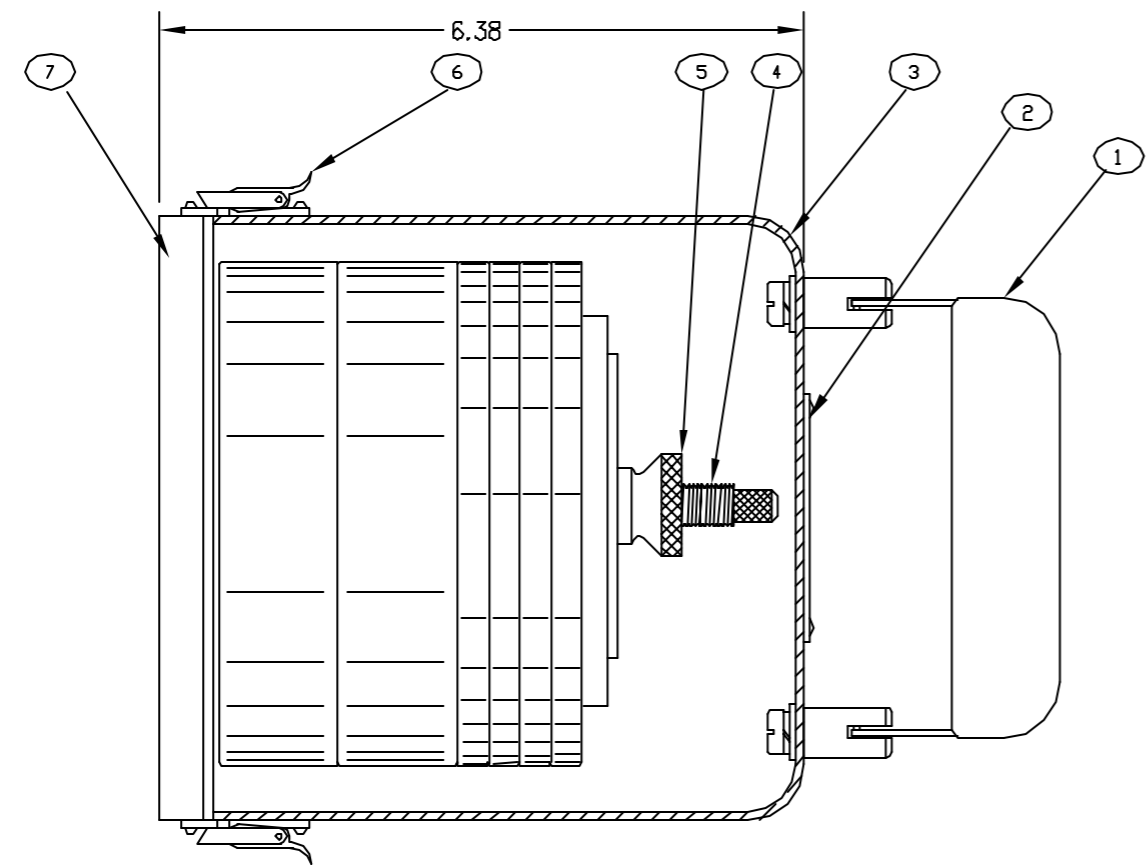
TOLERANCES:  
 1 PLACE +0.030 [-.78]  
 2 PLACE +0.010 [-.25]  
 3 PLACE +0.005 [-.127]  
 ANGLES ±1/2°  
 SURF. FINISH 32/

**EG&G CHANDLER**

TITLE  
**FEATHERWEIGHT GAUGE ASS'Y**

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Copyright by EG&G Instruments/Chandler Division		CHECKED: <i>JEM</i>	6-27-97	C		59-0001	A
		ENGR.: <i>JEM</i>	6-27-97	SCALE: NONE	DO NOT SCALE DRAWING	SHEET: 1 of 1	

REVISIONS				
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS
	A	ECN 4414	1/12/95	AMW JJM
	B	ECN 6734	08/25/00	AEB BD



59-0015 WEIGHT CASE ASSEMBLY  
 INCLUDING WEIGHTS  
 FURNISHED WITH:  
 59-0001 FEATHERWEIGHT GAUGE  
 61-0001 FEATHER WEIGHT TESTER

QTY. REQD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
	1 59-0013	PLATE, BASE	ALUM.	7
	2 P-1110	CATCH, TOGGLE	SST	6
	1 15-0018	NUT, KNURLED	BRASS	5
	1 61-0008	ROD, WEIGHT	BRASS	4
	1 59-0004	COVER ASSEMBLY	ALUM.	3
	1 57-0002	NAME PLATE	ALUM.	2
	1 P-1109	HANDLE, BLK, W/ CATCH		1
-04 -03 -02 -01	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM

QTY. REQD.		PARTS LIST		UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]		<b>CHANDLER ENGINEERING</b>					
				TOLERANCES:		TITLE					
				1 PLACE ±0.030		WEIGHT CASE ASSEMBLY					
				2 PLACE ±0.010		DRAWN: AEB		DATE		SIZE	
				3 PLACE ±0.005		CHECKED: BD		01/08/01		A3	
				ANGLES ±1/2°		ENGR.: BD		06/25/00		SCALE: 1 = 1	
				SURF. FINISH 63/		APPROVALS		DATE		DO NOT SCALE DRAWING	
NEXT ASSY		USED ON		APPLICATION		APPROVALS		DATE		SHEET: 1 of 1	
						DRAWN: AEB		DATE		SHEET: 1 of 1	
						CHECKED: BD		DATE		SHEET: 1 of 1	
						ENGR.: BD		DATE		SHEET: 1 of 1	
						DRAWN: AEB		DATE		SHEET: 1 of 1	
						CHECKED: BD		DATE		SHEET: 1 of 1	
						ENGR.: BD		DATE		SHEET: 1 of 1	

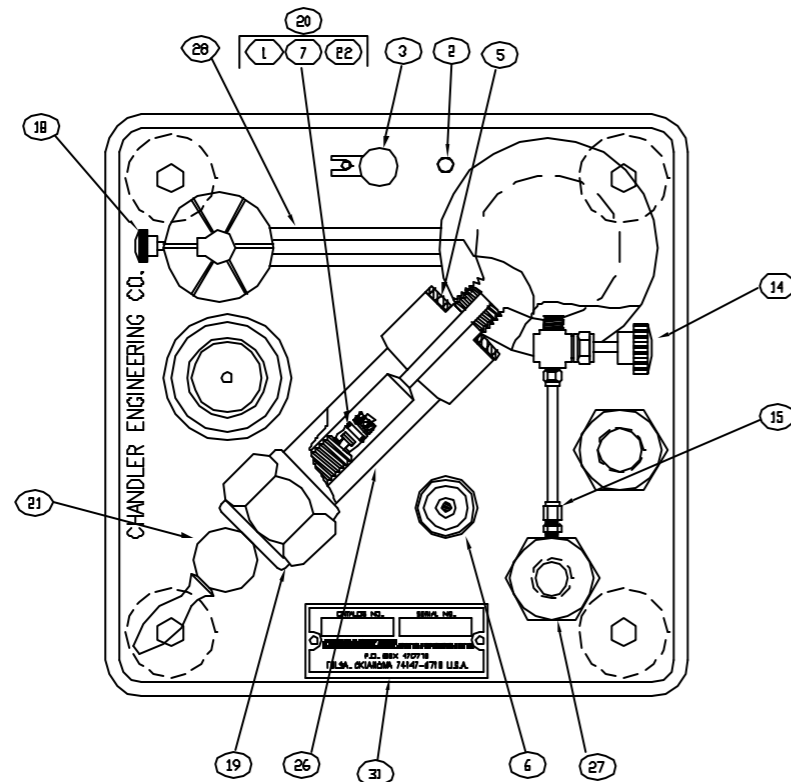
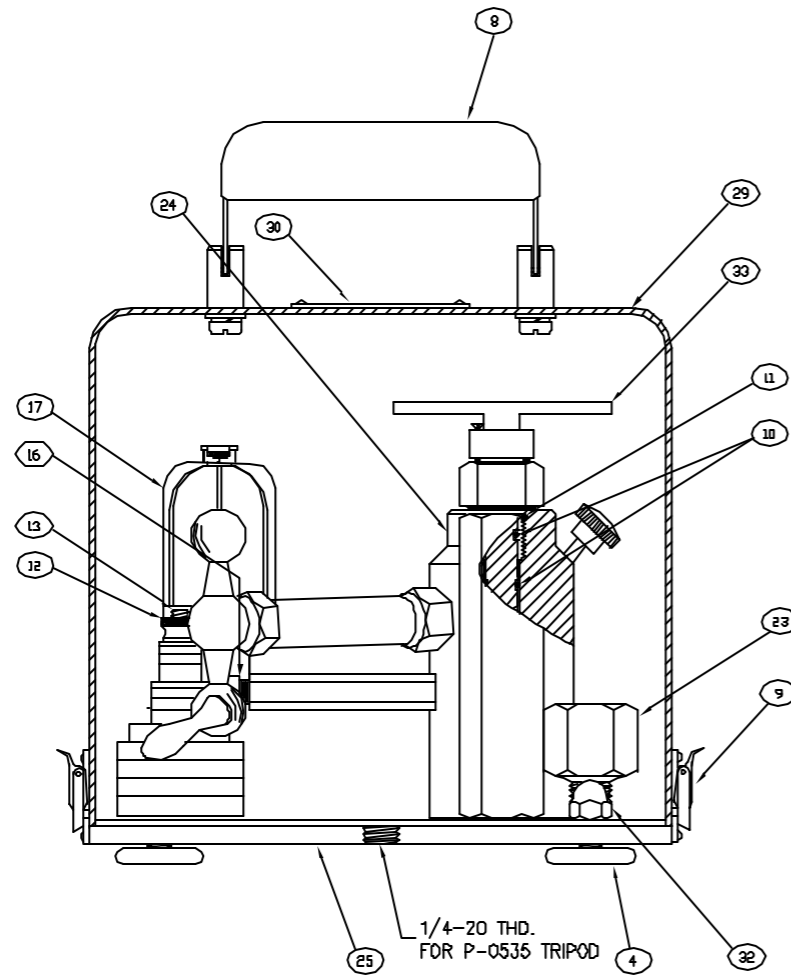
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SIZE	S.O. NO.	DWG NO.	REV.
A3		59-0015	B

REVISIONS				
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS
	E	ECN 6734	08/28/00	AEB BD

## SPECIFICATIONS

1. FURNISHED COMPLETE WITH:  
59-0015 WEIGHT CASE  
36-0050 NYLON HOSE ASSEMBLY
  
2. TOTAL WEIGHT INCLUDING ACCESSORIES:  
500 PSI = 19 lbs.  
1000 PSI = 25 lbs.  
1500 PSI = 31 lbs.  
2000 PSI = 37 lbs.

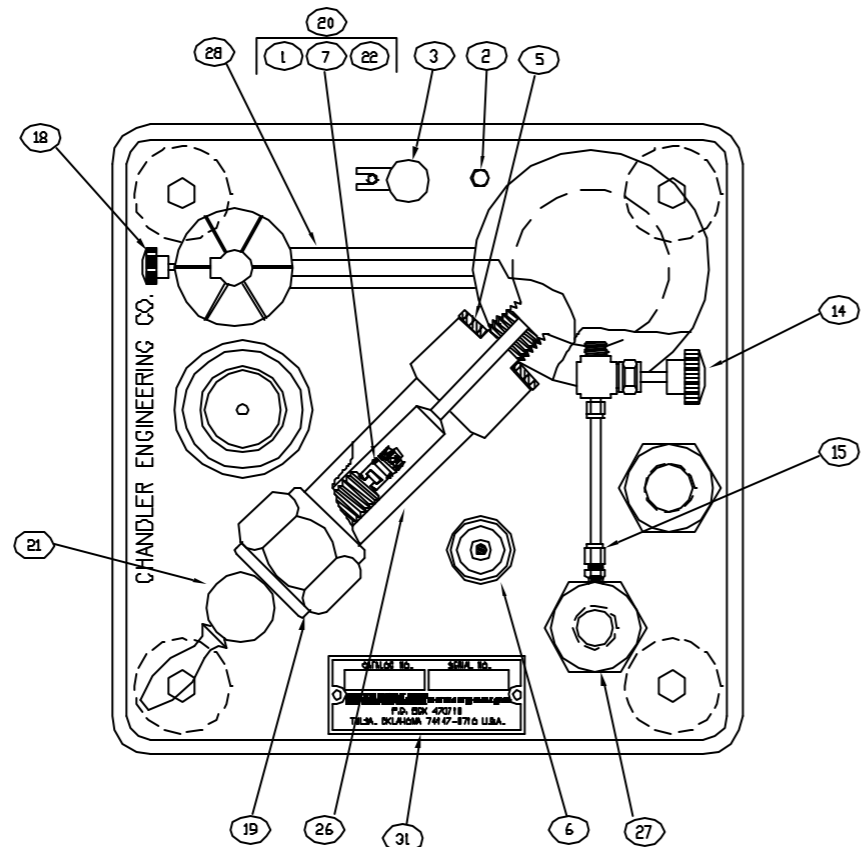
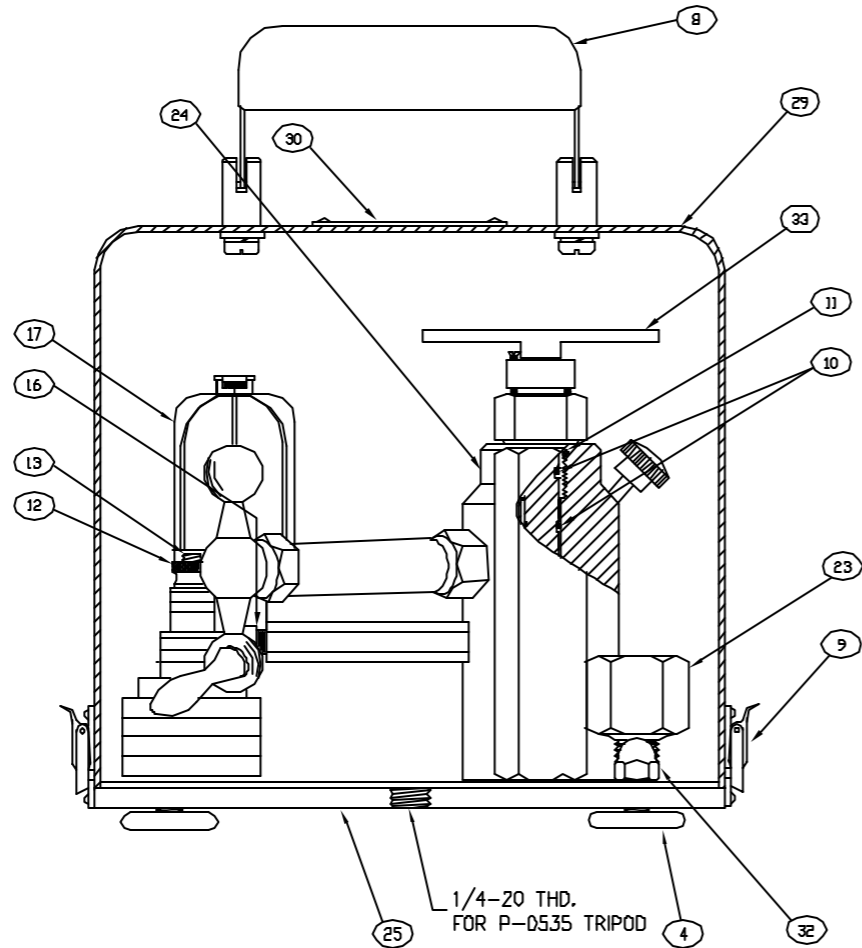


QTY.	RECD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
		1	59-0006	PISTON AND CYLINDER ASSEMBLY	33
		4	H-31-004	NUT, CAP, 5/16-18	SS 32
		1	57-0003	SERIAL NO. PLATE	ALUM. 31
		1	57-0002	NAMEPLATE	ALUM. 30
		1	61-0007	COVER ASSEMBLY	ALUM. 29
		1	61-0006	CONNECTOR, RESERVOIR	BRASS 28
		1	61-0005	CONNECTOR, GAUGE	ALUM. 27
		1	61-0004	PUMP, CYLINDER	BRASS 26
		1	61-0003	BASE PLATE	ALUM. 25
		1	61-0002	BODY	ALUM. 24
		1	36-0043	ADAPTER	ALUM. 23
		1	23-0062	PLUNGER, PUMP	BRASS 22
		1	23-0013	SCREW, PUMP, W/ HANDLE ASS'Y.	BRASS/SS 21
		1	23-0009	PLUNGER ASS'Y(INC. P-0066, P-1036, 23-0062)	20
		1	23-0006	CAP, OIL, PUMP	SS 19
		1	P-1506	VALVE, NEEDLE, 1/4FP X 1/4FP	BRASS 18
		1	P-1478	RESERVOIR, 4 Oz	PLASTIC 17
		1	P-1477	ELBOW, 1/4FNPT	BRASS 16
		1	P-1416	CONNECTOR, 1/4MPT X 1/4T, SW	BRASS 15
		1	P-1415	VALVE, 1/4MP X 1/4T	BRASS 14
		1	P-1121	STUD, 1/4-20, ALTHREAD	SS 13
		1	P-1120	NUT, KNURLED, 1/4-20	BRASS 12
		1	P-1112	O RING, AS022-70	BUNA 11
		2	P-1111	O RING, AS014-70	BUNA 10
		2	P-1110	CATCH, TOGGLE	SS 9
		1	P-1109	HANDLE, CARRYING	VINYL 8
		1	P-1036	PACKING, U-CUP	NEOPRENE 7
		1	P-0984	LEVEL, CIRCLE	ALUM 6
		1	P-0981	SEAL, .88 X .75	RUBBER 5
		4	P-0655	FOOT, GLIDER	CRS 4
		1	P-0531	JACK, HAND,	BRASS 3
		1	P-0530	POINTER, DRIVER	BRASS 2
		1	P-0066	O RING, AS113-70	BUNA 1

QTY. RECD.		PARTS LIST		<b>CHANDLER ENGINEERING</b>  TITLE <b>ASSEMBLY FEATHERWEIGHT TESTER</b>	
		UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES (mm)			
		TOLERANCES: 1 PLACE +0.030 [.76] 2 PLACE +0.010 [.25] 3 PLACE +0.005 [.127] ANGLES +1/2° SURF. FINISH 63/			
NEXT ASSY		USED ON			
APPLICATION		APPROVALS		DATE	
		DRAWN: <i>ASB</i>		08/28/00	
		CHECKED: <i>ASB</i>		01/09/01	
		ENGR.: <i>ASB</i>		01/09/01	
		SIZE A2		S.D. NO.	
		DWG NO. 61-0001		REV. E	
		SCALE: 1 = 1		DO NOT SCALE DRAWING SHEET: 1 of 1	

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REVISIONS				
ZONE	REV	DESCRIPTION OF REVISION	DATE	APPROVALS
	B	ECN 6734	08/28/00	AEB BD



## SPECIFICATIONS

- FURNISHED COMPLETE WITH:  
59-0015 WEIGHT CASE  
36-0050 NYLON HOSE ASSEMBLY
- TOTAL WEIGHT INCLUDING ACCESSORIES:  
500 PSI = 19 lbs.  
1000 PSI = 25 lbs.  
1500 PSI = 31 lbs.  
2000 PSI = 37 lbs.

QTY.	RECD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM
1		59-0040	PISTON AND CYLINDER ASSEMBLY		33
4		H-31-004	NUT, CAP, 5/16-18	SS	32
1		57-0003	SERIAL NO. PLATE	ALUM.	31
1		57-0002	NAMEPLATE	ALUM.	30
1		61-0007	COVER ASSEMBLY	ALUM.	29
1		61-0006	CONNECTOR, RESERVOIR	BRASS	28
1		61-0005	CONNECTOR, GAUGE	ALUM.	27
1		61-0004	PUMP, CYLINDER	BRASS	26
1		61-0003	BASE PLATE	ALUM.	25
1		61-0002	BODY	ALUM.	24
1		36-0043	ADAPTER	ALUM.	23
1		23-0062	PLUNGER, PUMP	BRASS	22
1		23-0013	SCREW, PUMP, W/ HANDLE ASS'Y.	BRASS/SS	21
1		23-0009	PLUNGER ASS'Y(INC. P-0066, P-1036, 23-0062)		20
1		23-0006	CAP, OIL, PUMP	SS	19
1		P-1506	VALVE, NEEDLE, 1/4FP X 1/4FP	BRASS	18
1		P-1478	RESERVOIR, 4 Oz	PLASTIC	17
1		P-1477	ELBOW, 1/4FNPT	BRASS	16
1		P-1416	CONNECTOR, 1/4MPT X 1/4T, SW	BRASS	15
1		P-1415	VALVE, 1/4MP X 1/4T	BRASS	14
1		P-1121	STUD, 1/4-20, ALTHREAD	SS	13
1		P-1120	NUT, KNURLED, 1/4-20	BRASS	12
1		P-1112	O RING, AS022-70	BUNA	11
2		P-1111	O RING, AS014-70	BUNA	10
2		P-1110	CATCH, TOGGLE	SS	9
1		P-1109	HANDLE, CARRYING	VINYL	8
1		P-1036	PACKING, U-CUP	NEOPRENE	7
1		P-0984	LEVEL, CIRCLE	ALUM	6
1		P-0981	SEAL, .88 X .75	RUBBER	5
4		P-0655	FOOT, GLIDER	CRS	4
1		P-0531	JACK, HAND,	BRASS	3
1		P-0530	POINTER, DRIVER	BRASS	2
1		P-0066	O RING, AS113-70	BUNA	1

QTY.	RECD.	PART NUMBER	DESCRIPTION	MATERIAL SPEC.	ITEM												
<b>CHANDLER ENGINEERING</b>																	
<b>ASSEMBLY FEATHERWEIGHT TESTER</b>																	
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES (mm)		<table border="1"> <tr> <td>TOLERANCES:</td> <td></td> </tr> <tr> <td>1 PLACE</td> <td>+0.030 [.76]</td> </tr> <tr> <td>2 PLACE</td> <td>+0.010 [.25]</td> </tr> <tr> <td>3 PLACE</td> <td>+0.005 [.127]</td> </tr> <tr> <td>ANGLES</td> <td>+1/2°</td> </tr> <tr> <td>SURF. FINISH</td> <td>63/</td> </tr> </table>				TOLERANCES:		1 PLACE	+0.030 [.76]	2 PLACE	+0.010 [.25]	3 PLACE	+0.005 [.127]	ANGLES	+1/2°	SURF. FINISH	63/
TOLERANCES:																	
1 PLACE	+0.030 [.76]																
2 PLACE	+0.010 [.25]																
3 PLACE	+0.005 [.127]																
ANGLES	+1/2°																
SURF. FINISH	63/																
NEXT ASSY		USED ON	APPROVALS														
APPLICATION		DATE	DATE														
DRAWN: <i>CEJ</i>		D7/D7/B1	SIZE: A2	S.D. NO.	DWG NO. 61-0030												
CHECKED: <i>ARB</i>		D7/D7/B1	SCALE: 1 = 1	DO NOT SCALE DRAWING	SHEET: 1 of 1												
ENGR.: <i>ARB</i>		D7/D7/B1	REV. B														

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## HYDRAULIC DEADWEIGHT TEST CERTIFICATE - 0.02% ACCURACY

Customer: YOUR COMPANY  
 Address: \_\_\_\_\_  
 City, State, Country: \_\_\_\_\_  
 Sales Order Number: \_\_\_\_\_  
 Customer Order Number: \_\_\_\_\_

Certificate Number: 10641  
 Calibration Date: April 5, 2002  
 Reference Temperature: 72\* F  
 Calibration Procedure: MTE-2001

CALIBRATION STANDARDS					
Identification Number	Manufacturer	Description	Model Number	Serial Number	Exp. Date
620-051	Sartorius	Balance	1602	3310020	06/05/02
620-052	Sartorius	Balance	E55005	37010015	06/05/02
620-053	Sartorius	Balance	3862	3210003	06/05/02
620-055	Chandler Engineering	MFG. Transfer Standard	15-0006	620-055	09/12/02

Chandler Engineering certifies that the instrument listed below has been tested, calibrated (if necessary), and meets the criteria established in the referenced procedure. The standards used are traceable to the National Institute of Standards and Technology.

DWT Type: 23-001  
 Serial No: 19865  
 Press. Range: 5-500 PSI

Reference Height (in/cm): 7.9CM(3.1IN")  
 Crossfloat Pressure (psi): 500.00  
 Gravity (cm/sec<sup>2</sup>): 980.665

Total Mass (grams): 6271.7  
 Calculated Piston Area (in<sup>2</sup>): 0.027653  
 Calculated Piston Area (cm<sup>2</sup>): 0.178409

Nominal Pressure (psi)	Bottom Tolerance (grams)	Top Tolerance (grams)	Mass Before Adj. (grams)	Pass/Fail (P/F)	Mass After Adj. (grams)	Pass/Fail (P/F)	Calculated Pressure (kPa)	Calculated Pressure (BAR)	Calculated Pressure (psi)
100A	1,254.2	1,254.6	1,254.5	P	1,254.5	P	689.56	6.90	100.01
100B	1,254.2	1,254.6	1,254.4	P	1,254.4	P	689.51	6.90	100.00
100C	1,254.2	1,254.6	1,254.3	P	1,254.3	P	689.45	6.89	100.00
100D	1,254.2	1,254.6	1,254.3	P	1,254.3	P	689.45	6.89	100.00
20A	250.84	250.93	250.88	P	250.88	P	137.90	1.38	20.00
20B	250.84	250.93	250.79	F	250.91	P	137.92	1.38	20.00
20C	250.84	250.93	250.87	P	250.87	P	137.90	1.38	20.00
20D	250.84	250.93	250.85	P	250.85	P	137.89	1.38	20.00
10A	125.42	125.46	125.38	F	250.46	P	137.67	1.38	19.97
5	62.708	62.733	62.674	F	62.730	P	34.48	0.34	5.00
2A	25.084	25.093	25.087	P	25.087	P	13.79	0.14	2.00
2B	25.084	25.093	25.083	F	25.089	P	13.79	0.14	2.00
1	12.542	12.546	12.541	F	12.545	P	6.90	0.07	1.00
Table Weight	62.708	62.733	62.699	F	62.728	P	34.48	0.34	5.00
Total Mass	6,267.0	6,277.0	6,271.7	P	6,271.7	P	3,447.38	34.47	500.00

Certified By: MATT KISSIRE



# Standard Deadweight Tester - Series 23 and 02

Select the desired units and then the code number defining the instrument with the desired range and smallest weight.

## 23 - STANDARD PRESSURE (Under 2000 psi or 14,100 kPa)

Code	Smallest Weight		Minimum Pressure	Maximum Pressure	Units
	0.1 psi	1 psi			
001	H	N	5	500	psi
001	J	P	5	1000	
001	K	Q	5	1500	
001	L	R	5	2000	
	1 kPa	10 kPa			
145	H	N	100	4100	kPa
145	J	P	100	7100	
145	K	Q	100	11100	
145	L	R	100	14100	

## 02 - HIGH PRESSURE SERIES (Under 5,000 psi or 36,100 kPa)

Code	Smallest Weight		Minimum Pressure	Maximum Pressure	Units
	0.1 psi	1 psi			
001	H	N	50	3000	psi
001	J	P	50	4000	
001	K	Q	50	5000	
	1 kPa	10 kPa			
145	H	N	500	21100	kPa
145	J	P	500	31100	
145	K	Q	500	36100	
	0.01kg/cm <sup>2</sup>	0.1 kg/cm <sup>2</sup>			
080	H	N	5	211	kg/cm <sup>2</sup>
080	J	P	5	311	
080	K	Q	5	361	

### MATERIALS FOR WEIGHTS

B - Brass

S - Stainless Steel

### FILL FLUID

T - TYPE 23-70 Special Hydraulic Oil For Normal Use

O - Type P-1169 Synthetic Oil For Use with Oxygen

XX -XXXX - X - X

EXAMPLE: 23 - 001R - B - T



# Standard Deadweight Dual Range Tester - Series 02 & 55

## 02 HIGH PRESSURE DUAL RANGE TESTER

Code	Smallest Weight		Low Range		High Range		Units	
	0.1psi	1psi	Minimum	Maximum	Minimum	Maximum		
070	H	N	10	600	50	3000	psi	
070	J	P	10	800	50	4000		
070	K	Q	10	1000	50	5000		
		<b>0.01kg/cm<sup>2</sup></b>	<b>0.1kg/cm<sup>2</sup></b>					kg/cm <sup>2</sup>
190	H	N	1	42	5	211		
190	J	P	1	62	5	311		
190	K	Q	1	72	5	361		
		<b>1 kPa</b>	<b>10kPa</b>					kPa
195	H	N	100	4200	500	21100		
195	J	P	100	6200	500	31100		
195	K	Q	100	7200	500	36100		

## 55 SUPER PRESSURE DUAL RANGE TESTER

Code	Smallest Weight		Low Range		High Range		Units	
	0.01 psi	1 psi	Minimum	Maximum	Minimum	Maximum		
060	H	N	10	1200	50	6000	psi	
060	J	P	10	2000	50	10000		
060	K	Q	10	3000	50	15000		
		<b>0.01kg/cm<sup>2</sup></b>	<b>0.1 kg/cm<sup>2</sup></b>					kg/cm <sup>2</sup>
090	H	N	1	102	5	511		
090	J	P	1	142	5	711		
090	K	Q	1	202	5	1011		
		<b>1 kPa</b>	<b>10 kPa</b>					kPa
165	H	N	100	10200	50	51100		
165	J	P	100	14200	500	71100		
165	K	Q	100	20200	500	101100		

Dual Range Testers have interchangeable piston and cylinder pairs. The assembly can be changed very quickly to convert the range.

### MATERIALS FOR WEIGHTS

B - Brass

S - Stainless Steel

### FILL FLUID

T - Type 23-70 Special Hydraulic Oil For Normal Use

O - Type P-1169 Synthetic Oil For Use With Oxygen

XX - XXXX - XX - X

Example: 02 - 070H - B - T



# Featherweight Dual Range Tester - Series 61

Dual Range Testers have interchangeable piston and cylinder pairs. The assembly can be changed very quickly to convert the range. Select the desired units and then the code number defining the instrument with the desired range and smallest weight.

Code	Smallest Weight	Low Range		High Range		Units
		Minimum	Maximum	Minimum	Maximum	
	<b>0.1 psi</b>					
060	H	3	100	10	500	psi
060	J	3	200	10	1000	
060	K	3	300	10	1500	
060	L	3	400	10	2000	
	<b>1 kPa</b>					
165	H	50	820	100	4100	kPa
165	J	50	1620	100	8100	
165	K	50	2220	100	11100	
165	L	50	3220	100	16100	
	<b>0.01kg/cm<sup>2</sup></b>					
090	H	0.5	8.2	1	41	kg/cm <sup>2</sup>
090	J	0.5	16.2	1	81	
090	K	0.5	22.2	1	111	
090	L	0.5	32.2	1	161	

**MATERIALS FOR WEIGHTS**

- B - Brass
- S - Stainless

**FILL FLUID**

- T - Type 23-70 Special Hydraulic Oil for Normal Use
- O- Type P-1169 Synthetic Oil for Use with Oxygen

61 - XXXX - X - X

EXAMPLE:

61 - 060K - B - T

# Featherweight Motor-Driven Tester - Series 61

To achieve optimum sensitivity and repeatability at low pressures, friction between the piston and cylinder must be minimized. This can be achieved by using an electric motor with a flexible drive. Select the desired units and then the code number defining the instrument with the desired range and smallest weight.

Code	Smallest Weight		Minimum Pressure	Maximum Pressure	Units
	<b>0.1 psi</b>	<b>1 psi</b>			
035	H		3	100	
035	J		3	200	
035	K		3	300	
035	L		3	400	psi
025	H	N	10	500	
025	J	P	10	1000	
025	K	Q	10	1500	
025	L	R	10	2000	

**MATERIALS FOR WEIGHTS**

- B - Brass
- S - Stainless Steel

**FILL FLUID**

- T - Type 23 - 70 Special Hydraulic Oil for Normal Use
- O - Type P-1169 Synthetic Oil for Use with Oxygen

**OPERATING VOLTAGE AND FREQUENCY**

- 6 - 120V, 60 Hz AC
- 5 - 220V, 50 Hz AC

61 - XXXX - X - X - X

EXAMPLE: 61-035J - B - T - 6

## Precision Pressure Standard Tester - Series 58

Select the desired units and then the code number defining the instrument with the desired range and smallest weight.

Brass Weights	Stainless Steel Weights	Minimum Pressure	Maximum Pressure	Smallest Weight	Units	
050H	197H	10	1000	0.1	psi	
050J	197J	10	2000	0.1		
050K	197K	10	3000	0.1		
001H	198H	50	5000	1.0		
001J	198J	50	10000	1.0		
001K	198K	50	15000	1.0		
150H	151H	100	20000	1.0		
300H	301H	100	30000	1.0		
155H	191H	100	7010	1.0		kPa
155J	191J	100	15010	1.0		
155K	191K	100	21010	1.0		
145H	192H	500	35600	10.0		
145J	192J	500	75600	10.0		
145K	192K	500	105600	10.0		
265H	266H	1000	150100	10.0		
140H	194H	1.0	70.1	0.01	kg/cm <sup>2</sup>	
140J	194J	1.0	150.1	0.01		
140K	194K	1.0	210.1	0.01		
080H	195H	5.0	356.0	0.1		
080J	195J	5.0	756.0	0.1		
080K	195K	5.0	1060.0	0.1		
280H	281H	10.0	1501.0	0.1		

### FILL FLUID

T - Type 23-0070 Special Hydraulic Oil For Normal Use

O - Type P-1169 Synthetic Oil For Use With Oxygen

### AC Voltage For Motor

1 - For 120VAC, 50 or 60 Hz Power

5 - For 220VAC, 50 or 60 Hz Power

58 - XXXX - X - X

EXAMPLE: 58 - 195J - T - 1

# Precision Pressure Standard Tester - Series 58 Dual Range Testers

Select the desired units and then the code number defining the instrument with the desired range and smallest weight.

Brass Weights	Stainless Steel Weights	Minimum Pressure	Maximum Pressure	Smallest Weight	Units
060H	199H	10/50	1000/5000	0.1	psi
060J	199J	10/50	2000/10000	0.1	
060K	199K	10/50	3000/15000	0.1	
200H	201H	10/100	2000/20000	0.1	
165H	193H	100/500	7121/35605	1.0	kPa
165J	193J	100/500	15121/75605	1.0	
165K	193K	100/500	21121/105605	1.0	
205H	206H	100/1000	15010/150100	1.0	
090H	196H	1/5	71.21/356.05	0.01	kg/cm <sup>2</sup>
090J	196J	1/5	151.21/756.05	0.01	
090K	196K	1/5	211.21/1056.05	0.01	
210H	211H	1/10	150.10/1501	0.01	

**FILL FLUID**

T - Type 23-0070 Special Hydraulic Oil For Normal Use

O - Type P-1169 Synthetic Oil For Use With Oxygen

**AC Voltage For Motor**

1 - For 120VAC, 50 or 60 Hz Power

5 - For 220VAC, 50 or 60 Hz Power

58 - XXXX- X - X

EXAMPLE:

58 - 193J - T - 1

23-0070  
SPECIAL HYDRAULIC OIL

MATERIAL SAFETY DATA SHEET

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PRODUCT TRADE NAME: SUPERFILM A/W 15, 22, 32, 46, 68, 100, 150, 220, 320 HYDRAULIC OIL  
REVISION DATE: June 6, 1989  
TRANSPORTATION: EMERGENCY PHONE NUMBER (CHEMTREC): (800) 424-9300  
CHEMICAL NAME: Petroleum Oil Blend  
NFPA CODE: Health: 0 Fire: 1 Reactivity: 0  
HMIS SYSTEM: Health: 0 Flammability: 1 Reactivity: 0

---

SECTION 1 HAZARDOUS INGREDIENTS

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This material is not known to contain any chemical listed as a carcinogen or suspected carcinogen by OSHA, IARC or the National Toxicology Program (NTP) at a concentration greater than 0.1%.

Contains refined petroleum oil and selected additives.

SECTION 2 FIRE AND EXPLOSION HAZARDS

---

FLASH POINT, °F: 410-440  
UPPER FLAMMABLE LIMIT: Not determined  
LOWER FLAMMABLE LIMIT: Not determined  
EXTINGUISHING MEDIA: CO<sub>2</sub>; dry chemical; foam; water spray; water fog.  
SPECIAL  
FIREFIGHTING PROCEDURES: Cool containers with H<sub>2</sub>O and remove from fire exposure.  
UNUSUAL FIRE &  
EXPLOSION HAZARDS: Empty containers could contain flammable vapors.

---

SECTION 3 HEALTH HAZARD DATA

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ORAL TOXICITY: Minimal hazard. Oral toxicity greater than 5,000 mg/kg.  
EYE IRRITATION: May be an eye irritant.  
SKIN IRRITATION: Possible redness and defatting may result from prolonged exposure.  
OTHER: Unknown  
TLV: 5 mg/m<sup>3</sup> as oil mist.

EMERGENCY FIRST AID PROCEDURES:

SKIN: Wash with soap and water.  
EYE: Flush with large amounts of water. If irritation persists, get medical attention.  
INHALATION: Remove to fresh air. See physician if irritation persists.  
ORAL: Call physician. Do not induce vomiting.  
ADDITIONAL: None.

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SECTION 4 SPECIAL PROTECTION INFORMATION

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VENTILATION PROCEDURE: Normal shop ventilation adequate.  
GLOVE PROTECTION: Oil impervious gloves recommended.  
EYE PROTECTION: Not usually required, but goggles recommended.  
OTHER PROTECTION: None required.

---

SECTION 5 PHYSICAL DATA

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VAPOR PRESSURE: >1 mm Hg. VAPOR DENSITY: Not determined  
SPECIFIC GRAVITY: <1.00 @ 60°F EVAPORATION RATE: Not determined  
WATER SOLUBILITY: Slight ODOR: Mild hydrocarbon odor  
PERCENT VOLATILE: Not determined APPEARANCE: Amber liquid

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SECTION 6 STABILITY

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STABILITY: Stable  
INCOMPATIBILITY: Oxidizing agents  
POLYMERIZATION: Will not occur  
THERMAL DECOMPOSITION: Oxides of carbon, nitrogen; phosphorus, hydrogen sulfide.

---

SECTION 7 SPILL OR LEAK PROCEDURES

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SPILL PROCEDURES: Wear chemical splash goggles. Wear rubber boots. Prevent entry into sewers and waterways. Pick up free liquid for recycle/disposal. Absorb small amounts on inert material for disposal.  
WASTE DISPOSAL: If disposed of, this material may be hazardous for disposal under RCRA due to reactivity. Disposal should be in compliance with federal, state and local laws.

---

SECTION 8 SPECIAL PRECAUTIONS

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SPECIAL PRECAUTIONS: Launder contaminated clothing before reuse. Wash skin thoroughly after handling. Avoid prolonged contact.

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SECTION 9 TRANSPORTATION AND LABELING

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DOT PROPER SHIPPING NAME: Not applicable  
DOT HAZARD CLASS: Not applicable

---

SECTION 10 OTHER REGULATORY INFORMATION

---

SARA SEC 313 SUPPLIER NOTIFICATION

THIS PRODUCT CONTAINS THE FOLLOWING TOXIC CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 AND OF 40CFR372:

<u>CAS#</u>	<u>CHEMICAL NAME</u>	<u>%WEIGHT</u>
-------------	----------------------	----------------

None

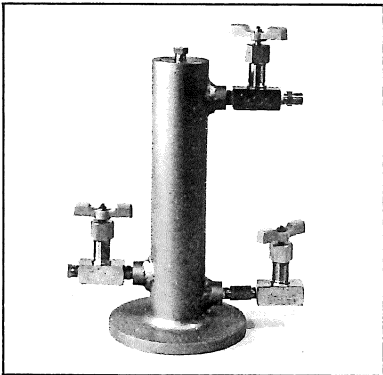
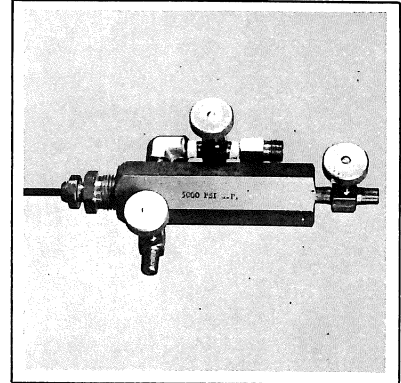
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SL 66  
OIL-WATER SEPARATORS

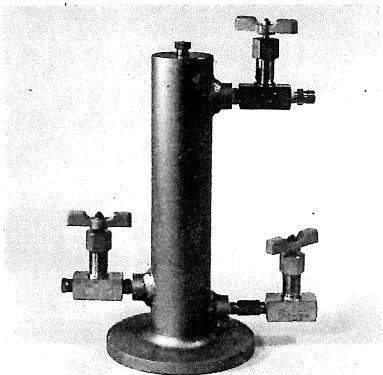
**MODEL 02-71**

The 02-71 Oil-Water Separator is rated for a working pressure of 5000 psi (34500 kPa) and is designed for use with the 02-001 and 23-001 Deadweight Testers. It will fit inside the tester case for transportation.



**MODEL 05-194**

The 05-194 Oil-Water Separator can be used with any Chandler Deadweight Gauge or Tester. It is rated for 5000 psi (34500 kPa) and is a stand-alone unit. It comes complete with inlet valve, outlet valve, drain valve, and 10 feet of 1/8-inch diameter stainless steel tubing to connect it to the deadweight instrument.



**MODEL 05-202**

The 05-202 Oil-Water Separator is rated for 10,000 psi (69000 kPa). It is similar to the Model 05-194 and is supplied complete with valves and stainless steel tubing.

**MODEL 55-36**

The 55-36 Oil-Water Separator has been designed specifically for use with the Model 55-100 Deadweight Tester. It can be mounted on the side of the tester case for transportation. The pressure rating is 6000 psi (41400 kPa).





## Deadweight Testers

### **PRIMARY STANDARD**

Deadweight Testers are the basic primary standard for the accurate measurement of pressure. Chandler Testers are used to measure the pressure exerted by a gas or liquid and can also generate a test pressure for the calibration of pressure gauges, electronic pressure calibrators, transducers, transmitters, recorders, etc. No other device can match the stability, repeatability and accuracy of the Deadweight Tester.

### **HIGH SENSITIVITY**

When the weights are applied to the piston, the entire assembly is rotated slowly. This rotation minimizes frictional effects and permits vertical motion of the piston with extremely small variations in pressure. Measurements to 1/10 psi (1 kPa) can be made.

### **OPERATION**

The Chandler Engineering Deadweight Tester utilizes the well proven piston system consisting of a vertically mounted precision lapped stainless steel piston and sleeve with a metal to metal seal. This superior design eliminates friction and oil leakage created by o-ring seals used in lower cost testers. A bubble level and adjustable feet are provided to enable the operator to level the instrument.

### **HIGH ACCURACY**

Deadweight Testers blend ruggedness with high accuracy. Variations over time typical of strain gauges or spring gauges are eliminated. Their operation depends only on balancing known weights against the force exerted by an unknown pressure acting on a piston of precisely known area. The weights are applied manually until the piston is floating with no net vertical movement. Each piston's area is determined by comparison against a piston of known area traceable to the National Institute of Standards and Technology. The mass of the balancing weights is also traceable to NIST.



### **FEATURES**

- ✓ **Accurate** - 0.05% of indicated pressure, traceable to the National Institute of Standards and Technology (NIST), 0.02% available
- ✓ **Reliable** - hardened stainless steel pistons and corrosion resistant materials.
- ✓ **Screw Pump** - allows fine pressure adjustments
- ✓ **Certificate of Calibration**
- ✓ **Gas or Liquid** pressure measurement
- ✓ **Repair Service** - spare parts available.



**General Specifications**

- Accuracy:** 0.05% of indicated pressure
- Certificate of Calibration:** Furnished for 0.05%
- Calibration Temperature:** 77°F (25°C)  
Calibration based on std gravity of 980.665
- Calibration Meets:** MIL-C-45662A
- Temperature Limit:** 40° to 120°F (4° to 50° C)
- Humidity:** 0 to 95% RH
- Vibration:** Small amplitude, high frequency only
- Environment:** Minimize dust and corrosive atmosphere
- Piston Material:** Hardened Stainless Steel
- Pressure Tubing Material:** Stainless Steel
- Weight Material:** Brass
- Fill Fluid:** Non-toxic ISO Grade 68 Premium Oil, standard. Synthetic fluid optional

**Options**

- Stainless Steel Weights
- Dual Range Piston/Cylinder
- 0.02% Certificate of Calibration
- Oxygen Service Cleaning
- Oil Water Separator
- Metric Adapters
- Synthetic Operating Fluid for O2, Water or Steam Service
- Local Gravity Calibration

**Furnished with every Deadweight**

- Carrying Case with Instruction Manual
- Set of Weights
- Operating Fluid
- Gauge Pointer Remover
- Gauge Pointer Driver
- 1/4 in and 1/2 in NPT adapters
- Certificate of Calibration for 0.05% accuracy
- One Year Guarantee

**Furnished with Precision Pressure STD Tester**

- Vinyl dust Cover in Lieu of Carrying Case
- Wrench Set
- Spare-o-rings and Seals
- Electric Motor to spin Weights

**Oil-Water Separators**

**Model 02-0071** – Rated for pressure of 5,000 psi (34,500 kPa) designed for use with Models 02-001 and Models 23-001 Deadweight Testers.

**Model 05-0194** – Rated for pressure of 5,000 psi (34,500kPa) is a stand-alone unit. It can be used with the Chandler Deadweight Gauge or Tester. It come complete with inlet, outlet and drain valves. You will also receive 10 ft of 1/8 in diameter SS tubing for connection.

**Model 05-0202** – Rated for 10,000 psi (69,000 kPa). It is similar to the Model 05-0194 and supplied complete with valves and SS tubing for connection.

**Model 55-0036** – Rated for 6,000 psi (41,400 kPa) designed especially for use with the Model 55-100 Tester.

	Standard			Featherweight	Pressure Standard
SERIES	23	02	55	61	58
Max Pressure PSI	2,000	5,000	20,000	2,000	30,000
Min Pressure PSI	5	50	50	3	10
Dual Range Option	No	Yes	Yes	Yes	Yes
Motor Drive Option	No	No	No	Yes	Standard
Size Inches	19x6x13	22x8x14	22x14x8	20x10x12	17x23x13
Size CM	48x15x33	55x20x35	55x35x45	50x25x30	48x58x33
Weight Lbs**	32-85	60-90	114-250	45	120-325
Weight Kg**	15-38	27-40	50-110	20	54-146



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# CHANDLER ENGINEERING

All products of Chandler Engineering are warranted for a period of one year from date of shipment to be free from defective workmanship and material. Providing written notice is made and authorization by us is given, any of our products claimed to be defective may be returned freight prepaid to our factory. If found to be defective and after examination by us, our obligation will be limited to repairing or replacing the product, at our option, free of charge, F.O.B. our factory.

## COMMERCIAL INSTRUMENTATION MANUFACTURED BY OTHERS

Commercial instrumentation manufactured by others is covered by separate manufacturer warranty, generally for one year. Contact Chandler Engineering for instructions on obtaining service directly from the manufacturer.

Our warranty does not cover damage or failure caused by abuse, misuse, abnormal usage, faulty installation, improper maintenance, or any repairs other than those provided by authorized Chandler Engineering personnel.

This warranty is in lieu of all other warranties, expressed or implied, and of all obligations or liabilities on its part for damages including but not limited to consequential damages, following the use or misuse of instruments manufactured by Chandler Engineering Company L.L.C.

## NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.

Our total liability on any claim shall not exceed the price allocable to the product or service or part thereof that gives rise to the claim.



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## Please Send Us Your Comments on This Manual

Model Number \_\_\_\_\_ Serial Number \_\_\_\_\_

Printing Date of this manual (from the Title Page) \_\_\_\_\_

Please circle a response for each of the following statements. Use:

(1)= Strongly agree (2) =Agree (3) =Neutral, no opinion (4) =Disagree (5) =Strongly disagree

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| a) The manual is well organized.                | 1 | 2 | 3 | 4 | 5 |
| b) I can find the information I want.           | 1 | 2 | 3 | 4 | 5 |
| c) The information in the manual is accurate.   | 1 | 2 | 3 | 4 | 5 |
| d) I can easily understand the instructions.    | 1 | 2 | 3 | 4 | 5 |
| e) The manual contains enough examples.         | 1 | 2 | 3 | 4 | 5 |
| f) The examples are appropriate and helpful.    | 1 | 2 | 3 | 4 | 5 |
| g) The manual layout is attractive and useful.  | 1 | 2 | 3 | 4 | 5 |
| h) The figures are clear and helpful.           | 1 | 2 | 3 | 4 | 5 |
| i) The sections I refer to most often are _____ |   |   |   |   |   |

Other comments \_\_\_\_\_

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My instrument is Chandler Model \_\_\_\_\_

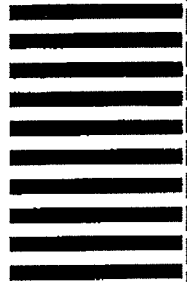
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IN THE  
UNITED STATES



**BUSINESS REPLY MAIL**  
FIRST CLASS MAIL PERMIT NO. 2303 TULSA, OK

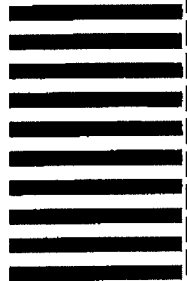
POSTAGE WILL BE PAID BY ADDRESSEE

# CHANDLER ENGINEERING

P.O. BOX 470710  
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