
GTC SERIES

Galiso Test Console Analog and Digital Gauge Operation INSTRUCTION MANUAL



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22 Ponderosa Ct., Montrose, CO 81401
(970) 249-0233 (800) 854-3789
www.galiso.com**



!!!DANGER!!!

**DO NOT USE THIS EQUIPMENT TO
PURGE TOXIC OR FLAMMABLE GAS**

AND

**DO NOT USE THIS EQUIPMENT UNDER
FLAMMABLE, VOLATILE OR TOXIC
ENVIRONMENTAL CONDITIONS**

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Included supplements:

- Warranty Terms
- Drawings and Schematics
- Vendor Equipment OEM Literature
- Hydrostatic Test Log

1.0 INTRODUCTION

The GTC Hydrostatic Test Console is designed to meet the needs of the low volume cylinder re-qualification facility. It is ideal for Fire Extinguisher, SCBA and SCUBA cylinder re-qualification. However, with the correct size Test Jacket, the GTC may be used to re-qualify up to 100 pound CO₂ size cylinders.

The manually operated GTC Test Console includes the following features:

- Standard Test Pressures up to 10,000 psi, with an overall system accuracy of plus or minus 1% at 2,000 psi, and gauge accuracy of .25%.
- Standard Electronic Expansion Measurement of the cylinder, up to 1200 cc with an accuracy of 0.1cc. *Larger Expansion options are available.
- An Air Driven Intensifier Pump
- A Table with Gauge Face Panel
- A convenient Desk Top Shelf which provides a writing area for recording test data and results on the test log.

1.1 Hydrostatic Testing

In accordance with D.O.T./T.C. regulations, certain cylinders must be periodically re-qualified and certified safe for use. The re-qualification procedure and regulations are discussed in detail in the Code Of Federal Regulation (CFR), Title 49, Section 180.205. Copies of the CFR may be obtained from Galiso or by writing to the following address:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

The Galiso GTC Test Console will perform water jacket (hydrostatic) testing of compressed gas cylinders. The specifications and procedure for hydrostatic testing are outlined in Compressed Gas Association Pamphlet C-1, "Methods for Hydrostatic Testing of Compressed Gas Cylinders". Copies of Compressed Gas Association Pamphlets are available from Galiso, Inc., online at: <https://www.cganet.com/>, or by writing to the following address:

**Compressed Gas Association
14501 George Carter Way
Suite 103
Chantilly, Virginia 20151
PH (703) 788-2700 or Fax (703) 961-1831**

1.0 INTRODUCTION, continued

1.1 Hydrostatic Testing, continued

In general, the water jacket method for hydrostatic testing consists of loading a water filled cylinder into a sealed chamber (Test Jacket), which is also filled with water and is connected to an Electronic Expansion Measuring System. The Expansion Bowl is first zeroed, and the cylinder is then pressurized to 5/3 of its D.O.T. or I.C.C. rating, which is stamped on the shoulder of the cylinder. This test pressure is held for thirty seconds.

As pressure is applied to "inflate" the cylinder, the cylinder expands and forces water out of the test jacket and up into the Expansion Bowl. After the thirty second test time has elapsed, the Expansion Bowl is then read to determine the Total Expansion (in cubic centimeters) of the cylinder under test pressure. The test pressure is then released and the cylinder "deflates". As the cylinder shrinks to its approximate original size, water is allowed to drain back into the Test Jacket from the Expansion Bowl. In most cases, the cylinder will not return to its original size, having been slightly stretched by the pressurization process. This stretching is called the Permanent Expansion. The difference between the "Total Expansion" and the "Permanent Expansion" is called the Elastic Expansion. The Percent Expansion of the cylinder is determined by the following formula:

$$\text{Percent Expansion} = (\text{Permanent Expansion} \div \text{Total Expansion}) \times 100$$

When the Percent Expansion exceeds the predetermined limits for the cylinder being tested, the cylinder must be condemned and removed from service. A high percent expansion value is an indication that there has been excessive thinning of the cylinder wall and that the cylinder is no longer safe for use.

All test records must be saved and maintained for the life of the test, in the event that there is any future problem with the cylinder. Galiso, Incorporated has software available for ease of calculation and record keeping, to use in place of the hand written Test Log.

Plus (+) stamped cylinders may be filled to an additional 10 percent beyond the rating which is stamped on the cylinder shoulder. Star (*) stamping makes the cylinder eligible for an extended ten year retest interval. The procedures and requirements for plus stamping and star stamping are discussed in Compressed Gas Association Pamphlet C-5, "Cylinder Service Life, Seamless High Pressure Cylinders". This pamphlet is available from Galiso, or from the Compressed Gas Association at the address indicated previously.

1.0 INTRODUCTION, continued

1.2 Quick Start Guide

TEST PROCEDURE FOR GTC SYSTEM

Prior to testing and before the system is turned on, it is important to complete the following.

- ensure the cylinders to be tested are free from defects and have been properly inspected according to CGA pamphlet C6.
- completely fill the cylinders with clean water and allow cylinders to achieve room temperature.
- gauge calibration sheet, calibrated cylinder must be on hand to verify calibration each day of testing. *GTC gauge needs to be calibrated every six months unless a master gauge is used.

SYSTEM START UP PROCEDURE

Read all instructions before attempting to operate the GTC 10K test system. Before testing, turn on scale and allow to warm-up for 30 minutes for maximum performance.

1. Turn power to scale on and allow scale to warm up.
Before turning on air and water, ensure all valves on console are off or closed.
2. Turn on air and water to system. Verify that control air pressure is at 90 PSI on small regulator where blue hose connects to the back of the system. Check oil level in lubricator. Place calibrated cylinder in the Test Jacket ensuring cylinder and jacket are completely filled with water. Connect hoses, (blue hose first). Turn the 3 way valve (on left side) to expansion.
3. Bleed air from expansion lines by filling bowl using bowl level adjustment valve. Remove blue hose from test head and allow water to drain back to jacket then reconnect blue (head seal) hose before water in bowl goes below probe end in bowl (not allowing air to be sucked into expansion line).
4. Adjust water level to just above probe (approx. ¼ inch). Make sure scale is set on grams, and zero scale. Ensure that before daily calibration, the scale will hold on 0.0 for 30 seconds, to make sure the system is stable. Verify the gauge needle is on the zero line.

1.0 INTRODUCTION, continued

1.2 Quick Start Guide, continued

5. To verify the bowl reading, place test weights on the bowl platform (with the reading starting at 0.0). The reading for the two 50 gram weights should be 100 grams or (99.7 – 100.3). If the reading is outside this tolerance, you must recalibrate the scale using the calibration procedure in the scale manual.
6. You are now ready to pressurize the system and check calibration. Proceed as follows:

Be sure expansion valve (3 way valve on left) is in the open position with calibration cylinder in jacket. Close bleed valve. Press zero on scale. Open water to pump valve. You will see scale and pressure rise as the system reads your local water pressure (this is normal). Open the Pump Speed Adjustment Valve slowly, (at first) to pressurize system. Do not pressurize system any higher than highest pressure on calibration cylinder. Close pump speed adjustment valve when pressure is reached, (3,000, 4,000, 5,000 etc.). Refer to pressure calibration sheet to stop system at proper indicated value on sheet for given pressure. With pump speed adjustment valve closed, close water to pump valve and start timer. When the desired value is reached, stop the pressurization and hold for 30 seconds. The pressure gauge should indicate the test pressure at the verification point within +/- 1.0%. The expansion and pressure should remain stable during the entire 30 seconds. If the expansion or pressure does not stabilize within +/- 1.00%, the system must be checked and the cylinder needs to be retested. If the test system is to be verified accurate at more than one pressure, it is not necessary to release pressure and return to zero at each pressure level. It is also not necessary to hold for 30 seconds at each pressure level, but the system should be allowed to stabilize at each pressure level before continuing to the next highest pressure level. It is necessary to maintain the 30 second hold on the highest pressure level before releasing the pressure from the system.
7. Bleed off pressure using the bleed valve, and verify system, (bowl) returns to 0.0. If system does not return to zero, you must (stretch) once or twice to get calibrated cylinder to zero out.

Calibrated cylinder must show NO permanent expansion.
Follow procedure in step 6 as necessary to run calibration cylinder at various pressures.

NOTE: It is the responsibility of the operator of the equipment to run the daily calibration of the system using the calibration cylinder within the DOT requirements. This means the bowl and pressure readings need to be within the 1% tolerance and the calibration cylinder has been run within 500 psi of the cylinder test pressures of that day.

1.0 INTRODUCTION, continued

1.2 Quick Start Guide, continued

8. Prior to cylinder testing, the expansion valve needs to be closed, the hoses removed and the calibrated cylinder removed and replaced with the first cylinder of the day to be tested. When that cylinder has been placed in the jacket, fill the jacket, then connect the hoses, and then, be sure to turn expansion valve before proceeding. Follow step 6 to be sure valves are opened and closed in their proper order. Any questions, call Galiso customer service. (800-854-3789)

CYLINDER TESTING

1. As cylinders are tested and results recorded to the test sheet, it is the responsibility of the operator to perform the proper calculations and record results. As each cylinder is finished and the results show the cylinder passes, the cylinder may then be removed from the jacket and placed in the inverter, (manual or automatic) to be drained and dried.
2. To shut down the system, turn off (or close) the water and then the air to the system.
The scale may now be turned off. Make sure all valves are off or closed.

NOTES- refer to the operation manual (provided) for any detailed information or call customer service at (800-854-3789) for additional information and assistance.

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2.0 GTC SYSTEM COMPONENTS AND SPECIFICATIONS

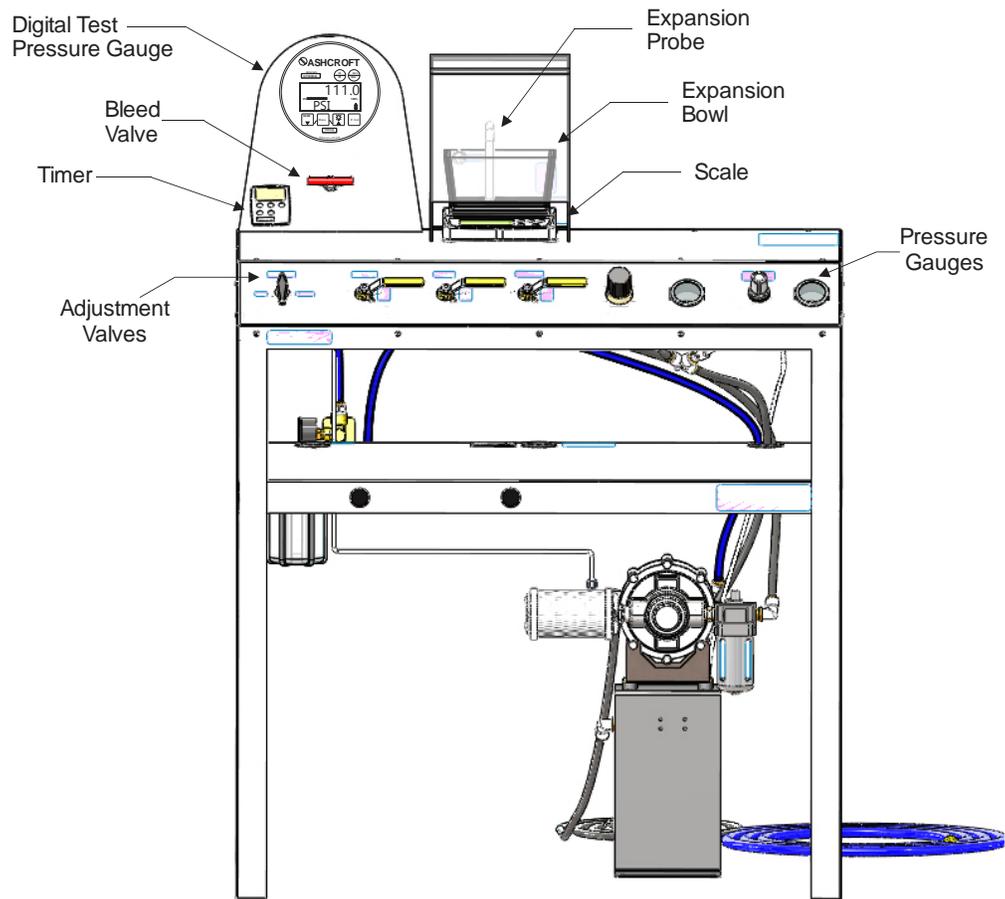


Figure 2- 1 Digital GTC Test Console

2.1 GTC Test Console Specifications:

- Test Stand Dimensions: Height: 55 Inches Width: 40 Inches Depth: 26 Inches
- Air Requirements: A minimum of 10 cfm Shop Air at 100 psig (intermittent)
- Water Requirements: City Water at a minimum of 10 PSI
- Electronic Expansion Scale Electrical Requirements: 110 VAC

2.0 GTC SYSTEM COMPONENTS AND SPECIFICATIONS, continued

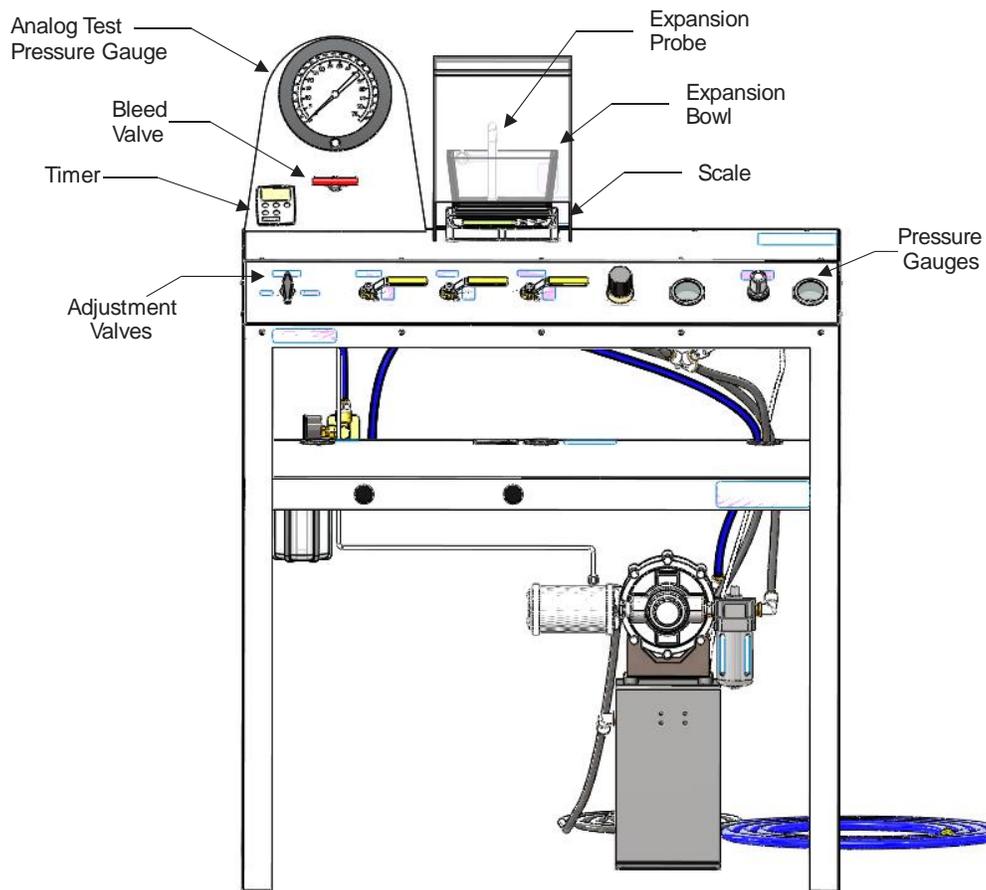


Figure 2-2 Analog GTC Test Console

2.1 GTC Test Console Specifications:

- Test Stand Dimensions: Height: 55 Inches Width: 40 Inches Depth: 26 Inches
- Air Requirements: A minimum of 10 cfm Shop Air at 100 psig (intermittent)
- Water Requirements: City Water at a minimum of 10 PSI
- Electronic Expansion Scale Electrical Requirements: 110 VAC

2.0 GTC SYSTEM COMPONENTS AND SPECIFICATIONS, continued

2.2 GTC Test Console Models and Options

The GTC model test console is available in three test pressure ranges. The available options are shown in Table 2-1, below.

Model Number	Part Number	Max. Test Pressure
GTC-1200	02-51-2019	1,200 psi
GTC-2200	02-51-2017	2,200 psi
GTC-7000	02-51-2021	7,000 psi
GTC-10000	02-51-2013	10,000 psi

Table 2 - 1 GTC Test Console Models

In addition to the different test pressure ranges, a Dual Jacket Option is available allowing test technicians to increase cylinder test throughput. The Dual Jacket Option is available both as original equipment and as an add-on upgrade. Reference part number: 02-41-2021 for the Dual Jacket Option.

Other options available;

- Skid Mount Option
- 2nd Gauge Option
- Direct Expansion version of GTC is available.
- A GTC System can be configured for use with a Large Dual Acting Pump.
- Hydrostatic Testing Software is available for keeping digital records and presenting test records to your customer in a professional digital file.

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3.0 SAFETY

Read all instructions before attempting to install or operate the GTC Test Console. GALISO, INC. IS NOT RESPONSIBLE FOR DAMAGE OR INJURY CAUSED BY UNSAFE USE, MAINTENANCE OR APPLICATION OF THIS MACHINE. Please contact Galiso for guidance when you are in doubt as to the proper safety precautions to be taken when installing or operating this machine.

3.1 Personnel Safety

3.1.1 Always double check the cylinder pressure rating stamped on the cylinder shoulder to determine the required test pressure.



**DO NOT OVER-PRESSURIZE CYLINDERS!
OVER-PRESSURIZATION OF CYLINDERS CAN CAUSE SEVERE EQUIPMENT
DAMAGE AND RESULT IN PERSONNEL INJURY OR DEATH!**

3.1.2 Do not handle the test pressure hose while the test vessel is pressurized. Injury could occur due to hose leaks.

3.1.3 When releasing the pressure from the test vessel at the completion of testing always open the Bleed/Vent Valve slowly to avoid sudden high energy pressure releases. Bleed valve should be left in open position, unless testing.

3.1.4 Do not attempt to remove the test connection prior to verifying that the test vessel has been completely de-pressurized.

3.1.5 Always wear eye protection when using the system.

3.2 Equipment Precautions

3.2.1 Before connecting a cylinder for testing, inspect the cylinder neck threads. Cylinders with excessively worn or damaged neck threads must be dispositioned in accordance with CGA Pamphlets C-6, 6.1 or 6.2 as appropriate.

3.2.2 Before connecting a test vessel (cylinder) for testing, check the test pressure hose and fittings to ensure they are in proper working order.

3.0 SAFETY, continued

3.2 Equipment Precautions, continued

3.2.3 The test spud (see figure 3-1) must engage the cylinder neck threads with at least four threads for the cylinder to be safely tested. If the test connection is not properly attached to the cylinder, it could be blown off during pressurization. If there is any question about the test connection **do not test the cylinder**.

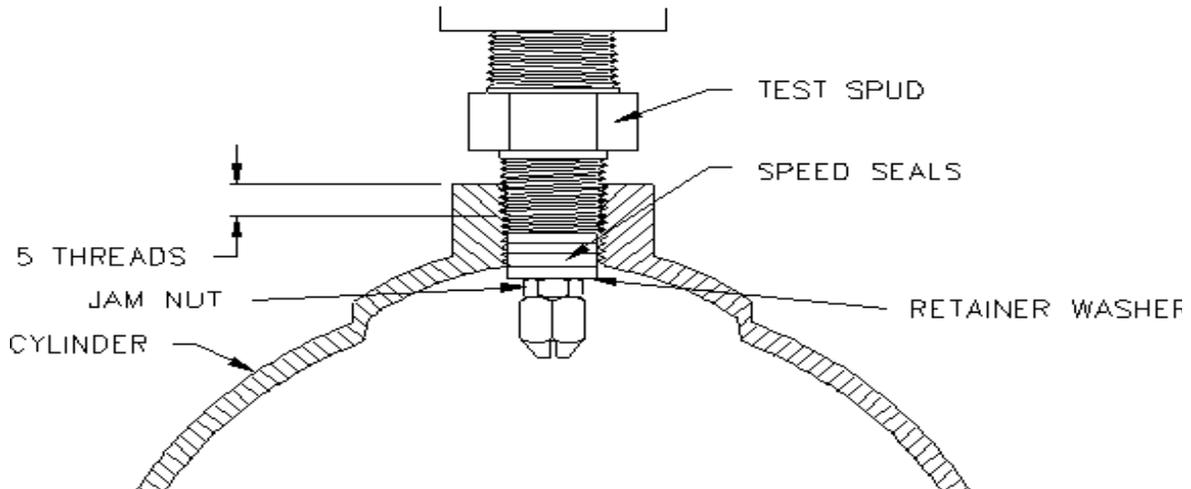


Figure 3 - 1 Hydraclose® Seal

3.2.4 Make certain that you are using a test spud that is appropriate for the neck threads of the cylinder that is being tested (see figure 3-2 below). When an incorrect test spud is screwed on to certain types of cylinders (such as Linde cylinders with oversize neck threads or Airco cylinders with double tapered neck threads), the cylinders will appear firmly attached, but they do not properly engage the threads of the test spud. If you have any questions concerning the appropriate test spud to be used with a particular type of cylinder, contact Galiso® Incorporated.

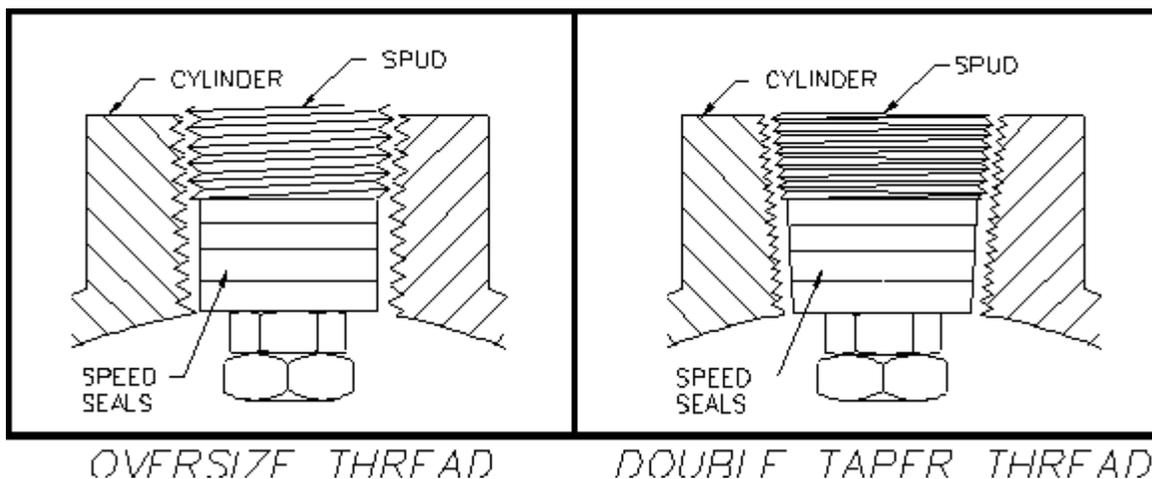


Figure 3 - 2 Cylinder Neck Thread Detail

3.0 SAFETY, continued

3.2 Equipment Precautions, continued

3.2.5 Test Jackets must include a suitable safety relief port, which is equipped with a Galiso crystal glass burst disk.

- ❖ The purpose of the relief port and burst disk is to protect the operator in the event of catastrophic failure of the cylinder while it is under pressure. The burst disk is designed to shatter in the event of a sudden release of pressure into the Test Jacket. When the burst disk shatters, excess pressure is released through the relief port, preventing the Hydraclose[®] Test Head from being forced out of the Test Jacket.
- ❖ In the event that you must replace the Test Jacket Burst Disk, make certain that you use a replacement burst disk from Galiso. Never operate the GTC Test Console with an improper burst disk in place. The burst disk is designed to fail at a specific pressure to prevent the Test Head from being blown out of the Test Jacket in the event that an improperly mounted cylinder comes off of the test spud while under test pressure, or in the event of a cylinder rupturing.

3.2.6 Before pressurizing a cylinder, adjust the Air Pressure Regulator to the Intensifier Pump to prevent cylinder over-pressurization. For example, if the cylinder test pressure is 500 psig, adjust the Air Pressure Regulator to stall the Pump at approximately 5500 to 6000 psig. See section 5.4.1.B for additional information regarding pump output pressure adjustment.

3.2.7 Keep the Expansion Scale clean and dry. If water is spilled on to the Scale, immediately unplug the unit and thoroughly dry the unit before plugging the unit back in. After reconnecting the Scale to electrical power, the Scale must be recalibrated as described in Section 6.0, Maintenance and Calibration.

3.2.8 Keep the work area around the GTC Test Console clean, dry and free of debris to reduce the risk of operator injury due to slips or falls.

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4.0 INSTALLATION

Read all instructions and familiarize yourself with the installation drawings before attempting to install or operate the GTC Test Console.

4.1 Receiving

When you receive the GTC, carefully un-crate the Test Console and remove all banding and padding materials.

Inspect the unit for damage, loose parts or disconnected lines. Refer to Figure 4-3 for information if the lines have been disconnected. Contact Galiso, Incorporated immediately if damaged items are identified.

4.2 Placement

Select an area to install your GTC Test Console. The installation location should allow sufficient drainage to prevent water from accumulating around the test system. Refer to the installation drawings supplied with this manual. Detail the flow of cylinders through the test area. Take care not to install your system in such a manner that would inhibit or cause interruptions in the flow of cylinders. If you need help with this, send a detailed drawing of your shop floor to Galiso[®] for suggestions.

The GTC Test Console must be installed in a location that does not allow direct sunlight to shine on the Test Jackets. The installation location must also be sheltered from breezes, which could move the Expansion Bowl and affect the accuracy of test results.

4.3 Facility Requirements

Construct a suitable test pit and install the I-Beams and Hoist Assemblies as shown in the installation drawings. Figure 4-1 illustrates an example of a completed test pit. For custom configurations contact Galiso, Inc. at 1 (970) 249-0233.

Connect the eye hook to the Hoist Chains.

Install the Test Jacket in the test pit as indicated on the installation drawings. Bolt the Test Jacket to the floor of the test pit.

Move the GTC Test Console to the installation location. If you do not use the console platform (crate base), bolt the Test Stand and Pump Skid securely to the floor.

4.0 INSTALLATION, continued
 4.3 Facility Requirements, continued

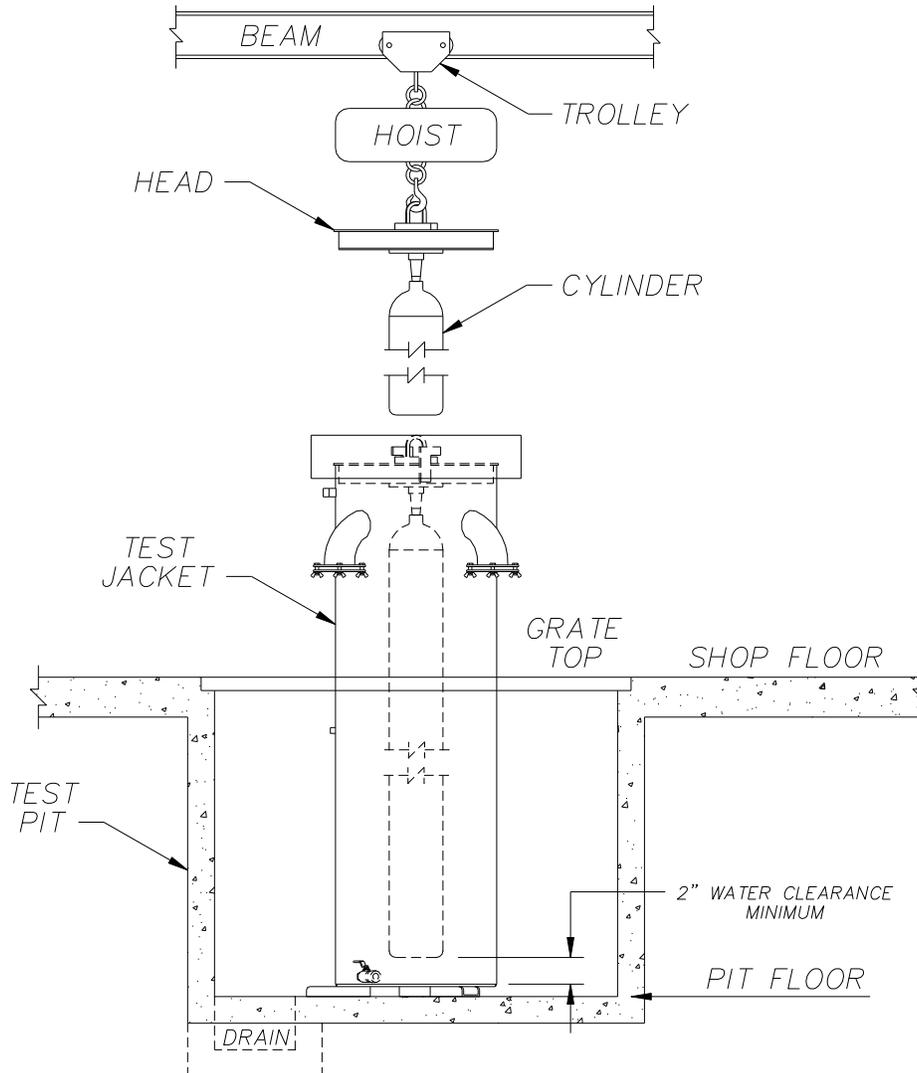


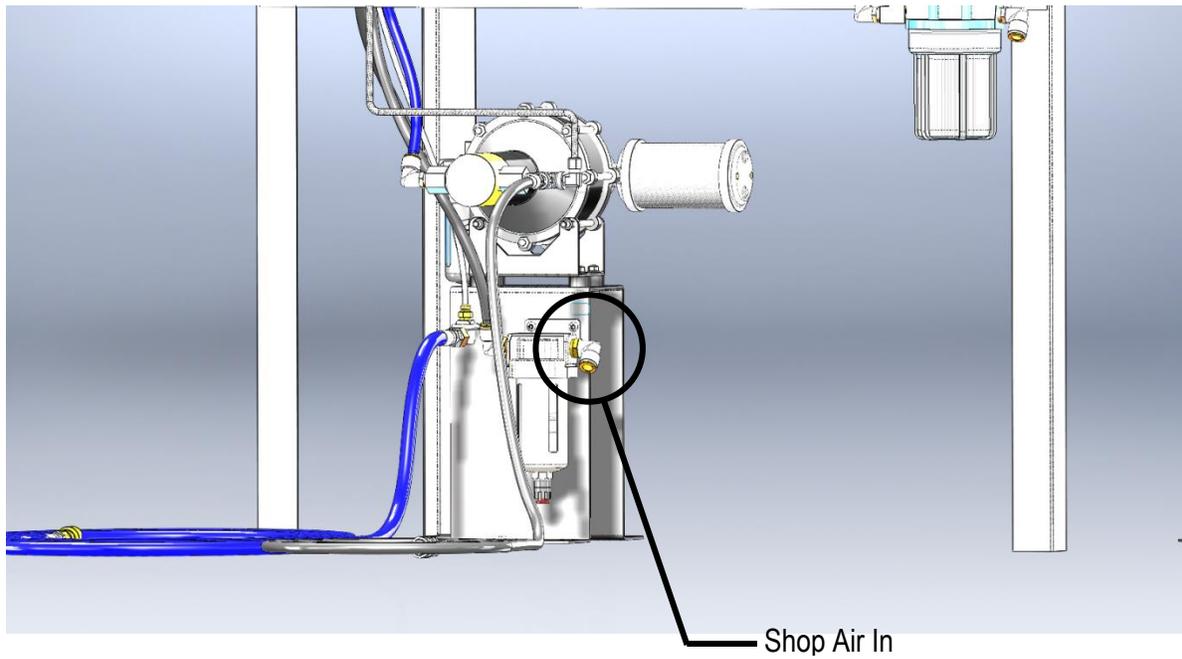
Figure 4 - 1 Example Hydrostatic Test Pit

4.4 Utility Connections

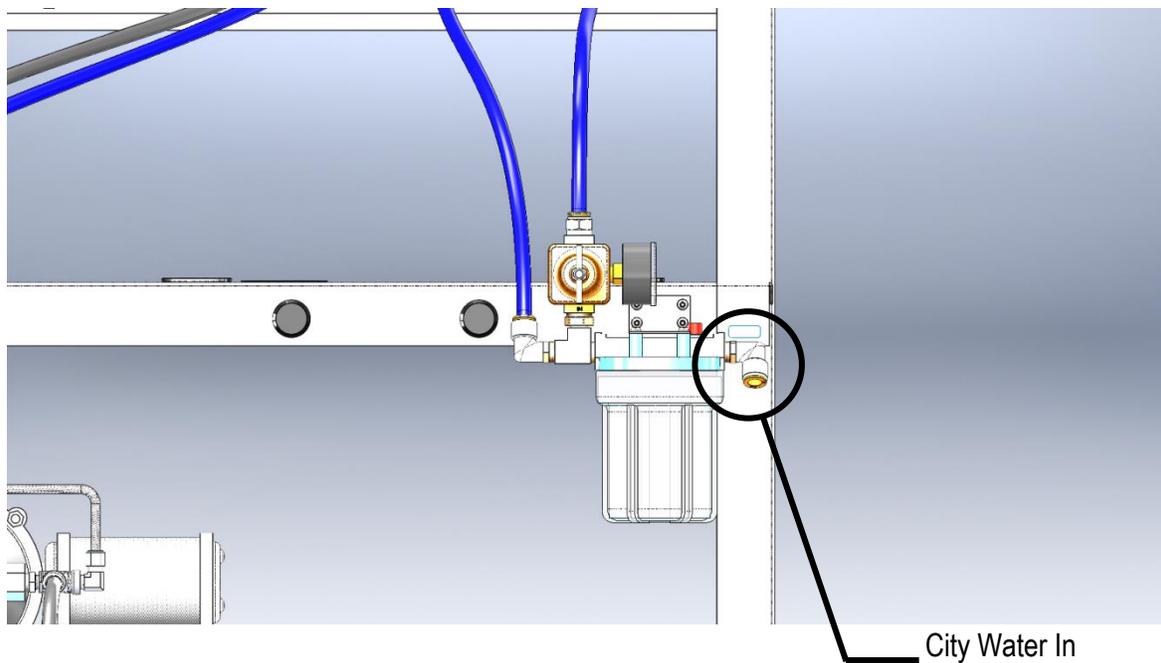
Familiarize yourself with the Water and Air plumbing required for the GTC Test System. Carefully consider your individual system layout and plan the route of each plumbing line.

Connect a 100 psig shop air supply to the GTC Test Console at the location labeled "Shop Air In". Connect a water supply to the GTC Test Console. The utility service connection locations are shown in figure 4-2.

4.0 INSTALLATION, continued
4.4 Utility Connections, continued



Figures 4 – 2a and 4 – 2b



4.0 INSTALLATION, continued

4.5 Plumbing Installation, continued

In addition to the utility service connections, the following additional plumbing connections must be made:

4.5.1 Expansion Line and Jacket/Bowl Fill Plumbing

Route the ½" plastic tubing from the GTC console expansion valve to the Test Jacket ½" brass CPI connection. Note that if the Dual Jacket Option has been purchased, two expansion lines will need to be plumbed as indicated in figure 4-3.

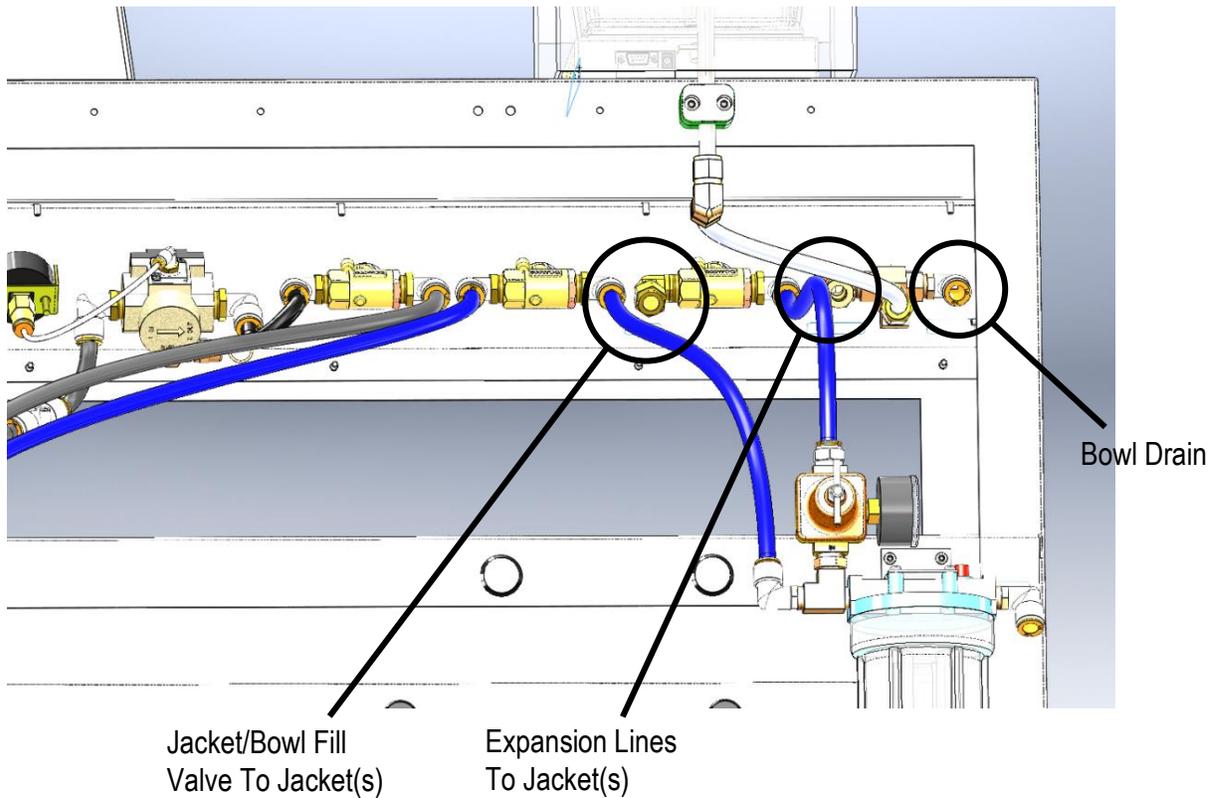


Figure 4-3 Digital and Analog GTC Console Plumbing

4.0 INSTALLATION, continued

4.5 Plumbing Installation, continued

4.5.2a Digital GTC Bleed Line Plumbing

Route the 1/4" stainless steel tubing provided, from the Bleed Valve exhaust to a convenient pit or drain location, see figure 4-3.

Table 4-1 summarizes the required plumbing connections.

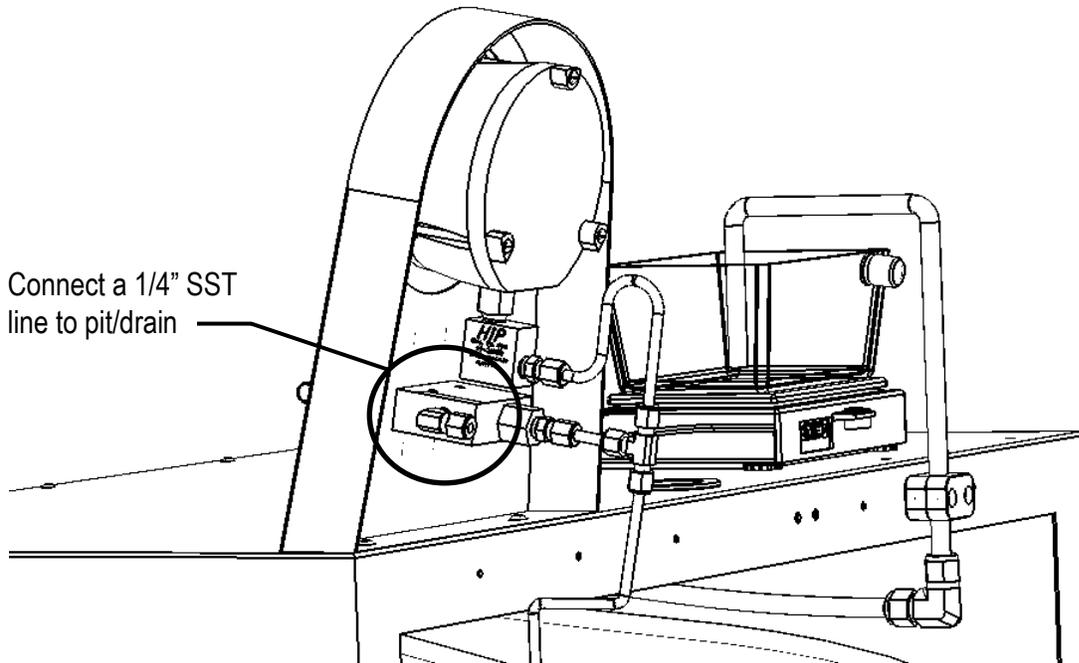


Figure 4-3b.1 Digital GTC Console Plumbing

4.0 INSTALLATION, continued

4.5 Plumbing Installation, continued

4.5.2b Analog GTC Bleed Line Plumbing

Route the 1/4" stainless steel tubing provided, from the bleed valve exhaust to a convenient pit or drain location, see figure 4-3b.1 for the Digital GTC, and 4.3b.2 for the Analog GTC.

Table 4-1 summarizes the required plumbing connections.

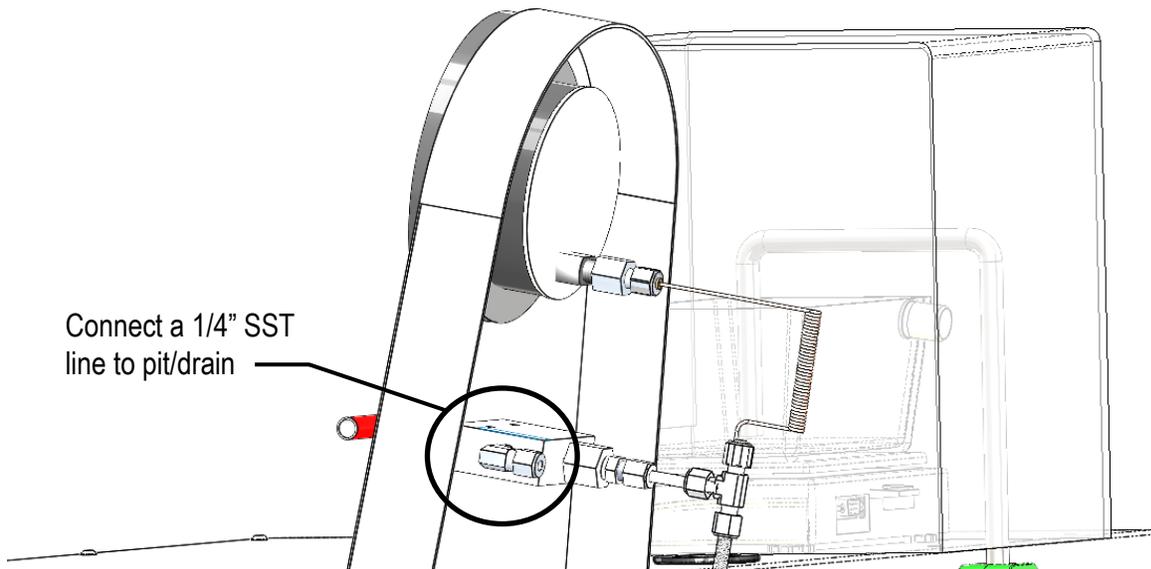


Figure 4-3b.2 Analog GTC Console Plumbing

4.0 INSTALLATION, continued

4.5 Plumbing Installation, continued

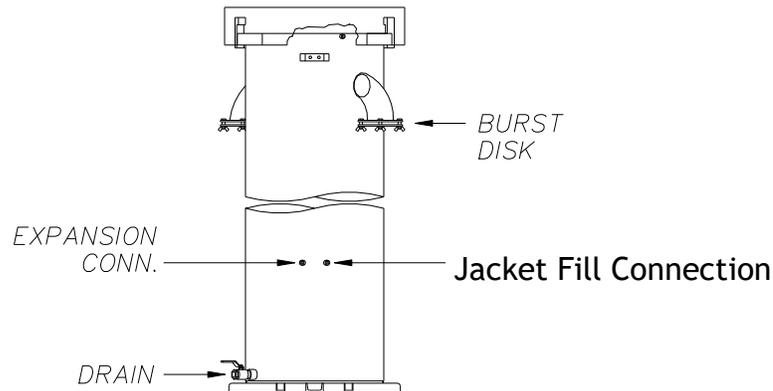


Figure 4 - 4 Hydrostatic Test Jacket

Line	From	To
Expansion Line 1 (1/2" Nylon)	Expansion Valve (1/2" CPI Brass)	Test Jacket 1 (1/2" CPI Brass)
Expansion Line 2 (Dual Jacket Only, 1/2" Nylon)	Dual Jacket Expansion Valve (1/2" CPI Brass, Dual Jacket only)	Test Jacket 2 (1/2" CPI Brass, Dual Jacket only)
Bleed Drain Line (1/4" x .065 SST)	Bleed Valve (1/4" SS CPI)	Pit/Drain
Water Supply	Customer Supply	GTC Water Filter Inlet (3/8" Prestolok)
Air Supply	Customer Supply	GTC Air Filter Inlet (1/2" Prestolok)
Jacket Fill	Jacket/Bowl Fill Valve	Test Jacket 1

Table 4-1, Field Plumbing Connections

4.6 Expansion Bowl and Scale Setup

Remove the packing materials from the Scale and Expansion Bowl and place the scale on the shelf located on the upper left side of the Test Console. Place the circular metal pan (platform) into position on top of the scale then, place the scale unit onto the rubber pad. Place the Expansion Bowl on top of the Scale platform and under the probe. Be careful not to bump the probe.

Plug the power cable into the Scale through the hole in the console then, plug the other end of the power cable into a 110 VAC outlet. Turn the unit ON and wait at least five minutes for the scale to warm up. The Scale will need to be calibrated prior to initiating any system checkout or cylinder testing activities. See the manufacturers OEM literature for scale calibration instructions.

4.0 INSTALLATION, continued

4.7 Hydraclose® Test Head Preparation

Hydraclose® Test Heads are normally shipped completely assembled. The following instructions are provided to ensure the installer has all the information necessary in the event individual component replacements are required.

The top end of the Test Spud must be securely attached to the Hydraclose® Test Head. With GHH-6H and GHH-6B Hydraclose® Test Heads, Teflon tape should be used to seal the connection between the threaded test spud and the spud plate on the bottom of the Test Head. **Do not overtighten** the test spud. The test spud uses a maximum seal pressure of 100 psi.

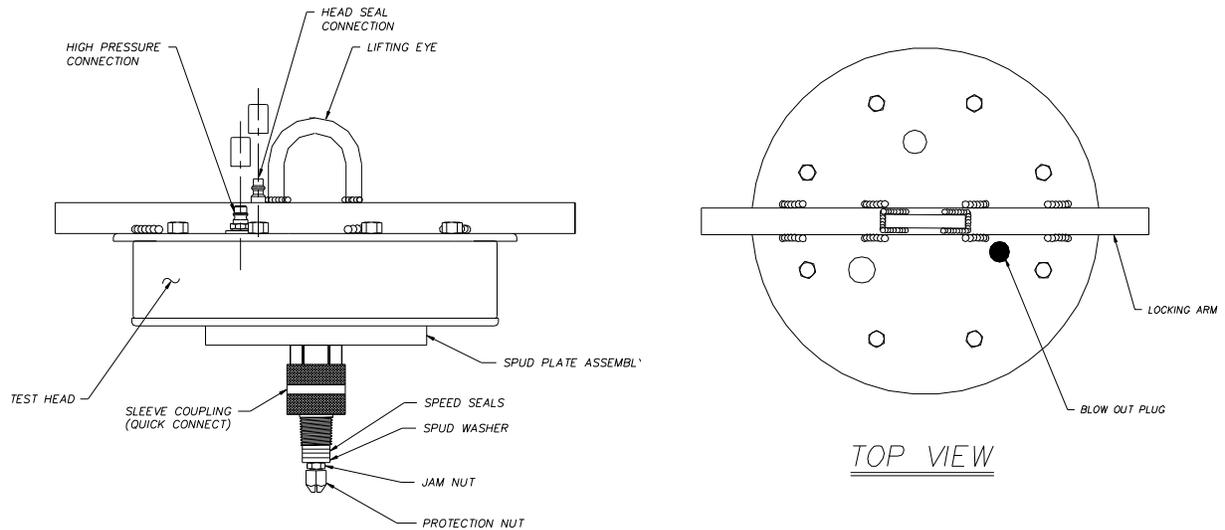


Figure 4 - 5 Hydraclose Test Head

With GHH-6G Hydraclose® Test Heads, the "Quick Change" Test Spud snaps in place on the Hydraclose® Test Head. Before attaching the GHH-6G Hydraclose® Test Head to the cylinder, grasp the "Quick Change" Test Spud and check to make sure that it is securely attached to the Test Head.

Install the proper size "Speed Seals" on the end of the Test Spud. Next, the Retainer Washer fits over the "Speed Seals" to hold them in place, followed by the Jam Nut and then the Brass Protector Nut, as shown in figure 4-6. The "Speed Seals" and Retainer Washer must be of the proper size to match the Test Spud and cylinder neck that they are being used with, otherwise the spud seal may leak and the head sealing mechanism may be damaged.

4.0 INSTALLATION, continued

4.7 Hydraclose® Test Head Preparation, continued

The Jam Nut should only be snug against the retaining washer. Do not over tighten. You should still be able to turn the Speed Seals with your fingers; however, they should not be loose. Lock the Jam Nut and the Brass Protector Nut together so that they will not unscrew. Do not use the test head without the Brass Protective Nut in place, the stem threads will be damaged, resulting in unnecessary repairs.

The 1/2 inch spud requires only one 1/2 inch "Speed Seal". The 1/2 inch "Speed Seal" is manufactured as one unit since, 1/2 inch cylinder neck threads are generally shorter than 3/4 inch and one inch neck threads.

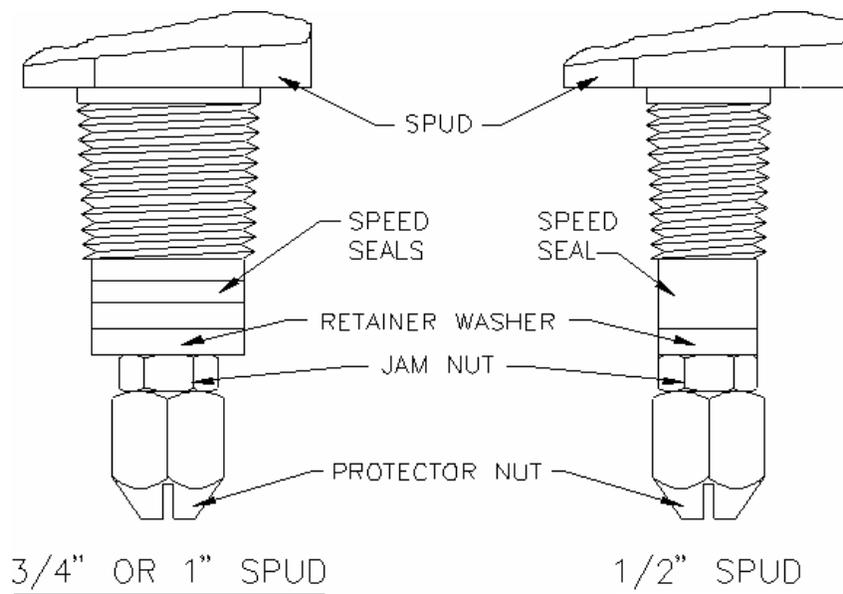


Figure 4 - 6 Speed Seal Details

The 3/4" and 1" spuds require three "Speed Seals" to properly seal. If the cylinder neck threads are short, the spud can be sealed with two or even one "Speed Seal", providing that spacer washers of the appropriate diameter are used adjacent to the Retainer Washer to maintain the proper stack up.

4.0 INSTALLATION, continued

4.8 Preparations for Testing

Fill the test jacket with water using a garden hose or other suitable means.

Recheck the lines and fittings on the GTC Test Console for tightness.

Turn on the air and water supply to the system. Check the lines for leaks. If leaks are detected, turn off the air and water supplies and tighten the leaking fittings.

The system should now be ready for start-up and checkout. Refer to Section 5.0 of this manual for the necessary operating instructions.

4.9 Dual Jacket Conversion Installation

This section provides additional installation instructions for converting a single Jacket GTC system to a Dual Test Jacket GTC system. The Dual Jacket Conversion Kit, Galiso part number 01-41-2021, includes a replacement 3-way expansion valve, labels and miscellaneous tubing. Proceed as follows to connect a second Test Jacket to the GTC Test Console.

- A. Remove the tubing from the existing 2-way Expansion Valve on the back side of the Console, and remove the Valve from the console.
- B. Install the new 3-way valve in the Console and connect the plumbing from the Water Level adjustment Valve as shown in figure 4-7.
- C. Plumb the Expansion lines using ½" natural plastic tubing and brass compression fittings. See figures 4-7 and 4-8.

NOTE:

During GTC test system operations, the operator must verify that the three way expansion valve on the test console is in the correct position for the Test Jacket being used. See Section 5.0, Operations.

4.0 INSTALLATION, continued
4.9 Dual Jacket Conversion Installation, continued

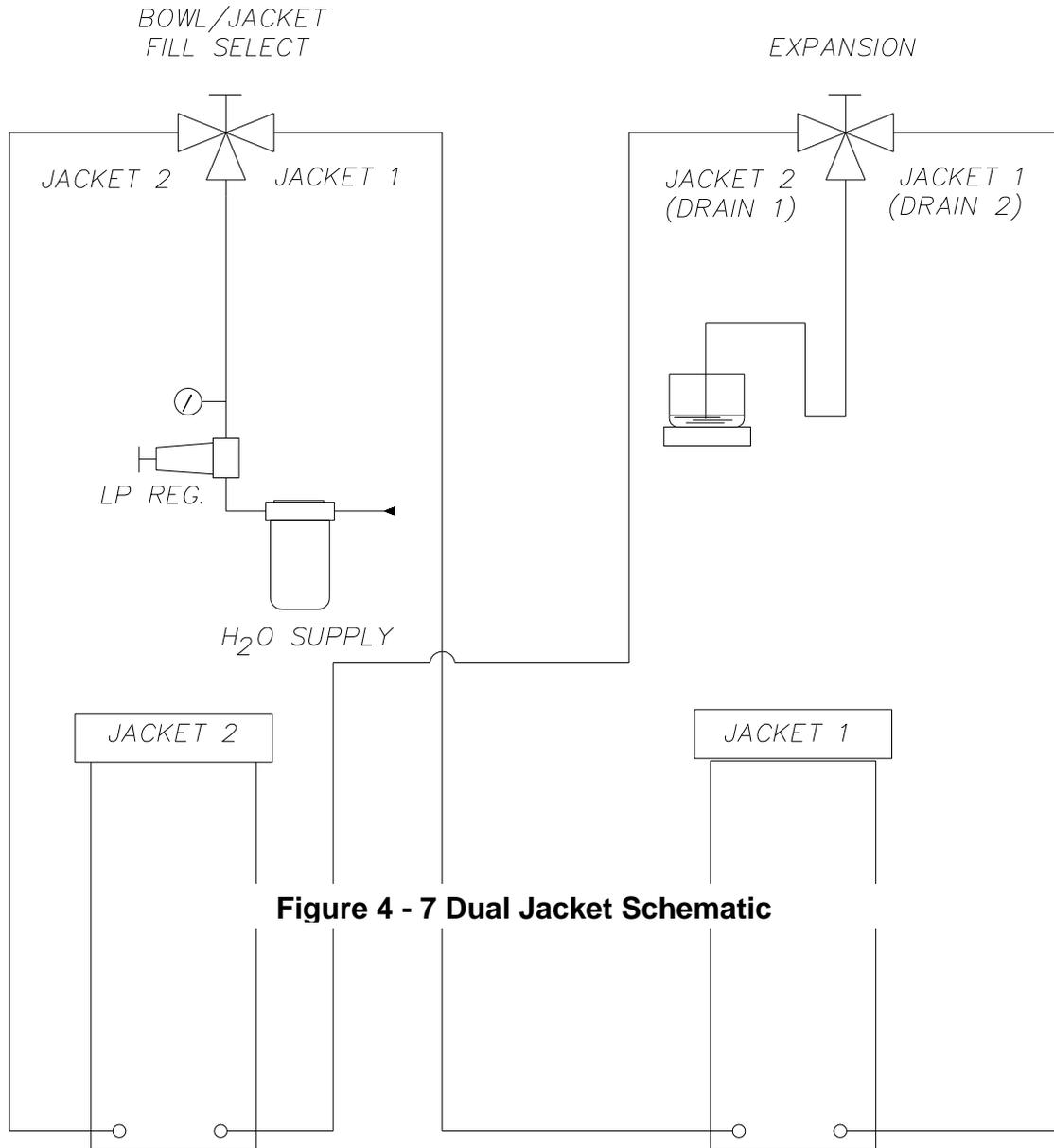


Figure 4 - 7 Dual Jacket Schematic

When utilizing both Jackets, it is advisable to completely disengage the Test Head on the Jacket that is not testing. This is so the Safety Interlock, of the non-testing Jacket, is not engaged while the other Jacket is testing.

Place Test Jacket Select Valve to the Jacket that is currently ready for testing. Follow normal procedure, being sure to have the Expansion Select valve selected to the correct Jacket, and the Bowl/Jacket Fill Select on “Hold” during testing. Monitor the bowl water level over time, after testing cylinders, and adjust as needed.

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5.0 OPERATION

These operating instructions describe procedures required for system start-up and cylinder testing activities.

5.1 Precautions

Hydrostatic testing of cylinders involves the use of high pressure equipment and components. Hydrostatic testing should be performed only by personnel properly trained in hydrostatic testing and the specific equipment to be used.

Take care not to disturb the Expansion Bowl Assembly, located on the upper left hand shelf of the Test Stand.

Do not lean on the GTC Test Console or Test Jackets while tests are in progress. Weight applied against the side of the Test Console can cause the Expansion Bowl to sway and affect the accuracy of expansion readings.

The water supply should be turned off if the air supply to the system is turned off. The water supply to the system should also be turned off when the system is not in use.

The GTC Test Console should not be installed in a location that is subject to direct sunlight or breezes. Breezes or drafts will cause the Expansion Bowl to move and affect the accuracy of the expansion reading. Even minor changes in the temperature of the Test Jacket can cause expansion readings to drift, invalidating test results.

Never pressurize the Test Head outside of the Jacket. The "Speed Seals" can be constrained by screwing the Test Spud into a cylinder neck or appropriate test blank (available from Galiso). The Test Boot can be constrained with either the Test Jacket or with a snug fitting metal band at least 2" wide and 1/16" thick which is slipped over the head boot to prevent rupturing. At 50 psig sealing pressure, there is over 3000 pounds of force exerted by the Sealing Boot on the Test Head. Hydraclose[®] Head, testing and maintenance, systems are available from Galiso, Incorporated.

Make certain that you are using a test spud that is appropriate for the neck threads of the cylinder that is being tested. Certain types of cylinders (such as Linde cylinders with oversize neck threads or Airco cylinders with double tapered neck threads) will appear firmly attached when screwed on to an incorrect Test Spud, without properly engaging the threads of the Test Spud. If you have any questions concerning the appropriate Test Spud to be used with a particular type of cylinder, contact Galiso[®] Incorporated.

5.0 OPERATION, continued

5.1 Precautions, continued

Never operate the GTC Test Console with an improper burst disk in place. In the event that you must replace the Test Jacket Burst Disk, make certain that you use a replacement burst disk from Galiso as these discs are specially designed to burst between 14 and 19 psig.

Before each starting operation of the GTC Test Console, a visual check of the system should be made to assure the unit is ready for testing. Check the lines to make certain they are tight and there is no damage.

With the air and water to the system OFF, remove the Air Filter bowl to check for accumulation of water.

5.2 System Start-Up

The following Start-Up procedures should be performed before attempting to operate the GTC Test Console after initial installation or for the first time after water pressure to the unit has remained off for a prolonged period of time.

5.2.1 Calibrated Cylinder Preparation

Add water as needed to completely fill the cylinder before using. Ensure that the water temperature has stabilized prior to testing cylinders. Water should be left in the Calibrated Cylinder at all times. If the cylinder is emptied, it should be dried immediately to prevent corrosion.

The Calibrated Cylinder should be protected from freezing temperatures. The force generated by the freezing water can permanently damage the calibration of the cylinder and possibly rupture the cylinder wall.

5.2.2 Test Jacket Preparation

Check the expansion line connection(s) to the Console. Ensure that the Test Jacket (both Jackets for the Dual Jacket System) is filled to the proper level and that the water temperature has stabilized prior to testing cylinders.

NOTE: Expansion measurements are extremely sensitive to temperature variations. Temperature changes and variations must be held to less than $\pm 5^{\circ}$ F for large cylinders, and $\pm 2^{\circ}$ F for small cylinders.

5.0 OPERATION, continued

5.2.3 Scale Calibration Check

Scale calibration should be checked on a daily basis immediately prior to initiating cylinder testing activities. Turn the Scale ON and let it warm up for at least five minutes before using.

Remove the Expansion Bowl from the scale platform. Press the Tare button and place the 1kg gram weight on the platform. If the scale is properly calibrated, the display will read "1kg." plus or minus 1.0 grams. If the scale does not read properly, re-calibrate in accordance with the manufacturers literature.

Remove the weight and return it to a clean storage area. Replace the Expansion Bowl on the scale platform.

5.2.4 Cylinder and Test Head Installation

Screw the Hydraclose® Test Head into the cylinder neck, engaging with 3 to 5 neck threads.

Attach the hoist to the Hydraclose® Test Head with the attached cylinder and load the assembly into the Test Jacket, see figure 5-1.

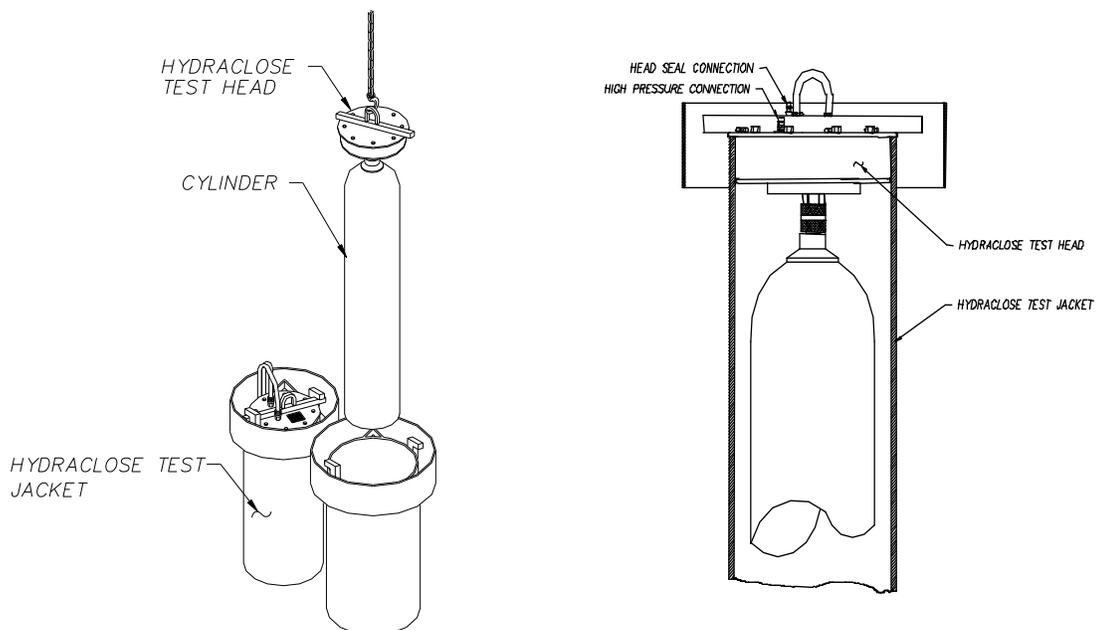


Figure 5 - 1 Cylinder/Test Head Installation

5.0 OPERATION, continued

5.2.4 Cylinder and Test Head Installation, continued

When the Test Jacket is full and ready to use, lower the cylinder, attached to the Test Head, into the Test Jacket. Twist the Test Head to lock it into place under the Head Retaining Brackets.

After the Test Head is in place in the Test Jacket, attach the Head Seal Hose first, and then attach the Test Pressure Hose, see figure 5-2.

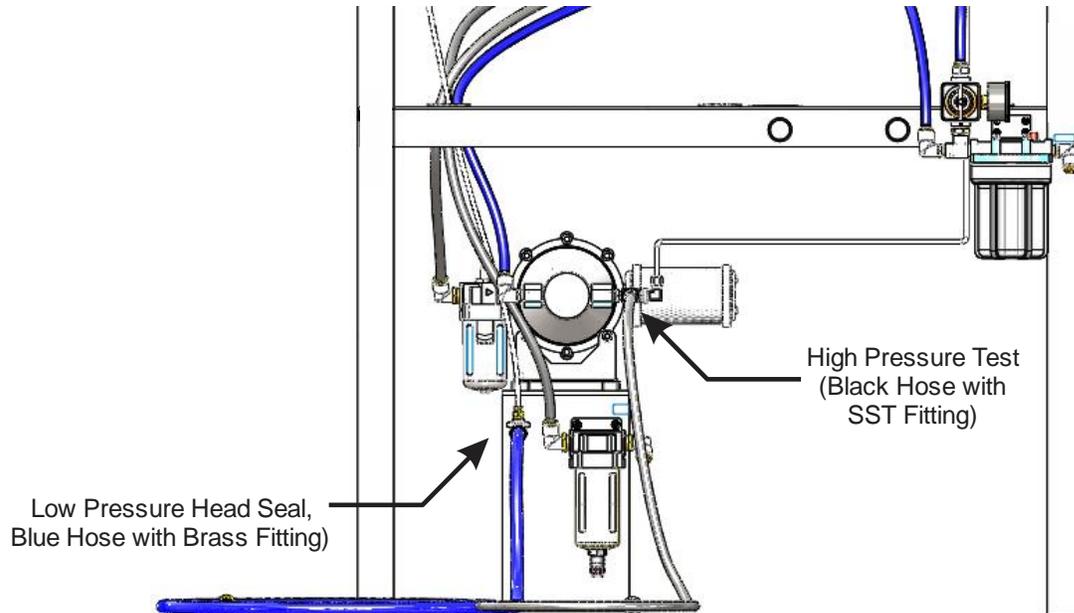


Figure 5 – 2 Hose Connections

Test Jackets, 24” and larger, have thumb screws incorporated on the Test Head retainer brackets to prevent Test Head “Floating,” giving inaccurate expansion reading. Tighten thumb screws against head, hand tight after head is in place. After testing, back-off thumb screws to prevent damage to them during subsequent head installation.

5.2.5 Pump Pressure Adjustment

GTC Test Consoles are supplied with either a low pressure or a high pressure Pump, depending on the model ordered. Table 5-1 shows the pump specifications for the available GTC Test Consoles. The pump pressure adjustments are required to ensure that cylinders are not over-pressurized.

5.0 OPERATION, continued

5.2.5 Pump Pressure Adjustment, continued

GTC Model	Pump Type	Press. Ratio	Max. Pump Press.	Remarks
GTC-1200	LP, AZ-1-26	26:1	2625 psi	Figure 5-3
GTC-2200	LP, AZ-1-26	26:1	2625 psi	Figure 5-3
GTC-10000	HP, AZ-1-140	140:1	14000 psi	Figure 5-4
GTC-10K MOD II	HP, AZ-1-140	140:1	14000 psi	Figure 5-4

Table 5 – 1 Pump Specifications

- A. To determine the required air pressure regulator setting, first determine the required cylinder test pressure. Then, find the corresponding air pressure regulator setting using the graph shown in figure 5-3 or 5-4 whichever applies to your test system (see Table 5-1). Alternatively, the required air pressure may be determined by dividing the cylinder test pressure by the pressure ratio value (either 26 or 140) shown in Table 5-1.

**Pump Hydraulic Pressure VS Air Regulator Pressure
For Low Pressure (26:1) Pump**

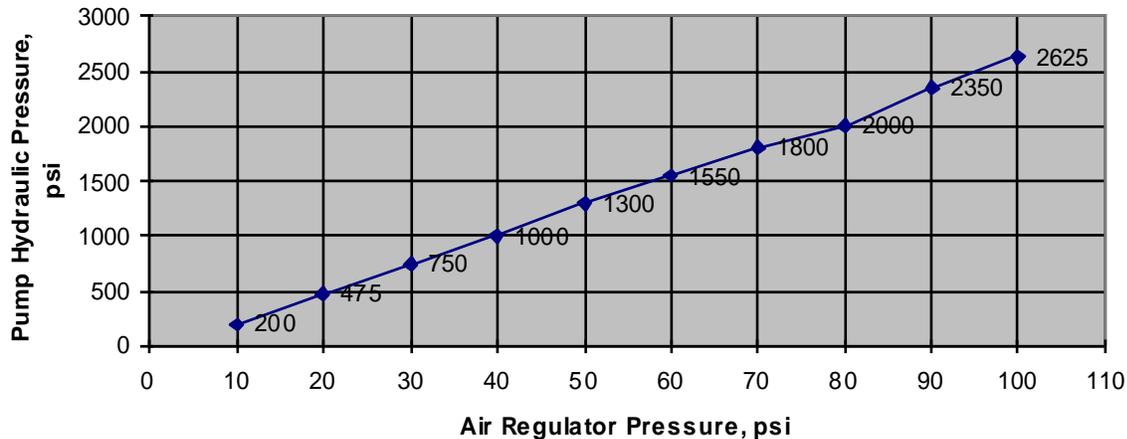


Figure 5 – 3

- B. Since the values shown in figures 5 - 3 and 5 - 4 are approximate, add 5 to 10 psig to the air to pump pressure regulator setting determined from the graph (or from the pressure ratio multiplier) to insure that the pump will not stall out prior to reaching the required test pressure.

5.0 OPERATION, continued

5.2.5 Pump Pressure Adjustment, continued

**Pump Hydraulic Pressure VS Air Regulator Pressure
For High Pressure (140:1) Pump**

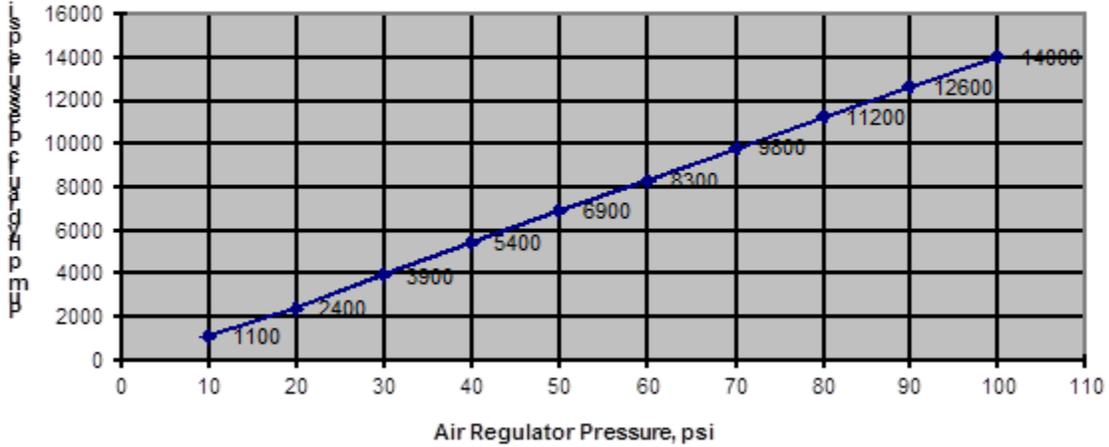


Figure 5 - 4

5.0 OPERATION, continued

5.2.6 System Fill and Purge

- A. With a Calibrated Cylinder and Test Head in the Jacket, apply the blue Head Seal Hose (air) to the Test Head. Open the Expansion line to the corresponding Jacket. Turn Jacket/Bowl Fill Valve to "Fill Bowl". **CAUTION: DO NOT OVERFILL THE BOWL!** Turn the Bowl Fill Valve to the off position. Remove the blue Head Seal Hose to drain, then, re-apply to stop the draining. Alternatively, turn the Expansion Valve to Drain to remove excess water from the Bowl. Bowl water level should be approximately $\frac{1}{4}$ " above the tip of the Probe.

- B. There may still be some air in the water line when first setting up the system. This will be noticeable by a 'milky' color to the water. To completely clear the lines, repeat the BOWL FILL / BOWL DRAIN steps described above, until the water runs clear. Ideally the Bowl should be drained by removing the Air Line from the Head to clear possible air in the Test Jacket circuit. Then at least once use the Drain Valve to clear any possible air in the circuit.

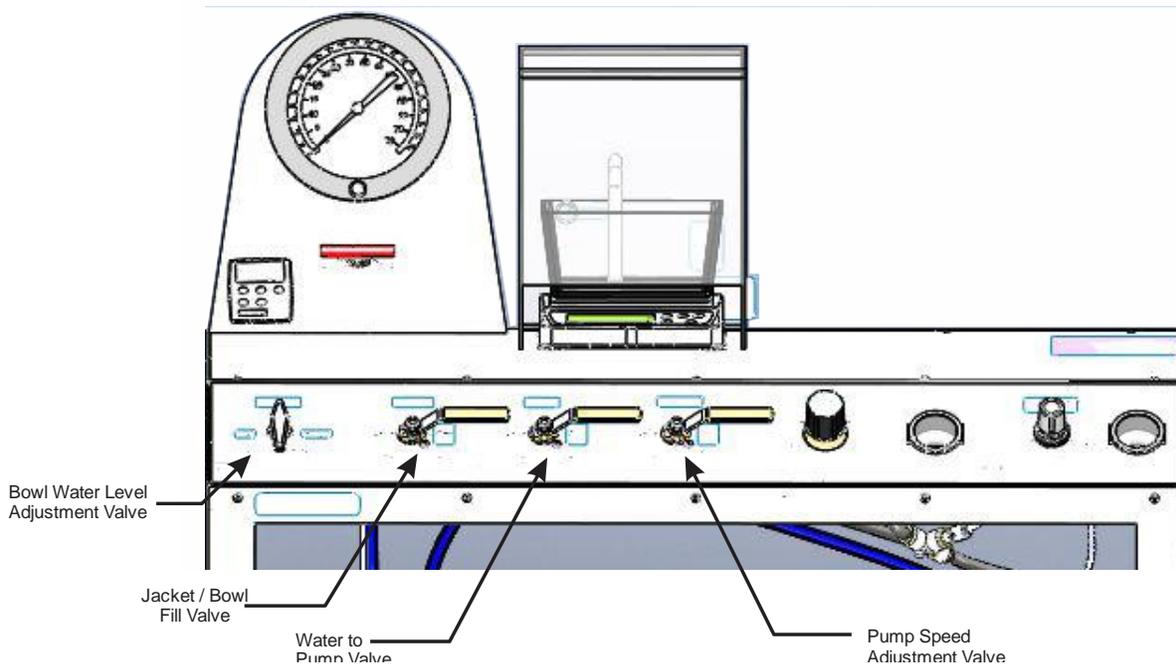


Figure 5 - 5 GTC Control Panel

5.0 OPERATION, continued

5.3 Cylinder Preparation

Cylinders to be tested must be subjected to an internal and external visual inspection in accordance with CGA pamphlet C-6, "Standards for Visual Inspection of Compressed Gas Cylinders".

The exterior of each cylinder should be cleaned of dirt, scale, grease, oil and any other contamination before inspection. The inspector should check the entire exterior surface, including the bottom of the cylinder, for any damage such as dents, arc or torch burns, bulges, serious corrosion or any other damage that could appreciably weaken the cylinder. Any cylinders that do not pass the inspection should be removed from further service.

WARNING

Do not test obviously defective cylinders. Testing of defective cylinders is a safety hazard and can result in equipment damage, personnel injury or death.

Remove the cylinder valve and tag it with the cylinder serial number so that the valve will be reinstalled in the same cylinder. Cylinder valves generally conform themselves to the particular neck threads of the cylinder in which the valve is first installed and may not seal as well in cylinders with a slightly different neck thread configuration.

If the cylinder has contained a flammable gas it must be washed prior to internal visual inspection. Either fill the cylinder with water and then dump it out, or purge the cylinder with clean, dry air or Nitrogen.

Use a Galiso Opti-Lite, Fiber Optic Inspection Light or low voltage bulb to inspect the interior of the cylinder per CGA pamphlet C-6, "Standards for Visual Inspection of Compressed Gas Cylinders".

Carefully check the interior of the cylinder for excessive corrosion, dirt, scale, or sludge which must be removed prior to hydrostatic testing. Internal cleaning of the cylinder should be performed prior to hydrostatic testing.

Add water as needed to completely fill the cylinder before testing. The temperature of the water in the cylinder should be within a maximum of five (5) degrees Fahrenheit of the temperature of the water in the Test Jacket and the water used to pressurize the cylinder during testing. A large variation of the two water temperatures will cause inaccurate test results.

5.0 OPERATION, continued

5.3 Cylinder Preparation, continued

5.3.1 Cylinder Test Log

The Test Log will list a series of cylinder/test data to be filled out by the operator prior to or during the test for each cylinder to be tested. The following information is required for each cylinder to be tested:

1. CYLINDER OWNER:
2. SERIAL NUMBER:
3. ICC OR DOT RATING/SERVICE PRESSURE:
4. MANUFACTURER or symbol and date of manufacture:
5. DIMENSIONS:
6. GAS SERVICE:
7. VISUAL INSPECTION: Record the results of the Visual Inspection.
8. ACTUAL TEST PRESSURE:
9. EXPANSION
10. TOTAL EXPANSION (Total while under Test Pressure)
11. PERMENANT EXPANSION (Expansion after pressure is released):
12. ELASTIC EXPANSION (Total – Permanent)
13. PERCENT PERMENANT EXPANSION (Permanent Expansion/Total x 100):
14. PLUS: Indicate YES or NO.
15. STAR: Indicate YES or NO.
16. TEST RESULT CODE: Enter the appropriate code:
17. TESTED BY: The test equipment operator's name or initials.
18. REE Reject Elastic Expansion
19. REE Source
20. REMARKS: Write in any remarks pertinent to the test in this area.

5.0 OPERATION, continued

5.4 Cylinder Test Procedure

The first test should be on the user's calibrated cylinder, in order to have a record showing that the test system is accurate to 1%. This test is performed to verify that the components of the system are in proper working order.

The following instructions describe the recommended cylinder testing procedure(s).

5.4.1 Air Regulator Settings

Verify that the gauge on the Head Seal Pressure mini regulator is set at 90 PSI.

Verify the gauge on the Intensifier Pump regulator indicates the proper air pressure setting for the cylinders to be tested. Refer to Section 5.2.5, Pump Pressure Adjustment, for instructions.

5.4.2 Expansion Bowl and Scale Set-up

Ensure that the scale is properly calibrated per Section 5.2.3. If necessary, re-calibrate the scale in accordance with the manufacturers OEM literature.

Verify that the system has been purged of air, and that the expansion bowl level is approximately $\frac{1}{4}$ " above the probe tip, see Section 5.2.6 for system purge instructions. During the process of testing cylinders, the water level in the bowl may change. It may become necessary to adjust the water level in the bowl. Turn the Bowl Water Level Adjustment Valve to BOWL FILL to add water to the bowl and to BOWL DRAIN to drain water.

5.4.3 Cylinder Test Connections

Verify that the Water To Pump Valve is in the OFF position and the Bleed Valve handle is securely in the OFF position. Verify the Regulator Gauge is set for the proper pressure for the cylinders being tested.

Attach the Test Head to the cylinder for which you have entered the information. The Test Spud should engage with 3 to 5 neck threads in order for the cylinder to be safely tested. Cylinders with excessively worn neck threads should be condemned.

Load the cylinder to be tested into the Jacket and lock into place. Attach the blue Head Seal Hose and black Test Pressure Hose to the Test Head.

5.0 OPERATION, continued

5.4 Cylinder Test Procedure, continued

5.4.4 Test Procedure

- A. Turn the Expansion Valve ON (or select a Jacket for Dual Jacket Systems).
- B. Check the pressure gauge for zero reading, allow the bowl level to stabilize and press the TARE button on the Expansion Scale to re-zero the scale.
- C. CLOSE the Bleed Valve.
- D. Turn the Water To Pump Valve to the ON position (the pressure gauge will indicate incoming water supply pressure).
- E. Turn ON the Pump Speed Adjustment Valve to pressurize the cylinder to the required pressure for the cylinder being tested. Test pressures for DOT rated cylinders are listed in CFR49.
- F. If the needle on the gauge bounces erratically during pressurization, reduce the speed of the pump with the Pump Speed Adjustment Valve until there is a steady rise from the needle. Erratic movement of the needle could affect the performance of the gauge.
- G. When the gauge indicates that pressurization is within 500 psi of the test pressure, turn the Pump Speed Adjustment Valve toward the OFF position to slow the pump until the desired pressure is reached. A rate of approximately 100 psi per three seconds is recommended.
- H. Upon reaching the desired pressure, turn the Pump Speed Adjustment Valve to OFF. Turn OFF the Water To Pump Valve.
- I. To accurately read the Test Gauge, tap it lightly, and line the indicator needle up with its mirrored image and read the gauge where the needle and mirror form a single image.
- J. If the gauge pressure has not reached minimum test pressure, slowly turn the Pump Speed Adjustment Valve to increase the pressure in the cylinder.
- K. Maintain the test pressure for at least 30 seconds, or for however long it takes to allow for complete expansion of the cylinder. If fluctuations occur, allow for extra time until the system stabilizes and the gauge and scale display hold steady. If the pressure does not stabilize, the system must be checked and the cylinder will need to be re-tested. (See CFR49, 180) Refer to Section 6.0, Maintenance and Troubleshooting, for possible problems and remedies.

5.0 OPERATION, continued

5.4 Cylinder Test Procedure, continued

5.4.4 Test Procedure, continued

- L. After assuring that the expansion reading has stabilized, record the Total Expansion, shown on the scale display, on the Test Log.
- M. Turn the Bleed Valve counter-clockwise to bleed the pressure from the cylinder. When testing the Calibrated Cylinder, the Test Gauge and the scale display should both return to zero readings. When testing other cylinders, the Test Gauge should return to zero and the scale display will show the amount of permanent expansion after the cylinder has been bled.
- N. Allow approximately 30 seconds for the scale to stabilize. The scale readout will display the amount of permanent expansion for the cylinder. Record this information on the Test Log in the Permanent Expansion column.
- O. Turn OFF the Expansion Valve (turn to HOLD for Dual Jacket Systems), leave the Bleed Valve OPEN until the next cylinder is ready to test.
- P. Remove the Head Seal Hose and Test Pressure Hose from the test head.
- Q. Remove the Test Head and cylinder from the Test Jacket. Detach the test head from the cylinder.

Repeat Steps 5.4.4.A through Q. for additional cylinders to be tested.

5.4.5 System Shutdown Procedure

The system should be shut-down whenever it will be left unattended for any length of time such as between shifts, overnight and over weekends.

- A. Drain the water from the bowl.
- B. Verify that all valves are in the OFF or HOLD position, EXCEPT for the Bleed Valve.
- C. Turn OFF the power to the Scale.
- D. Turn OFF the City Water and Shop Air Supply sources to the system.

6.0 MAINTENANCE and TROUBLESHOOTING

6.1 GTC Test Console

Keep the Test Console and components clean and dry and free of dirt and debris.

Regularly inspect the plumbing components of the Test Console for leaks. Also inspect the lines which connect the Test Console to the Test Jacket, Test Head and Pump Assembly for leaks.

6.2 Expansion Bowl Assembly

Before start up, place the 1 Kg, or 2 each 50 gram weights, on the pan of the Scale to verify the calibration of the scale. If the scale display does not read 1Kg or 100 grams, (99.7-100.3 grams), the Scale will need to be re-calibrated. Refer to the Scale manufacturers' literature, included in this manual, for calibration procedure.

Regularly inspect the Expansion Bowl Assembly. If dirt and residue have accumulated in the Expansion Bowl, carefully remove the Expansion Bowl and clean it. Avoid using sharp instruments and abrasive cleaners. Replace the Expansion Bowl as described in Section 4.0, Installation.

Keep the scale housing and pan clean and free of foreign material. A damp cloth with a mild detergent may be used to clean the scale.

6.3 Hydraclose[®] Test Head

Regularly inspect the Head Boot for cuts and gouges which could damage the sealing surface.

Change the Speed Seals when they become excessively worn or ragged to avoid leakage and damage to the test system sealing mechanism.

Regularly inspect the threads on the bottom of the Test Spud. If the threads become excessively worn or damaged, replace the Test Spud.

The Quick Connect Fittings should be inspected for wear periodically and replaced as needed. The hose couplers should fit snugly on the Quick Connect Fittings.

The 2-part Seal, Galiso Part Number: 69-41-0022, in the Quick Connect Fittings should be changed when wear prevents proper sealing.

6.0 MAINTENANCE and TROUBLESHOOTING

6.3 Hydraclose[®] Test Head, continued

The metal surfaces of the Hydraclose[®] Test Head should be kept clean and free of rust and corrosion. Metal surfaces should be painted with a high quality, cold galvanizing metal primer.

Protect the Spud Stem from being bent or twisted. A bent or twisted Spud Stem will interfere with sealing action.

Protect the Head Boot from cuts and gouges that could damage the sealing surface. If the head boot is properly cared for, it should last for years. If the test head is damaged, it can either be sent to the factory for repairs or you can repair it yourself with Galiso replacement parts. Rental heads are available from Galiso to allow you to continue testing while your Test Head is being repaired.

6.4 Hydrostatic Test Jacket

The inside upper 12 inches of the Test Jacket should be painted with cold galvanizing, metal primer to protect the sealing area.

The Test Jacket should be cleaned periodically to remove any accumulation of dirt or debris as needed or at least once every three months.

Test Jacket water that has become stagnant or brackish should be drained from the Test Jacket and replaced with fresh water.

6.5 Calibrated Cylinder

Water should be left in the Calibrated Cylinder at all times. If the cylinder must be emptied, it should be dried immediately to prevent corrosion.

The water filled Calibrated Cylinder must be protected from freezing temperatures. The force generated by the freezing water can permanently damage the calibration of the cylinder and possibly rupture the cylinder wall.

6.6 Gauges

System Gauge: The system Gauge on the machine should be recalibrated every 6 months. A Master Gauge can be used for this recalibration.

Master Gauge Assembly:

In accordance with CGA recommendations, the Master Gauge Assembly should be recalibrated at least once per year.

NOTE: Handle the Master Gauge Assembly very carefully! Sudden shocks and rough handling can damage the calibration of the gauge.

6.0 MAINTENANCE and TROUBLESHOOTING

6.7 Intensifier Pump Assembly

Regularly inspect the plumbing components of the Pump Assembly for leaks.

Pump speed and pressure must be adjusted for the size/rating of cylinders being tested. Refer to Section 5.3.5, for the adjustment procedure.

Replace worn pump seals and packings as needed.

Regularly inspect the filters of the Pump Assembly. Clean or replace as needed.

6.8 Troubleshooting

If you develop what appears to be a problem, please check the following section to identify where the problem might be located. If you should need additional help, please call Galiso, Inc. at (800) 854-3789.

Table 6 - 1 Troubleshooting

PROBLEM	POSSIBLE CAUSE	REMEDY
Expansion Increasing		
	Bowl Fill valve leaks	Remove valve and check to see if water is leaking through valve. Replace as necessary.
	Head Seal Leak	Switch heads (if another is available). If the problem ceases, repair the faulty head. If another head is not available, check the head around the diaphragm and boot using the Head Retaining Device. If any leaks exist, repair or replace the head.
	Temperature Fluctuations	Check to see that incoming water, test jacket, filled cylinders and ambient air temperature are within 5° F of each other.
Expansion Decreasing		
	Burst Disc is leaking.	Replace Burst Disc.
	Head Boot is not sealing against the jacket.	Check the inside sealing surface of the test jacket to ensure that the surface is smooth. Check the Head Boot for deformations.
	Leak in expansion plumbing.	Dry off all tubing with an air hose and check for drops of water.
	Temperature Fluctuations	Check the inside sealing surface of the test jacket to ensure that the surface is smooth. Check the Head Boot for deformations.
	Bowl Drain Valve Leaks	Remove plastic tubing from the bottom of the Drain Valve and check to see if water is dripping from the tube.
	Leak in Bleed Valve	Remove the tubing from the Bleed Valve. If drops begin to form at the elbow or end of the tubing when the system is pressurized, the valve needs to be rebuilt

6.0 MAINTENANCE and TROUBLESHOOTING

6.8 Troubleshooting

PROBLEM	POSSIBLE CAUSE	REMEDY
Expansion Unstable		
	Air trapped in Expansion Line	Flush Expansion Line by filling the bowl with water and removing the Head seal to the jacket.
	Vibration	The Expansion bowl must be stable. If there is vibration coming through the floor or other sources, the scale and bowl must be isolated.
Pressure Decreasing		
	Leak in Bleed Valve	Remove the tubing from the Bleed Valve. If drops begin to form at the elbow or end of the tubing when the system is pressurized, the Valve needs to be rebuilt.
	Leak in High Pressure Tubing	Check all connections from the Test Console out to the Jacket.
	Test Head has a high pressure leak	Change Test Heads if possible. If the problem ceases, check the old head for leaks around the diaphragm and boot. If any leaks exist, repair the head.
Pressure Increasing		
	Pump continues to run after turning off Pump Speed Control Valve.	Turn the air to the pump off. If this stops the increase, repair or replace the Pump Speed Control Valve.
Pump will not Cycle		
	Low air pressure	Check the incoming air pressure.
	Restricted air volume	Check air lines for contamination and leaks.
Scale reads LoBat or No Scale Display		
	Power not connected	Connect power adapter
	Batteries are low or dead.	Replace batteries
Underweight Readings		
	Scale Pan is off balance	Balance the Pan and perform zero function
	Scale is out of calibration	Recalibrate the Scale.
Incorrect Weight Readings		
	Scale was not re-zeroed before weighing.	Press TARE with no weight on pan then, weigh item.
	Scale is out of calibration	Recalibrate the Scale.

6.0 MAINTENANCE and TROUBLESHOOTING, continued

6.9 Spare Parts

Common Parts for both High and Low Pressure Test Consoles:

- 01-41-3901 SNUBBER LINE
- 36-11-2500 11,000 PSI GAGE
- 37-11-3055 WATER PRESSURE REGULATOR
- 37-11-3058 HEAD SEAL PRESSURE REGULATOR
- 37-11-3076 Regulator, Air, 1/2" NPT,
 - 37-11-3077 Pressure Gauge Adapter, AR40 (2x2x1)
- 38-11-5405 INLET CHECK VALVE REPAIR KIT
- 38-11-5406 OUTLET CHECK VALVE REPAIR KIT

- 40-94-7505 LOW PRESSURE COUPLER SEAL

- 69-41-0022 COUPLER SEAL, 2 part
- 80-11-0204 WATER FILTER ELEMENT
- 80-11-0205 AIR FILTER ELEMENT
- 81-11-0119 HIGH PRESSURE BLEED VALVE, Red Handle (replaced Black Handle)
 - Repair Kit for above 81-41-0263 includes the following items;
 - 81-11-0131 Valve Stem
 - 81-11-0132 Seal
 - 81-11-0133 Valve Seat
- 81-11-1000 Ball Valve, Panel Mount, 1/2" NPTF

Older Systems may have:

- 81-11-0299 HIGH PRESSURE BLEED VALVE (Black Handle)

- 81-11-1012 Ball Valve, Panel Mount, 3/8" NPTF
- 81-11-1013 3 WAY BALL VALVE
- 83-11-5010 OUTLET CHECK VALVE

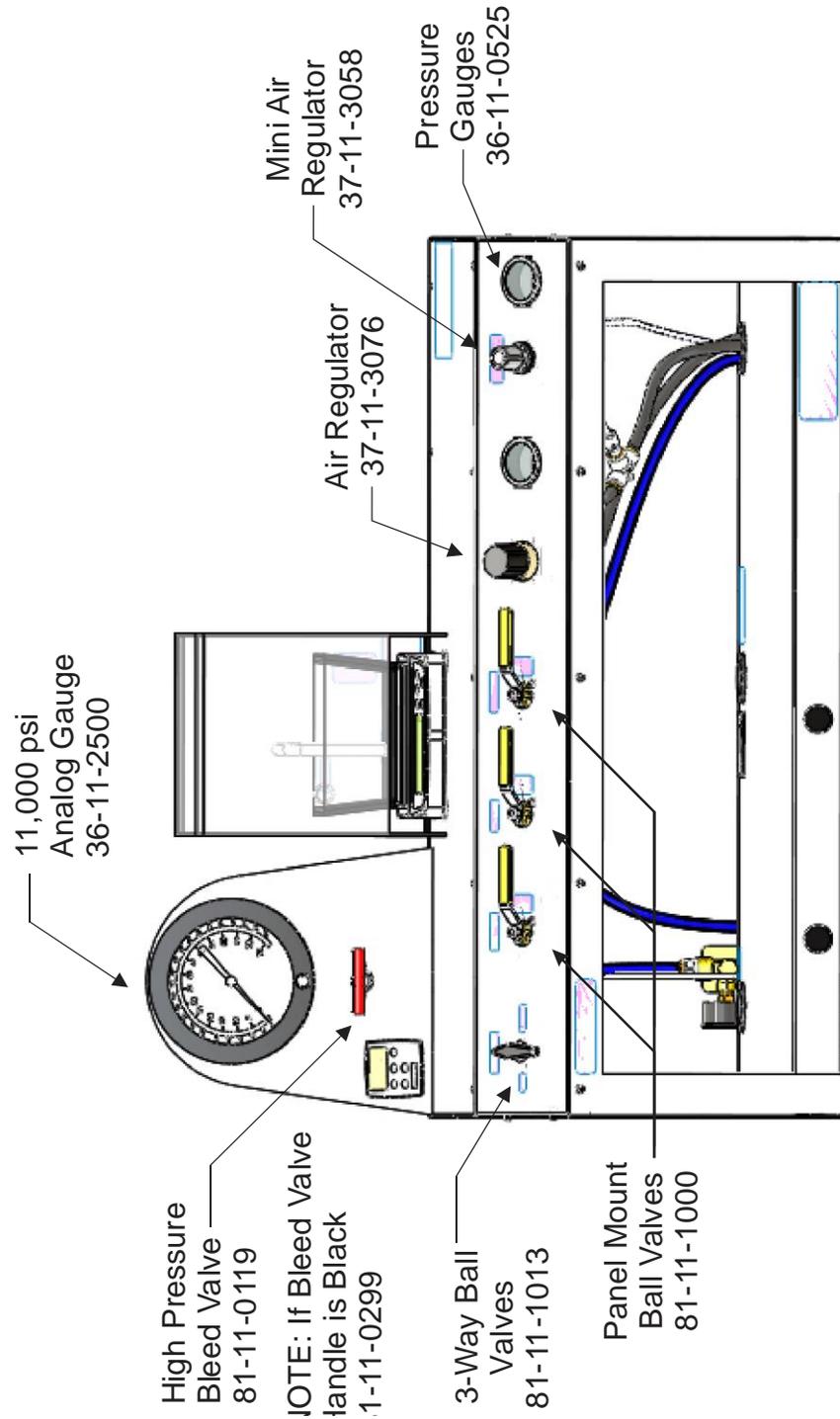
GTC 10K ModII parts:

- 38-11-3084 PUMP REPAIR KIT
- 40-11-3033 PUMP PISTON SEAL KIT
- 41-11-3010 6' HIGH PRESSURE HOSE
- 83-11-5009 INLET CHECK VALVE

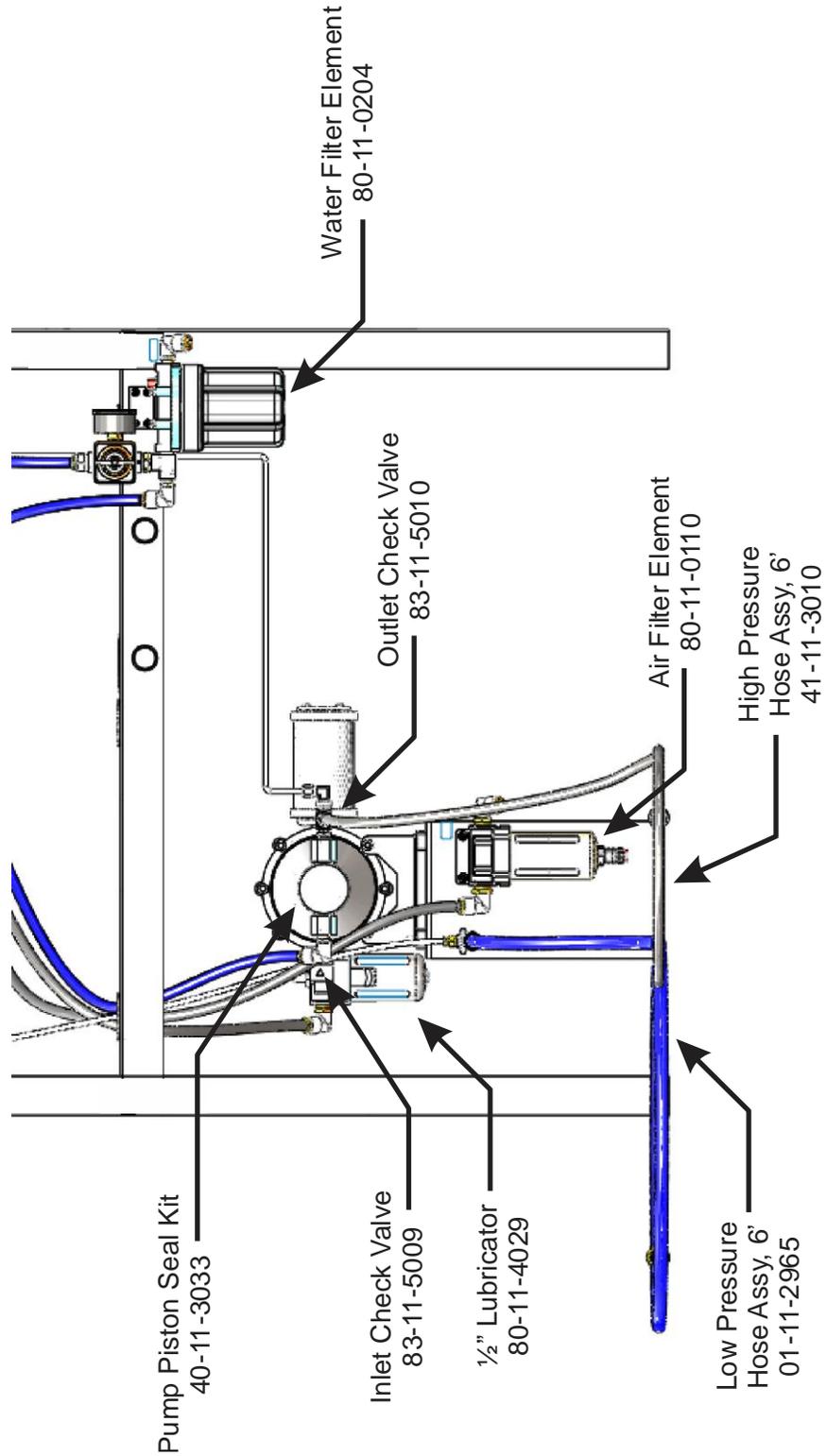
GTC 1200 parts:

- 41-11-3020 6' High Pressure Hose (GTC 2200 also)
- 38-11-5569 Pump Repair Kit
- 38-11-5570 Pump Piston Seal Kit
- 36-11-1515 1500PSI Test Gauge
- 83-11-5012 Inlet Check Valve

6.0 MAINTENANCE and TROUBLESHOOTING, continued
 6.9 Spare Parts, Visual I.D.



6.0 MAINTENANCE and TROUBLESHOOTING, continued
 6.9 Spare Parts, Visual I.D.



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1. **DURATION:** Galiso provides a one-year warranty from date of purchase, to the original purchaser, for standard products, unless otherwise specified. For all spare parts purchases, Galiso provides a 90-day warranty unless otherwise specified. Soft goods such as our speed seals, and O-rings, which are subject to wear in the normal course of operation, are not covered under this warranty.
2. **COVERAGE:** Galiso manufactured equipment is warranted against defective materials or workmanship. THIS WARRANTY IS VOID IF:

A) THE EQUIPMENT HAS BEEN DAMAGED BY ACCIDENT OR UNREASONABLE USE, IMPROPER SERVICE/MAINTENANCE, IMPROPER INSTALLATION, ABNORMAL OPERATING CONDITIONS, NEGLIGENCE, REPAIR BY ANY PERSON NOT AUTHORIZED BY GALISO, INC. OR OTHER CAUSES NOT RELATED TO MATERIAL DEFECTS OR WORKMANSHIP.

B) THE SERIAL NUMBER HAS BEEN ALTERED OR DEFACED.

3. **PERFORMANCE:** Galiso reserves the right to make warranty determination only after inspecting the item at the Galiso manufacturing facility. If the warranty determination indicates that the defective item is covered under warranty, the item will be repaired or replaced with the same parts/items or parts/items of equivalent quality, at the option of Galiso. In the event of replacements, the replacement unit will continue under the original equipment warranty or carry a 90-day warranty, whichever is longer. No charge will be made for warranty repairs, and/or replacements. All freight charges to and from Galiso Inc. or a Galiso Inc. authorized repair facility, are the responsibility of the customer requesting warranty service.

If the warranty determination indicates that the item is **not** covered by warranty, a repair/replacement cost estimate will be submitted to the customer/purchaser for approval prior to initiating any repair work.

4. **CLAIMS:** In the case of equipment malfunction, notify Galiso (1-800-854-3789) and provide the Model Name, Model Number, Serial Number and a description of the problem. Return Authorization Number, shipping and/or service information will be provided on receipt of the required information.
5. **SERVICE EQUIPMENT:** Galiso attempts to make available, whenever possible, a limited amount of service equipment at a minimal use charge, plus freight expense, for those customers wishing to avoid downtime during repair of their equipment. Such items are available on a first come, first served basis and are billable at the specific service charge applying with a one-month minimum.
6. **MODEL CHANGES:** Galiso reserves the right to make changes in materials and specifications, without notice. Galiso may offer, for a stipulated fee, the opportunity to upgrade your equipment to the latest configuration.
7. **DISCLAIMERS:** Galiso provides technical data and assistance to aid customers in the selection and use of our products. There are no implied warranties of merchantability nor suitability for a particular purpose associated with the transmittal of technical data and/or customer assistance.

Galiso does not assume liability for any consequential, incidental, or special damages. Liability under this warranty is limited to repairing, or replacing Galiso equipment items returned to the factory or an authorized facility.

8. **COMPUTER AND NETWORK VIRUS PROTECTION:** Galiso Inc. equipment, which utilizes internet access, comes equipped with a subscription to virus protection software. It is the responsibility of the equipment owner to maintain this virus protection subscription or other virus protection at their cost. Current virus subscriptions are mandatory to maintain the benefits of this warranty. Galiso does not assume liability for any or all damages related to or are the result of internet or network failure or malware or computer viruses or any other type of internet or network malfunction or attack.

TEST LOG

D.O.T REGISTRATION NO.: _____
 COMPANY: _____
 LOCATION: _____

STAPLE RECORDER CHART TO BACK OF SHEET(S)
 MAINTAIN TEST LOG FOR LIFE OF TEST

DATE: _____ SHEET _____ OF _____
 PRESSURE REC. CHART NO. _____
 CUSTOMER: _____
 ORDER NO.: _____

	CYLINDER OWNER	CYLINDER SERIAL NO.	ICC OR DOT SPEC. & SERVICE PRESSURE	MFG OR SYMBOL AND DATE	DIMENSIONS	GAS SERVICE	VISUAL INSP.	ACTUAL TEST PRESSURE	EXPANSION			% PERM. EXPANSION	* + *	* * *	TEST RESULT CODE	TESTED BY	R.E.E.	R.E.E. SOURCE	REMARKS
									TOTAL	PERM.	ELASTIC								
	CAL. CYLINDER																		
1																			
2																			
3																			
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⊙ GASES ▽ LIQUIDS ⊕ SOLIDS
 22 PONDEROSA COURT
 MONTROSE, CO 81401
 (970) 249-0233 • www.galiso.com
 FAX: (970) 249-0607 • 1-800-854-3789

TEST RESULT CODE

A. PASS
 B. PASS HYDRO, FAIL R.E.E.
 i.e. LESS THAN 10% PERM PASSES TEST,
 BUT OVER R.E.E. = NO +/*
 C. FAIL, EXCESSIVE PERMANENT EXPANSION
 D. FAIL, EXCESSIVE ELASTIC EXPANSION
 E. FAIL, VISIBLE DEFECTS, SEE REMARKS
 F. REPEATED TEST (PROVIDE REASON AND
 PREVIOUS TEST DATE IN REMARKS)

THE ABOVE CYLINDERS WERE TESTED UNDER MY SUPERVISION IN ACCORDANCE WITH THE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

BY: _____
 DATE: _____