



!!!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**

**INSTALLATION, OPERATIONS, AND MAINTENANCE
MANUAL FOR THE GALISO**

RECORTTEST III

AUTOMATED HYDROSTATIC TEST SYSTEM



GALISO® INCORPORATED
22 PONDEROSA CT., MONTROSE, CO 81401
(970) 249-0233 (800) 854-3789
www.galiso.net

MANUAL NUMBER 21-11-1015

Revision B Issued 8/01

RECORTEST III Automatic Hydrostatic Test System Instruction Manual

TABLE OF CONTENTS

Section/Title	Page
1.0 Introduction	1-1
1.1 Hydrotest Requirements	1-2
1.2 Hydrostatic Test Overview	1-2
1.3 Scope of Manual.....	1-3
2.0 System Components and Specifications.....	2-1
2.0 RECORTEST III System Components.....	2-1
2.1 RECORTEST III Control Console	2-3
2.2 RSP-10D Utility Support Package	2-4
2.3 HYDRACLOSE Test Heads.....	2-5
2.4 HYDRACLOSE Test Jackets	2-6
2.5 Master Gauge Assembly	2-7
2.6 Calibrated Cylinder	2-8
2.7 Optional Equipment	2-8
3.0 Safety	3-1
3.1 Personnel Safety	3-1
3.2 Equipment Operation and Test Precautions.....	3-2
4.0 Installation	4-1
4.1 Site Preparation	4-1
4.2 Receiving and Placement	4-2
4.3 Plumbing Connections.....	4-3
4.4 Calibrated Cylinder Preparation.....	4-13
4.5 HYDRACLOSE Test Head Preparation	4-13
4.6 Expansion Bowl Setup.....	4-16
4.7 Electrical Connections	4-18
4.8 Preparations for Testing	4-18
4.9 Printer Setup.....	4-19
5.0 System Start Up Procedure	5-1
5.1 Purging Air From Expansion Lines	5-3

RECORTEST III Automatic Hydrostatic Test System Instruction Manual

TABLE OF CONTENTS (continued)

Section/Title	Page
6.0 System Operations	6-1
6.1 Requirements Before Testing	6-1
6.2 Test Cylinder Installation	6-1
6.3 Testing Sequence	6-3
6.4 Pump Air Pressure Adjustment.....	6-3
6.5 Pump Speed Adjustment	6-4
6.6 Pump Speed Adjustment Procedure	6-5
7.0 Control Console Keypad	7-1
8.0 Control Console Display Monitor	8-1
8.1 Main Menu Options	8-3
8.2 Edit Menu	8-4
8.3 Calibrate Menu	8-5
8.4 Test Cylinders Menu	8-5
8.5 Information Menu.....	8-5
9.0 Display Monitor, Parameters Function	9-1
9.0 Parameter Function	9-1
10.0 Display Monitor, Test Cylinders Function	10-1
10.0 Test Cylinders Function	10-1
10.1 Test Jacket Selection.....	10-2
10.2 Test Cylinders Function, Specification Cues	10-3
10.3 Test Cylinders Function, Test Results	10-4
10.4 Test Cylinders Function, Test Indicators and Controls Labels	10-5
11.0 Display Monitor Archive Function	11-1
12.0 Verification and Calibration Procedure	12-1
12.1 Verify Function	12-1
12.2 Expansion Reading Verification	12-3
12.3 Pressure Reading Verification.....	12-4

RECORTEST III Automatic Hydrostatic Test System Instruction Manual

TABLE OF CONTENTS (continued)

Section/Title	Page
13.0 Expansion Calibration.....	13-1
14.0 Pressure Calibration	14-1
15.0 Cylinder Preparation.....	15-1
16.0 Test Procedure	16-1
17-0 Printing a Test Report	17-1
18.0 Maintenance.....	18-1
18.1 RECORTEST III Control Console Components	18-1
18.2 HYDRACLOSE Test Heads	18-2
18.3 HYDRACLOSE Test Jackets.....	18-2
18.4 Calibrated Cylinder	18-2
18.5 Master Gauge Assembly	18-2
18.6 High Pressure Pump	18-3
18.7 Auxiliary Equipment.....	18-4
18.8 RECORTEST III Console Replacement Parts.....	18-4
19.0 Cylinder Code Table.....	19-1
20.0 Trouble Shooting Guide	20-1
Attachments:	
1. Warranty Terms	
2. RECORTEST III P&ID, No. 21-61-1015-01, 3 shts	
3. RECORTEST III Electrical Schematic, No. 21-91-1015-01	
4. RECORTEST III General Arrangements, No. 01-71-8268, 6 shts.	
5. RECORTEST III Test Pit Layout, No. 01-71-8269, 3 shts.	
6. RECORTEST III Test Pit Layout-Grating, No. 01-21-8270	
7. RECORTEST III Spare Parts Addendum	

RECORTEST III Automatic Hydrostatic Test System Instruction Manual

List of Figures

Number/Title	Page
2-1 Four Jacket RECORTEST III	2-2
2-2 RECORTEST III Console	2-3
2-3 RSP-10D	2-4
2-4 HYDRACLOSE Test Head	2-5
2-5 HYDRACLOSE Test Jacket	2-6
2-6 Master Gauge Assembly	2-7
2-7 RCSG Cylinder Filling Equipment	2-8
2-8 PCT Cylinder Inverter	2-9
2-9 GVM Cylinder Valver	2-10
2-10 GAH Hoist	2-11
2-11 Opti-Lite	2-12
3-1 HYDRACLOSE Seal	3-3
3-2 Cylinder Neck Thread	3-3
4-1 Test System Layout	4-1
4-2 RECORTEST Plumbing Schematic	4-3
4-3 Test Jacket Plumbing Connections	4-4
4-4 RSP-10D Plumbing Connections	4-6
4-5 RSP-10D Plumbing Connections	4-7
4-6 RECORTEST III Console Plumbing Connections	4-8
4-7 REC. III Electro/Pneumatic Control Valves	4-10
4-8 Test Head Installation	4-13
4-9 Test Spud	4-14
4-10 Expansion Bowl Assembly	4-17
5-1 Cylinder Test Head Installation	5-2
5-2 Cylinder Jacket Installation	5-2
5-3 Test Hose Connections	5-3
6-1 Cylinder/Test Head Details	6-2
6-2 Cylinder/Test Head Installation	6-2
6-3 Jacket Manifold Detail	6-3
7-1 Control Console Keypad	7-1
8-1 Display Monitor, Main Menu	8-3
9-1 Parameters Menu	9-1
9-2 Parameters Function Menu	9-2
10-1 Display Monitor, Test Cylinders Function	10-1
12-1 Verify Screen	12-2
12-2 Expansion Bowl	12-4
13-1 Load Cell Calibration Screen	13-1
14-1 Pressure Calibration Screen	14-1
17-1 RECORTEST III Test Report	17-1

RECORTTEST III Automatic Hydrostatic Test System Instruction Manual

List of Figures (continued)

Number/Title	Page
18-1 High Pressure Pump	18-3
18-2 RECORTTEST III Console	18-5
18-3 RECORTTEST III Console	18-5
18-4 RSP-10D Replacement Parts	18-7
18-5 RSP-10D Replacement Parts	18-7

List of Tables

Number/Title	Page
Table 4-1 Equipment Utilities	4-2
Table 4-2 REC. III Electro/Pneumatic Control Valves	4-10
Table 4-3 Plumbing Connection Summary	4-11
Table 18-1 Replacement Parts	18-4
Table 18-2 RSP-10D Replacement Parts	18-6
Table 18-3 Additional RECORTTEST III Replacement Parts	18-8

©2001 Galiso Inc

The Galiso Recortest III is a computer controlled hydrostatic test system which is designed for rapid, accurate testing of compressed gas cylinders at test pressures up to 10,000 PSI. The Recortest III uses an IBM compatible PC and a patented Electronic Expansion Measuring System to automate the cylinder test procedure. After test requirements have been entered in the Recortest III control computer, the system will automatically seal test pressure within the cylinder, perform the test at the required specifications, interpret and record the test results and de-pressurize the cylinder at the end of the test. In addition, the control computer may be used as a personal computer to perform data analysis and processing tasks.

The RECORTTEST III system controls the entire hydrostatic testing procedure. Each cylinder is tested in accordance with specifications that are entered into the control computer with the keypad. Identical test specifications may be repeated many times when a series of identical cylinders are tested, or specifications may be changed to fit the requirements of each individual cylinder. Test specifications include; Remarks, Cylinder Serial Number, Size, D.O.T. / I.C.C. Rating, Test Pressure, Maximum Allowable Elastic Expansion, Test time, and Visual inspection results.

The RECORTTEST III will record specifications and store them along with test results for each cylinder tested. Test results include the test pressure, total expansion, permanent expansion, percent expansion and a disposition code which indicates whether the cylinder has passed or failed. All specifications and results are shown on a high resolution, color display monitor. The RECORTTEST Printer prints a complete test report, which includes all test specifications and results. The test report should be filed to provide a permanent record of the test. Results can also be archived to floppy disks.

Depending on the cylinder sizes, a typical RECORTTEST III System with one test jacket, filling, draining and drying equipment can process between 35 cylinders per hour when manned by two operators.

The RECORTTEST III system will provide greater accuracy than is possible with conventional cylinder testing equipment. With this system, documented test results are no longer subject to operator interpretation. The RECORTTEST III automatically determines if each cylinder meets Department of Transportation specifications, or any other pre determined specification, and will notify the test operator if a cylinder must be re-tested or rejected. The RECORTTEST III also monitors the pressurization and expansion circuits for leaks that would invalidate results. Upon detection of leaks the system will notify the operator so that corrective measures may be taken.

The components and equipment required for a complete RECORTTEST III installation may be custom configured to meet the specific customer requirements. RECORTTEST III systems are also designed to be able to grow with the production requirements of your operation. Options may be added after time of purchase that will allow you to expand the production output of your system. Contact your Galiso representative for additional information regarding cylinder testing and handling equipment and accessories.

1.1 Hydrostatic Test Requirements

In accordance with D.O.T. / I. C. 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 173.34. 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 RECORTTEST III Test System 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 by writing to the following address:

Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, Virginia 22202
(703) 979-0900

1.2 Hydrostatic Test Overview

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 a calibrated glass tube (burette). The RECORTTEST III uses a patented Electronic Expansion Measuring System (Expansion Bowl) in place of the burette. The burette or 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 (or an operator defined time period).

As internal 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 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 burette or 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 **Permanent Expansion**. The difference between the Total Expansion and the Permanent Expansion is called the **Elastic Expansion**.

1.2 Hydrostatic Test Overview, continued

The **Percent Permanent Expansion** of the cylinder is determined as follows:

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

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

All test data, such as test pressure, cylinder serial number, expansion results, etc. are recorded by the RECORTTEST III Control Computer. At the end of a test period, a test report may be printed to provide a hard copy of test specifications and results. All test records must be saved and maintained for the life of the cylinder or until the cylinder is re-tested, in the event that there is any future problem with cylinder.

Cylinders which will receive a plus (+) stamp or a star (*) stamp require additional test specifications and calculations. Plus (+) stamping allows the cylinder to 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 procedure and requirements for plus stamping are contained in the Code Of Federal Regulations (CFR), Title 49, Section 173.302(c). Star stamping requirements are discussed in the Code Of Federal Regulations (CFR), Title 49, Section 173.34(e)(16).

1.3 Scope Of Manual

This manual was written for the test operator/technician familiar with cylinder hydrostatic testing fundamentals. The RECORTTEST III systems and equipment should only be operated by personnel who have been properly trained in the function and use of the requisite systems and equipment.

This manual discusses the various hardware components of the RECORTTEST III Automated Hydrostatic Test System. This manual covers:

- Equipment Specifications
- Operator Safety and Equipment Protection
- Equipment Installation
- Equipment Operations
- Equipment Maintenance

2.0 RECORTTEST III System Components

The advanced design of the RECORTTEST III Test System is the culmination of fifteen years of research and development in the field of computer controlled hydrostatic test systems. Each component of the RECORTTEST III Test System has been carefully designed to streamline the cylinder re-qualification process. Collectively, the components of the RECORTTEST III Test System work together to provide unparalleled speed, accuracy and simplicity of operation. The primary RECORTTEST III test system components are discussed in detail in Sections 2.1 through 2.6. Standard RECORTTEST III System specifications are as follows:

Test Pressure Range:	0 to 10,000 psig
Expansion Test Results:	0.1 cc increments
Hydraclose® Test Jackets er Throughput:	35 cylinders (2640 cu. in. ea.) per hour
Utility Requirements:	See RSP-10D and Control Console specifications
Warranty:	1 Year, see warranty terms

A typical RECORTTEST III System is depicted in figure 2-1.

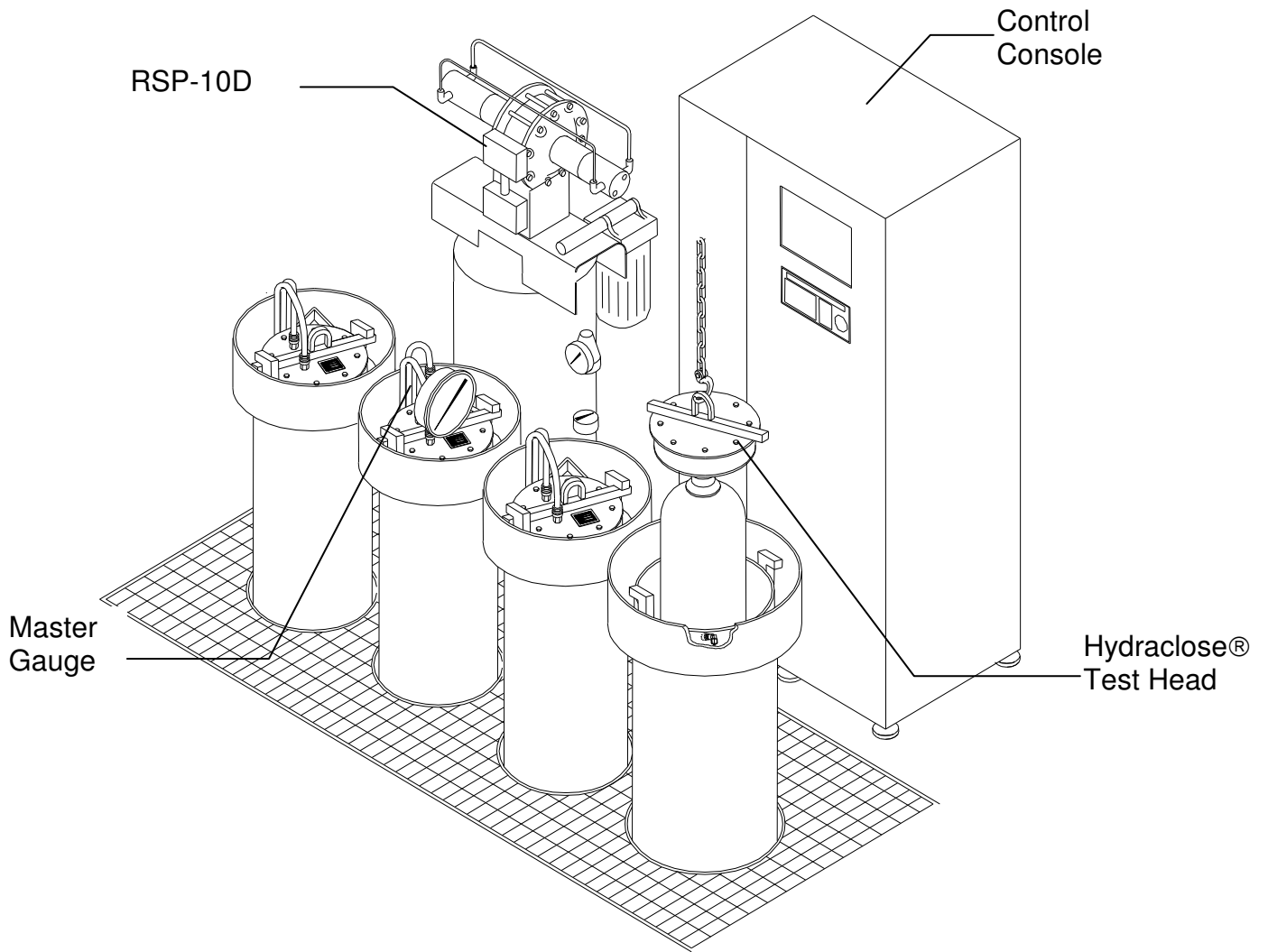


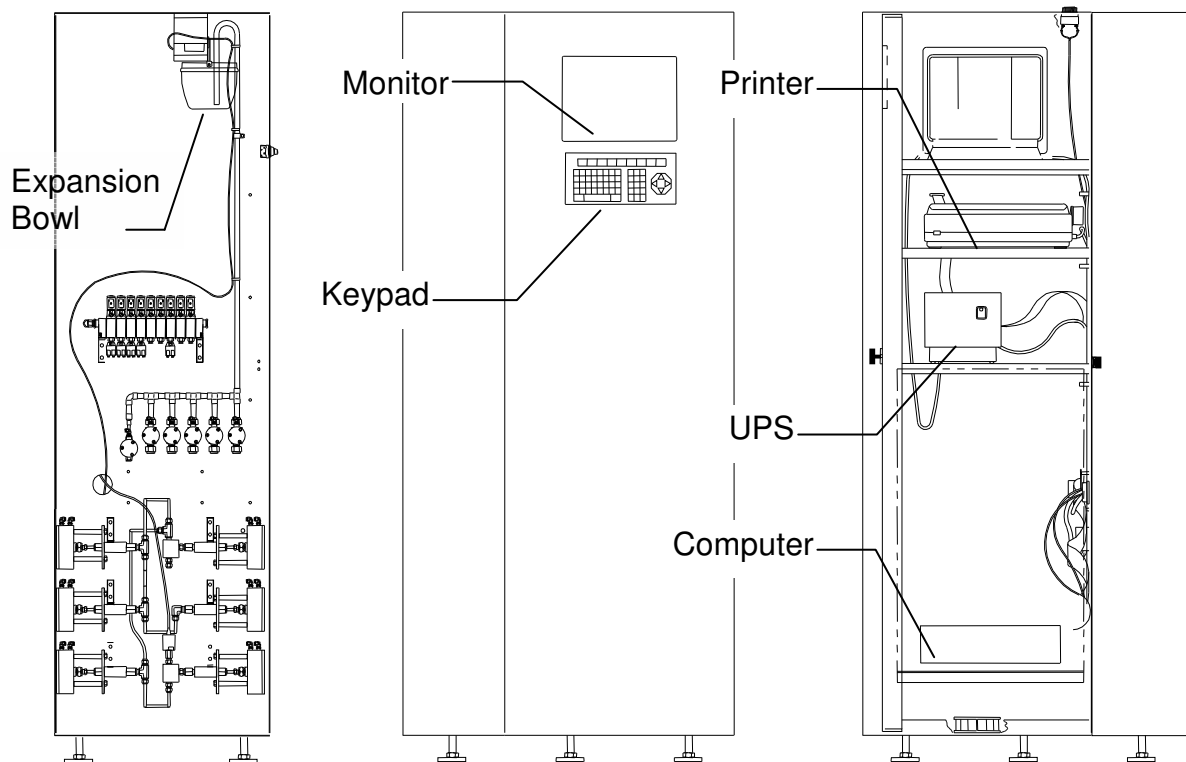
Figure 2 - 1
FOUR JACKET RECORTTEST III

2.1 RECORTEST III Control Console:

The RECORTEST III Control Console (figure 2-2) contains a IBM Compatible PC (computer) which controls and monitors the hydrostatic testing process. The Control Console also houses the valves and other components that mechanically control the test process in response to commands from the Control Console. The patented Expansion Bowl Assembly, which electronically measures cylinder expansion, is also enclosed in the Control Console. The Control Console features convenient membrane switch keypad for entry of test specifications and a high resolution display monitor that notifies the test operator of test status and results. The Control Console also provides a suitable protective enclosure for the printer.

MAIN COMPONENT SPECIFICATIONS:

Dimensions:	72" high x 22.5" long x 34" wide
Display Monitor:	VGA
Printer:	Dot matrix
Electrical Req'd:	5amps @ 110 VAC/3.0 amps @ 220 VAC

**Figure 2 - 2****RECORTEST III Control Console:**

2.2 RSP-10D Utility Support Package

The RSP-10D Utility Support Package (figure 2-3) consists of an air driven intensifier pump, air and water filtration systems and an air pressure reservoir. The RSP-10D delivers filtered air at a constant pressure for operation of the RECORTTEST III System valves and equipment. The unit also delivers water at pressures up to 11,000 psig for performing hydrostatic testing.

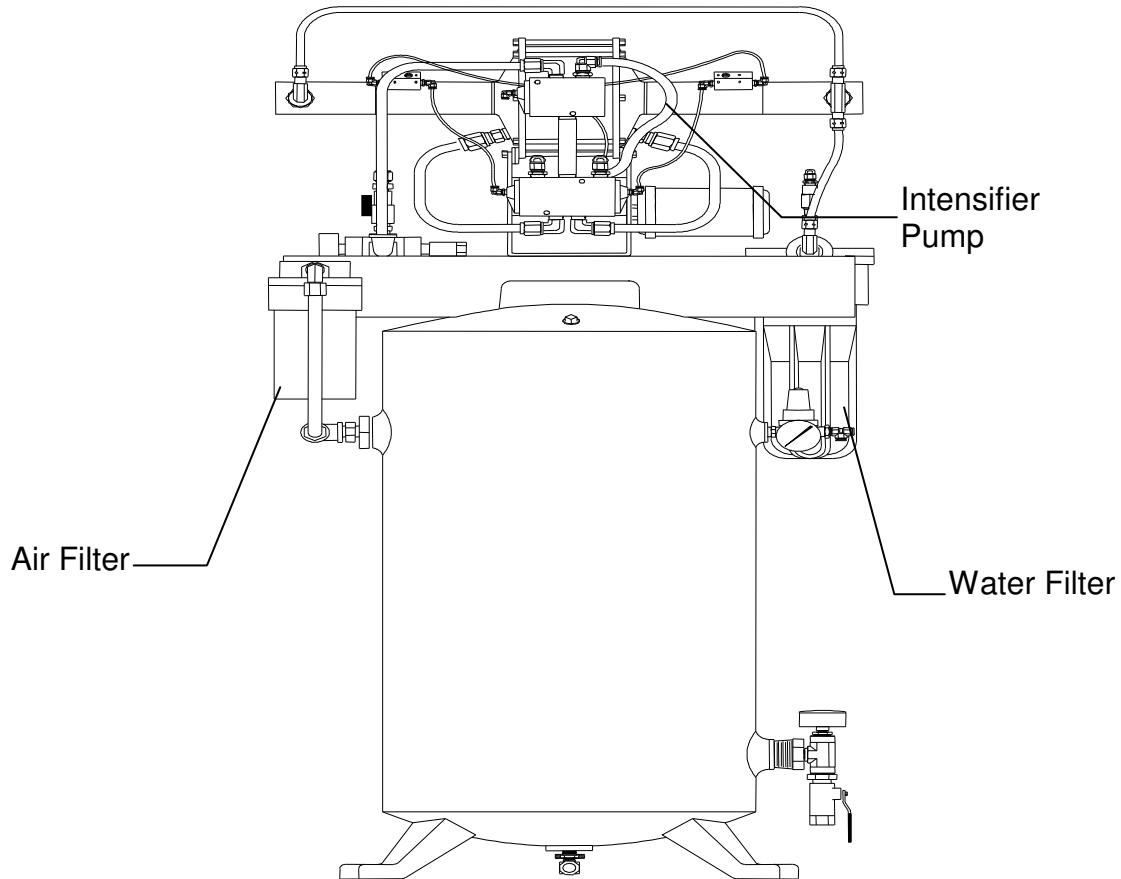


Figure 2-3

RSP-10D Utility Support Package

SPECIFICATIONS:

Dimensions:	60" high x 29" long x 28" wide
Air Reservoir:	30 gal. Capacity, 250 psig max. W.P.
Air Filtration:	5 micron, grade D
Air Supply Req'd:	60 cfm (7 cfm @ 120 psig)
Hydraulic Output:	10,000 psig.
Water Filtration:	5 micron
Water Supply Req'd:	2 gpm @ 20 psig per minute

2.3 HYDRACLOSE[®] Test Heads:

The patented HYDRACLOSE[®] Test Head (figure 2.4) is a pneumatically controlled test jacket closure and cylinder pressurization device. The HYDRACLOSE Test Head automatically seals itself within the test jacket and also seals the connection between the cylinder and the test head. Note that if a Test Head, Test Spud, Test Adapter, Master Gauge or any other equipment is to be used for oxygen cylinder testing, it must be cleaned per the instructions in CGA pamphlet G-4.1 "Cleaning Equipment for Oxygen Service".

HYDRACLOSE[®] Test Heads are available to fit all Galiso HYDRACLOSE[®] Test Jackets. Spud adapters are available to fit 1/2", 3/4" and 1" NPT and NGT cylinder neck threads. Custom and specialty cylinder neck thread adapters and spud's are also available.

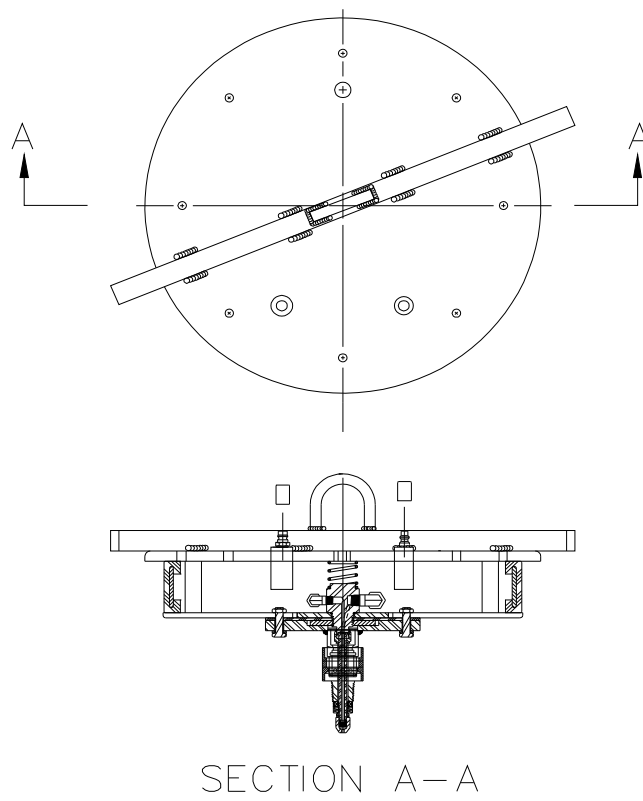


Figure 2 – 4

HYDRACLOSE[®] Test Head

SPECIFICATIONS:

Maximum Air Pressure:	100 psig
Maximum Hydraulic Pressure:	11,000 psig

2.4 HYDRACLOSE[®] Test Jacket:

The Test Jacket is used in conjunction with a Test Head to provide volumetric expansion measurement capability during cylinder pressurization. The Test Jacket includes a splash shield, burst disk and drain valve as well as the plumbing components needed for water fill, expansion and bleed functions. Standard Test Jacket specifications are provided below (figure 2-5).

SPECIFICATION SHEET for 12" – 24" DIAMETER JACKETS							
JACKET SIZE	"H" JACKET HEIGHT	CYLINDER LENGTH MAXIMUM *	CYLINDER DIAMETER MAXIMUM	PERIMETER DIAMETER	BOLT HOLE CIRCLE	BURST DISK #(S) USED	FLOOR TO BEAM HEADROOM MINIMUM ~
12" DIAMETER JACKETS							
SHORT (42" PIPE)	48.37"	32.5"	10.0"	31.75"	18.875"	1	116.87" (NO PIT)
TALL (78" PIPE)	84.37"	68.5"	10.0"	31.75"	18.875"	1	140.87" ^
SPECIAL (LENGTH PIPE)	SPECIAL LENGTH PLUS 6.37"	SPECIAL LENGTH MINUS 9.5"	10.0"	31.75"	18.875"	1	(PIT UNKNOWN) ^
14" DIAMETER JACKETS							
SHORT (42" PIPE)	48.37"	32.5"	11.25"	33.00"	20.125"	1	116.87" (NO PIT)
TALL (78" PIPE)	84.37"	68.5"	11.25"	33.00"	20.125"	1	140.87" ^
SPECIAL (LENGTH PIPE)	SPECIAL LENGTH PLUS 6.37"	SPECIAL LENGTH MINUS 9.5"	11.25"	33.00"	20.125"	1	(PIT UNKNOWN) ^
18" DIAMETER JACKETS							
SHORT (42" PIPE)	48.37"	32.5"	15.25"	37.00"	24.125"	1 & 2	116.87" (NO PIT)
TALL (78" PIPE)	84.37"	68.5"	15.25"	37.00"	24.125"	1 & 2	140.87" ^
SPECIAL (LENGTH PIPE)	SPECIAL LENGTH PLUS 6.37"	SPECIAL LENGTH MINUS 9.5"	15.25"	37.00"	24.125"	1 & 2	(PIT UNKNOWN) ^
24" DIAMETER JACKETS							
SHORT (42" PIPE)	48.37"	32.5"	21.25"	43.00"	30.125"	1, 2 & 3	116.87" (NO PIT)
TALL (78" PIPE)	84.37"	68.5"	21.25"	43.00"	30.125"	1, 2 & 3	140.87" ^
SPECIAL (LENGTH PIPE)	SPECIAL LENGTH PLUS 6.37"	SPECIAL LENGTH MINUS 9.5"	21.25"	43.00"	30.125"	1, 2 & 3	(PIT UNKNOWN) ^

* USING NEW STYLE HEAD, NORMAL ADAPTERS & 2" WATER @ BOTTOM.
 ~ USING CYLINDER LENGTH MAXIMUM PLUS 36" FOR HOIST, HEAD & FREE SPACE, MINUS A PIT 48" DEEP.
 ^ NORMAL ABOVE FLOOR JACKET HEIGHT 36.37".

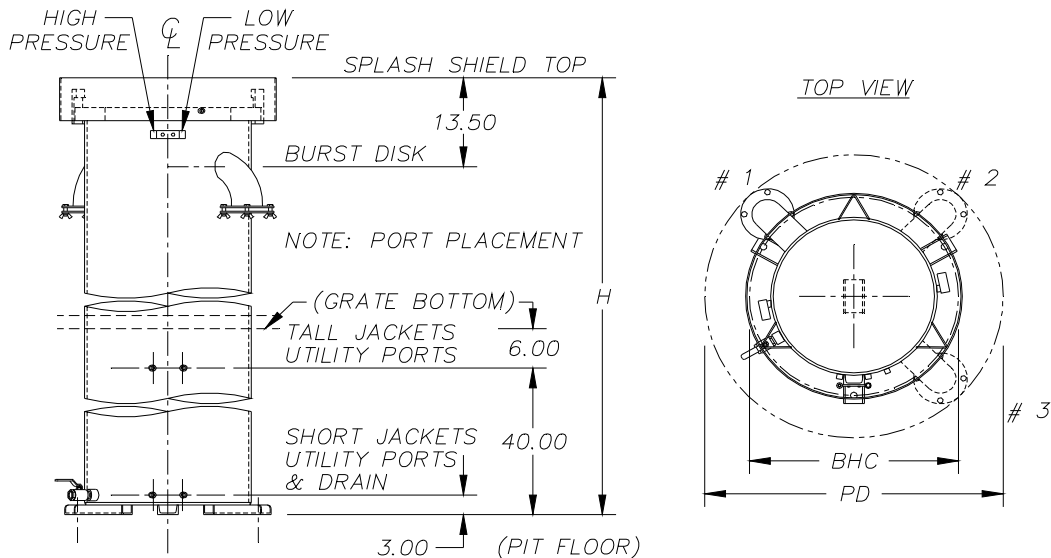


Figure 2 – 5: Jacket Specifications

2.4 HYDRACLOSE[®] Test Jacket, continued:

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.

2.5 Master Gauge Assembly:

The Master Gauge Assembly (figure 2-6) is used to perform daily pressure reading calibration in accordance with D.O.T. specifications. The Master Gauge Assembly features a mirror dial face and needle pointer for increased accuracy and legibility. The Master Gauge Assembly includes a calibration certificate.

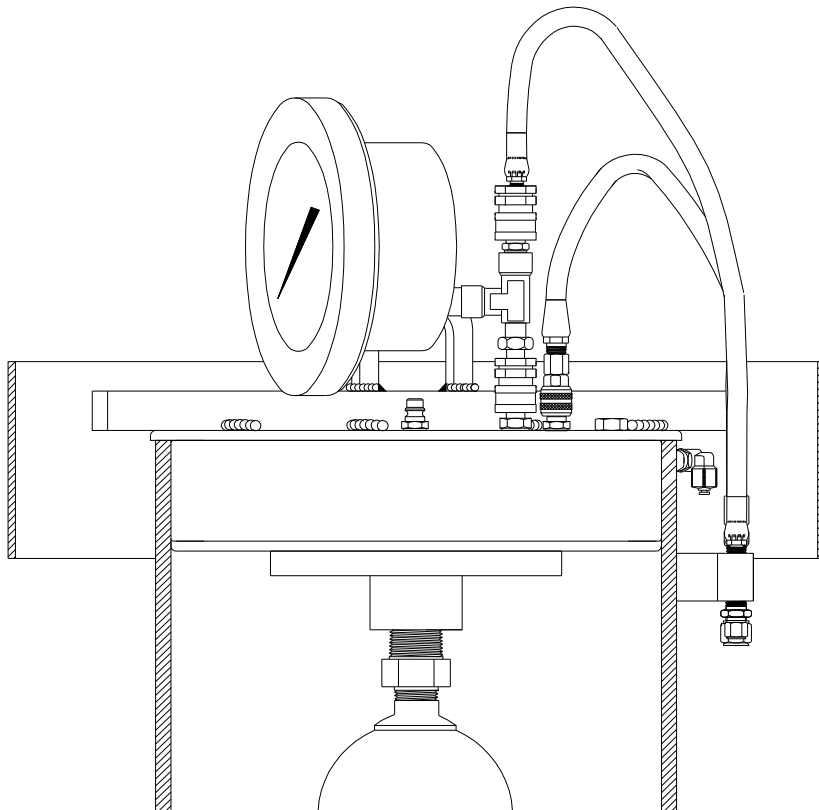


Figure 2-6: Master Gauge Assembly

SPECIFICATIONS:

Accuracy:	0.25 %
Range:	0 to 11,000 psig
Size:	6 inch diameter
Connections:	1/4" Female Quick Connect - Test Head 1/4" Male Quick Connect - Test Pressure Hose

2.6 Calibrated Cylinder:

The Calibrated Cylinder is a special steel cylinder which is used for daily test system expansion reading calibration. Calibration points are stamped on the cylinder shoulder and a NPT adapter is included to protect the cylinder neck threads. The Calibrated Cylinder includes a calibration certificate which provides an accurate record of the amount of expansion that can be expected at a given test pressure.

SPECIFICATIONS

See Galiso document 21-11-1133 for complete Calibrated Cylinder specifications.

2.7 Optional Equipment For RECORTTEST III Systems

The following optional equipment is recommended for use with the RECORTTEST III system for increased testing efficiency and reduced cylinder test cycle times.

2.7.1 RCSG Automatic Cylinder Filling Equipment:

The RCSG (figure 2-7) will quickly fill up to four (4) empty cylinders simultaneously with water, in preparation for testing. The RCSG features an automatic shut off that is activated when the cylinder is full.

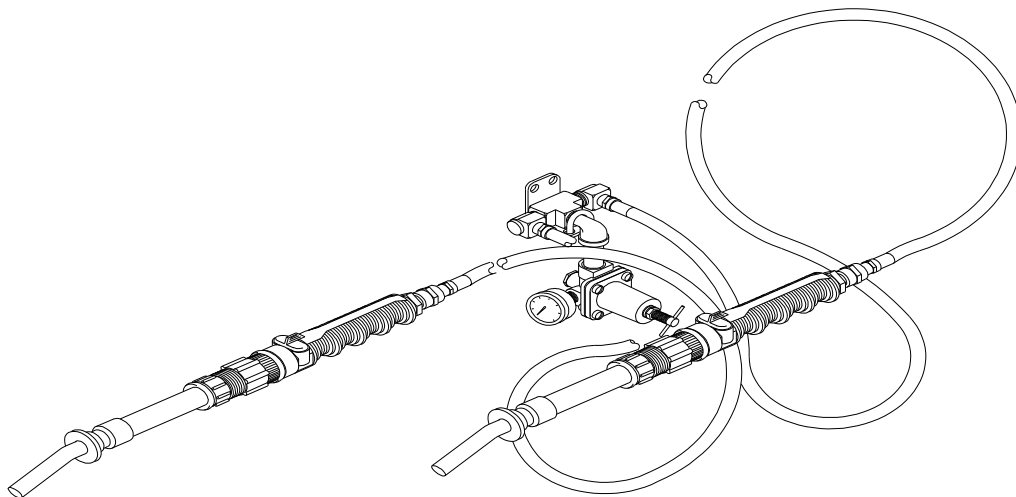


Figure 2 – 7: RCSG Automatic Cylinder Filling Equipment

SPECIFICATIONS:

Flow Rate:	2.0 gpm per nozzle @ 50 psi
Cylinder Fill Rate:	10 cyl./hr per nozzle
Max. Pressure:	50 psig

CFN-1 and CFS-2 large cylinder fill nozzles providing up to 12.0 gpm (per nozzle) @ 90 psig are also available.

2.7.2 PCT Series Automatic Cylinder Wash/Dry Equipment:

The PCT (figure 2-8) is designed to automatically invert cylinder(s), inject hot water and/or detergent solution, dry the cylinder(s) with compressed air and re-invert cylinder(s) all within a timed user programmed cycle. The PCT is available in single, dual, triple and quad cylinder handling configurations.

SPECIFICATIONS

See Galiso document 21-11-1007 for complete PCT specifications.

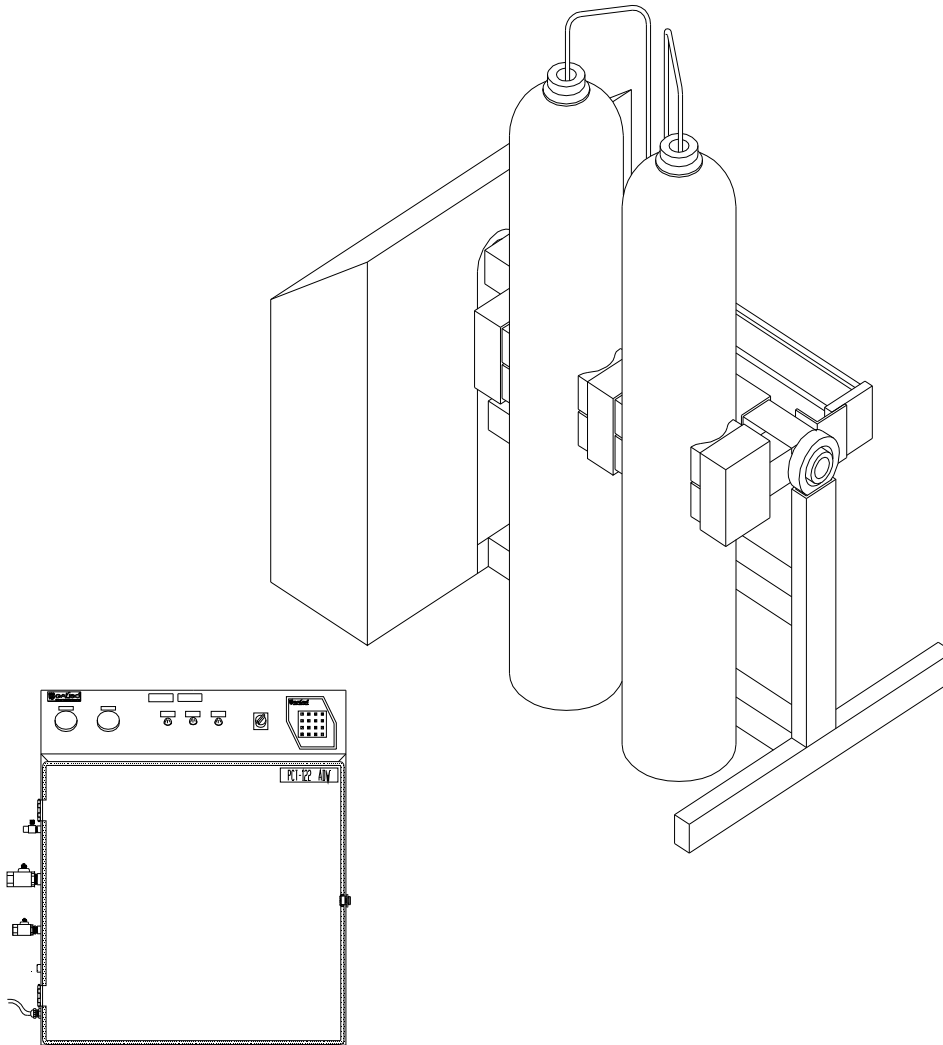


Figure 2 – 8: PCT Series Automatic Cylinder Wash/Dry Equipment

2.7.4 GVM-16 Series Automatic Valving Machine

The Galiso GVM-16 Series High Speed Turnair Valving Machines (figure 2-9) are designed to provide a fast, efficient means for removing valves from compressed gas cylinders. The GVM-16 features patented Turnair Valve Tongs, a counter-balanced power head assembly and a powerful pneumatic Cylinder Clamp. A convenient small cylinder stand is also provided to speed and simplify valving or de-valving of almost any type of compressed gas cylinder..

The GVM-16G Series High Speed Turnair Valving Machine is available in several different configurations to adapt to the work flow of each individual facility.

SPECIFICATIONS:

See Galiso document 21-11-1002 for additional information and complete specifications.

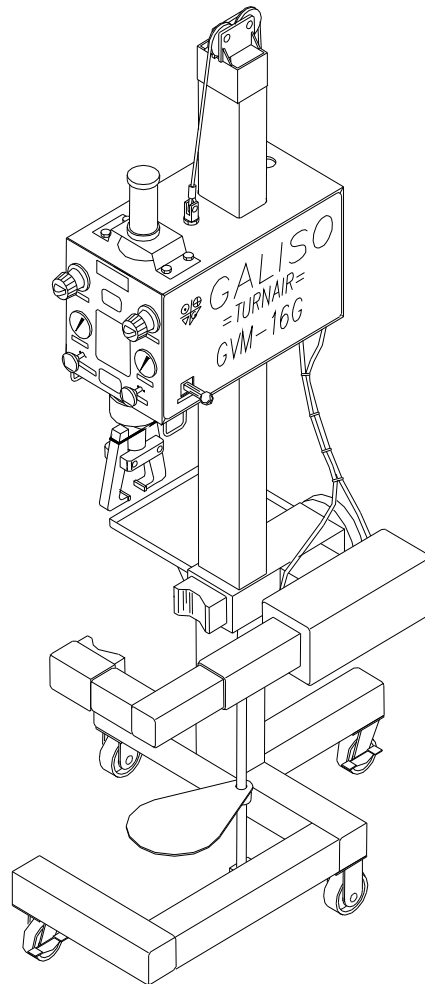


Figure 2 – 9: GVM-16 Series Automatic Valving Machine

2.7.5 GAH Series Hoists

GAH Hoists feature an air driven 10 ft. standard chain assembly capable of lifting up to 2,000 lbs. GAH models are ideal for high production environments and include a chain basket and trolley assembly.

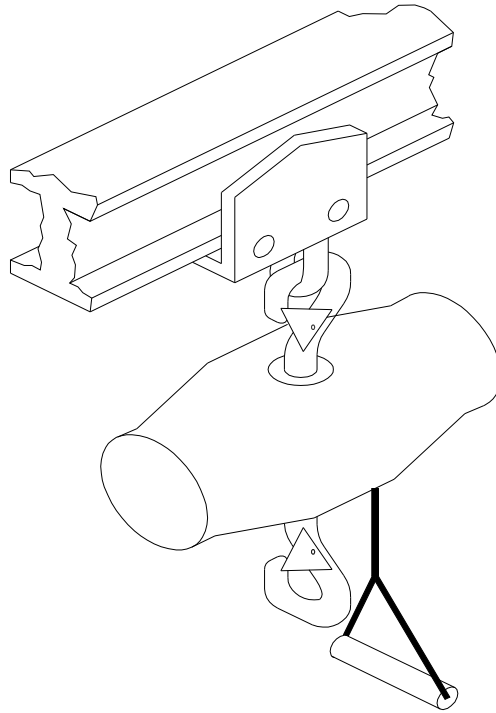


Figure 2 – 10: GAH Series Hoists

SPECIFICATIONS:

Dimensions:	15" high x 6" wide x 15 1/2" long, 10' chain
Rated Load Capacity:	300, 500, 1000 and 2000 lb models available
Lifting Speed:	71 fpm maximum
Air Requirements:	10 cfm @ 90 psig (GAH-1000)

2.7.6 OPTI-LITE Fiber Optic Cylinder Inspection Kit

The OPTI-LITE kit features a flexible stainless steel illuminator cable and a 150 watt quartz halogen lamp with brightness control. Since the lamp is housed remotely in the illuminator box, only the stainless steel wrapped fiber optic probe approaches and/or enters the cylinder during DOT required visual inspections. This feature makes the OPTI-LITE ideal for use in potentially flammable environments.

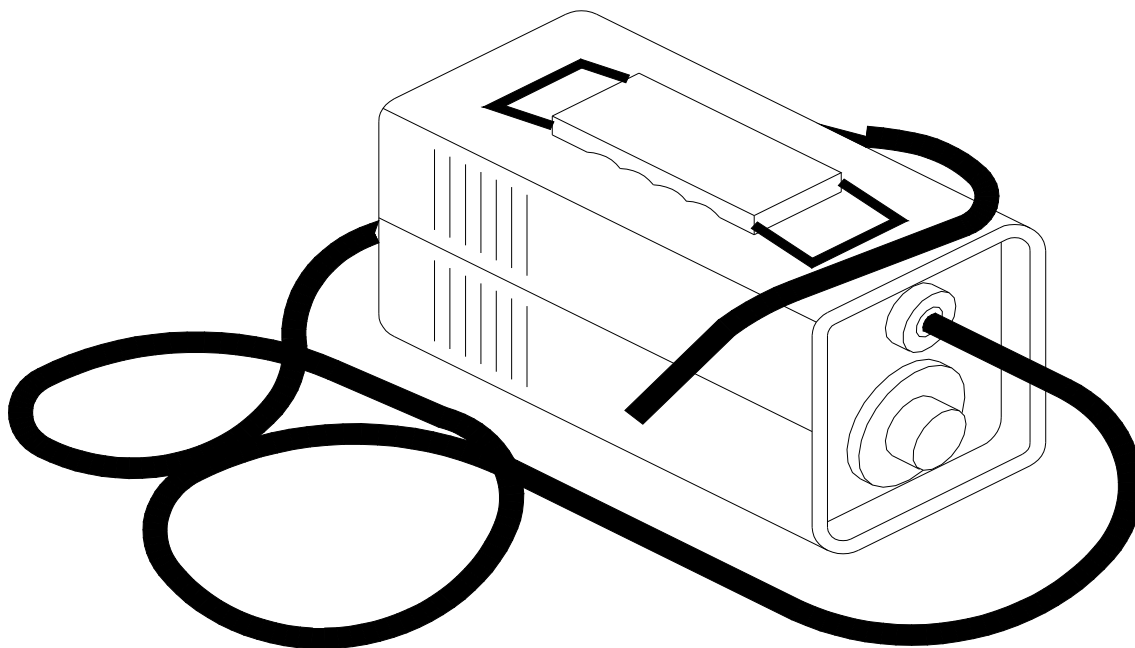


Figure 2 – 11: OPTI-LITE Fiber Optic Cylinder Inspection Kit

SPECIFICATIONS:

Box Dimensions:	6" high x 5" wide x 9" long
Illuminator Cable:	1/8" or 1/4" diameters available in 5', and 10' length standard. Specials sizes are available.
Electrical Req's:	3.0 amps @ 110 VAC or 1.5 amps @ 220 VAC

3.0 SAFETY

Read all instructions before attempting to install or operate the RECORTTEST III System.

NOTICE:

GALISO, INC. IS NOT RESPONSIBLE FOR DAMAGE OR INJURY CAUSED BY UNSAFE USE, IMPROPER MAINTENANCE OR MIS-APPLICATION OF THIS EQUIPMENT.

Please contact Galiso for guidance if you are in doubt as to the proper safety precautions to be taken when installing or operating this equipment.

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.

!WARNING!

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

- 3.1.2 Galiso, Inc. recommends installation of a safety barrier which isolates the test vessel (cylinder and jacket) from all personnel while testing is in progress. The safety barrier must be capable of protecting personnel in the event of a catastrophic test vessel failure. All personnel must stay clear of the test vessel during testing.

!WARNING!

HYDRACLOSE[®] Test Jackets are equipped with etched glass burst disks to relieve pressure within the test jacket should the cylinder fail during testing. Should a cylinder fail during testing, personnel injury and/or equipment damage could occur due to shattered burst disc glass.

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

3.1 Personnel Safety, continued

- 3.1.3 Do not handle electrical components or exposed connections inside of the Control Console. The control relays and E/P valves have exposed electrical connections which could cause electrical shock and injury. Verify that all electrical power has been turned off and/or disconnected prior to performing any work activities within the control enclosure.
- 3.1.4 NEVER operate the RECORTTEST III test system without the lower rear cover plate in place. Both the rear door and the side door of the Control Console should be kept closed while the system is in operation.
- 3.1.5 Do not attempt to remove the test connection prior to verifying that the test vessel has been completely de-pressurized.
- 3.1.6 Regularly inspect the pressure connection hose fittings. The hose connection fittings must be repaired or replaced when they become worn or loose fitting.
- 3.1.7 Always wear eye protection and gloves when using the system.
- 3.1.8 Keep the work area around the RECORTTEST III System clean, dry and free of debris to reduce the risk of operator injury due to slips or falls.

3.2 Equipment Operation and Test Precautions

- 3.2.1 DO NOT remove the lower cover plate from the Control Console except to perform repairs or maintenance. The lower rear cover plate seals the enclosure which houses the control computer. This protects the control computer and other electronic components from moisture and dirt and prolongs the life of the components. If it becomes necessary to remove the lower rear cover plate for repairs or maintenance, make certain that your hands are dry and that the floor is also dry.
- 3.2.2 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.
- 3.2.3 Before connecting a test vessel for testing, check the test pressure hose and fittings to ensure they are in proper working order.
- 3.2.4 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.**

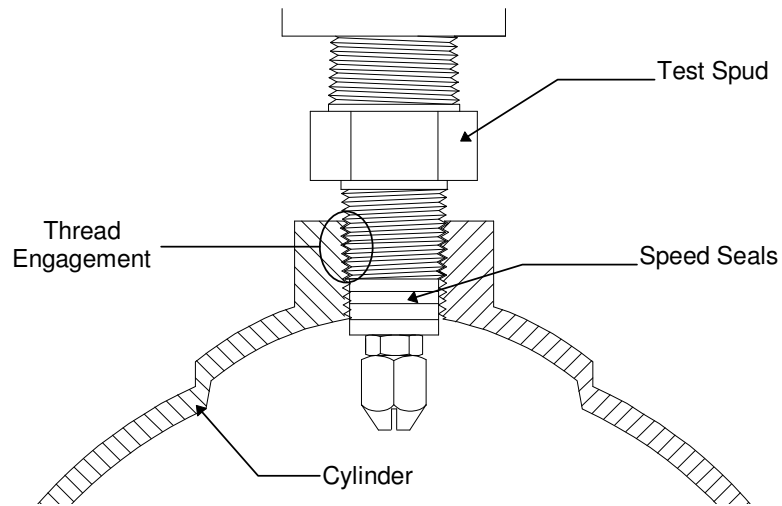


Figure 3 - 1 HYDRACLOSE[®] Seal

3.2.5 Verify that the test spud used is appropriate for the neck threads of the cylinder that is being tested (see figure 3-2). If 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.

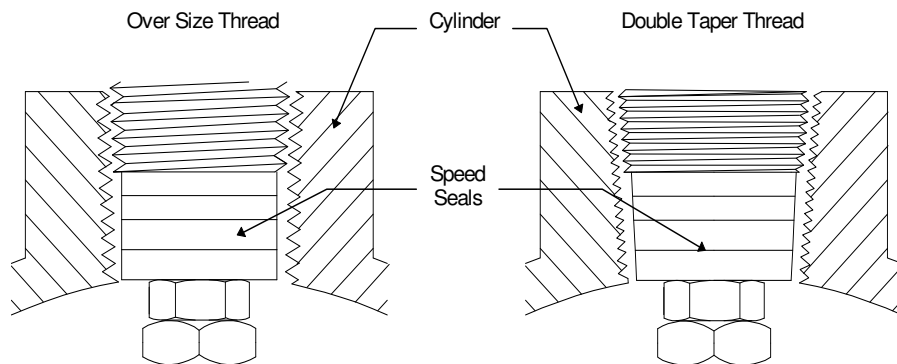


Figure 3 - 2 Cylinder Neck Thread Detail

3.2.6 All Galiso HYDRACLOSE[®] test jackets include appropriate explosion port(s) and burst disk(s). The purpose of the explosion port and burst disk is to protect the operator and test equipment 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 an explosive release of pressure into the test jacket. When the burst disk shatters, excess pressure is released through the explosion port, preventing the 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, Inc.

!WARNING!

Do not use Galiso, Inc test equipment with another manufacturers test jackets. Use of other manufacturers test jackets without appropriately designed explosion port(s) and burst disk(s) could result in equipment damage, personnel injury or death.

- 3.2.7 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 550 to 600 psig. See section 5.4.1.B for additional information regarding pump output pressure adjustment.
- 3.2.8 Keep the expansion load cell clean and dry. If water is spilled on the load cell, immediately unplug the unit from the computer and thoroughly dry the unit before plugging the unit back in. After reconnecting the load cell to the computer, the scale must be re-calibrated.

4.0 INSTALLATION

Read all instructions and familiarize yourself with your system installation drawings before attempting to install the RECORTEST III Test System.

4.1 Site preparation

Prepare a test pit and equipment layout design to support the planned flow of cylinders through the test area. A typical test pit and RECORTEST III system equipment layout is shown in figure 4-1.

NOTE:

The Test System must be installed in a location that does not allow direct sunlight to shine on the test jackets or breezes to impinge on the expansion bowl. These external influences could cause expansion reading instability and adversely affect the accuracy of the test results.

Construct the test pit to support the cylinder testing activities planned. A standard test system equipment layout is shown in figures 4.1 and 4.2

NOTES:

1. SOME ITEMS ARE NOT DRAWN TO SCALE OR PROPER LOCATION FOR CLARITY. OPTI-LITE, CALIBRATED CYLINDERS, & HEADS ARE NOT SHOWN.
2. SERVICES ARE TO BE ADAPTABLE TO CUSTOMER'S COMPONENT LOCATIONS AND ARE SHOWN ROUTED SCHEMATICALLY.

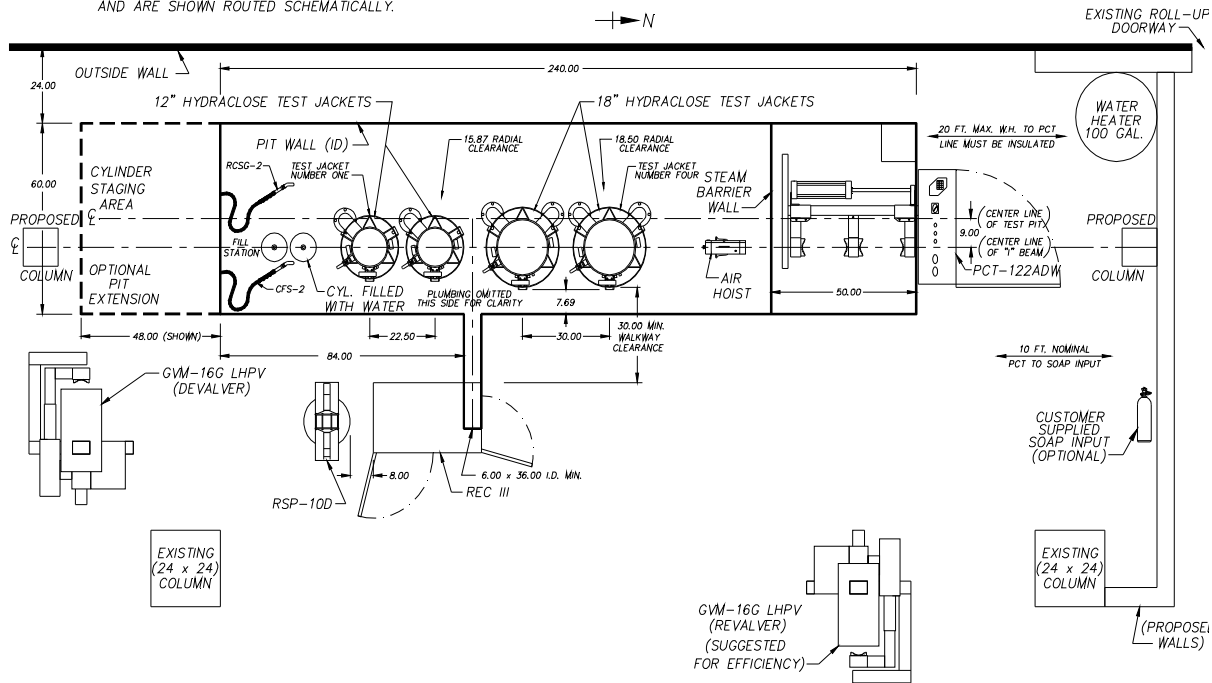


Figure 4 - 1: Test System Lay Out

4.1 Site preparation, continued

Install the I-Beams and Hoist Assemblies. Figures 4-1 and 4-2 also indicate where the hoist trolley beam should be located relative to the test pit and RECORTTEST III equipment.

Insure that the required utilities are available in the test area to support the cylinder handling and testing equipment to be used. Figure 4-3 shows a typical arrangement of compressed air and water supply lines required for a standard two jacket system. A summary of utility requirements is provided in Table 4-1.

Table 4-1
Equipment Utilities

Equip. Item	Air Req'd	Water Req'd	Elect. Req'd
RSP-10D	7 cfm @ 120 psi	2 gpm @ 20 psi	None
GVM-16	4 cfm @ 120 psi	None	None
PCT-122	7.5 cfm @ 120 psi	10 gpm @ 60 psi	0.5A @ 110 VAC
REC. III Console	from RSP-10D	from RSP-10D	5A @ 110 VAC
GAH Cyl. Hoist	9 cfm @ 90 psi	None	None

If a PCT unit is to be used, a hot water heater must be provided. See the Galiso PCT installation and Operations Manual for hot water heater requirements and specifications.

Contact your Galiso representative if you require additional details regarding test pit design, equipment layout and/or utility requirements.

4.2 Receiving and Placement

Carefully un-crate the RECORTTEST III and remove all banding and packing materials. Select an area to install your RECORTTEST III system. 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.

- A. Install the HYDRACLOSE[®] Test Jackets in the test pit as shown on the installation drawings. Bolt the test jackets to the floor of the test pit.
- B. Move the RECORTTEST III Control Console to the designated location. Adjust the feet on the Control Console to level the unit.
- C. Place the RSP-10D Utility Support Package in the appropriate location per the equipment layout design. Bolt or clip the RSP-10D to the shop floor.
- D. Place the GVM-16G units in the appropriate locations to support the desired cylinder handling and testing requirements.

4.3 Plumbing Connections, continued

These installation instructions were written to identify all of the required plumbing connections. The actual route of each line will vary depending on equipment and facility specific requirements. Detailed Piping and Instrument Diagrams (P&ID's) for the RECORTTEST III System, RSP-10D and Test Jackets are included as attachments to this manual. A standard system plumbing schematic is shown in figure 4-2.

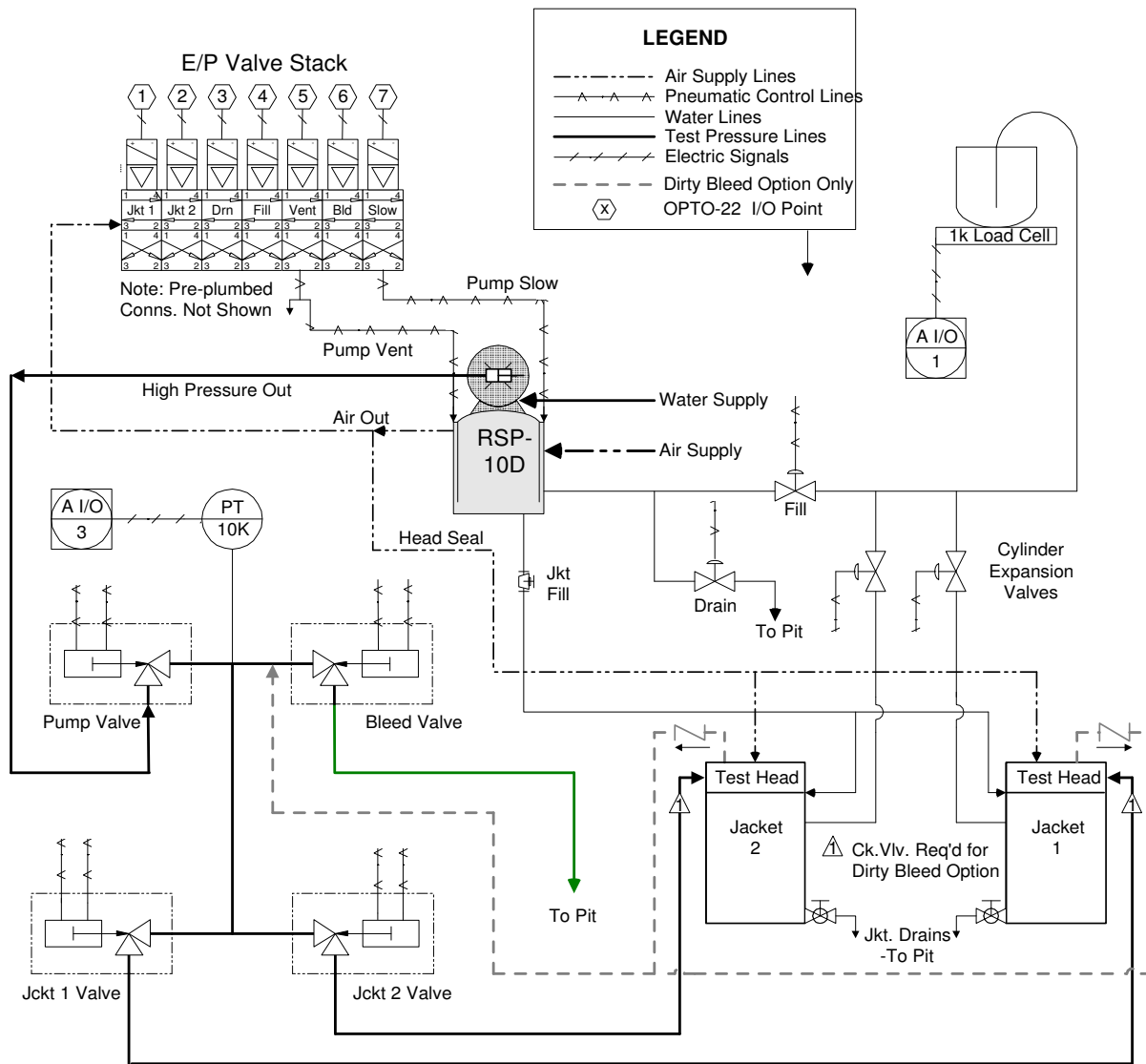


Figure 4 - 2
RECORTTEST Plumbing Schematic

4.3 Plumbing Connections, continued

The required plumbing connections are described for each equipment item as follows:

- Test Jackets - Section 4.3.1
- RSP-10D - Section 4.3.2
- RECORTTEST III Control Console - Section 4.3.3
- GVM, PCT, RCSG and other auxiliary equipment - 4.3.4

4.3.1 Test Jacket Plumbing

A jacket detail showing the connections required is included as figure 4-3. A summary Table of Jacket plumbing connections is also provided. Complete the required jacket plumbing connections as described below:

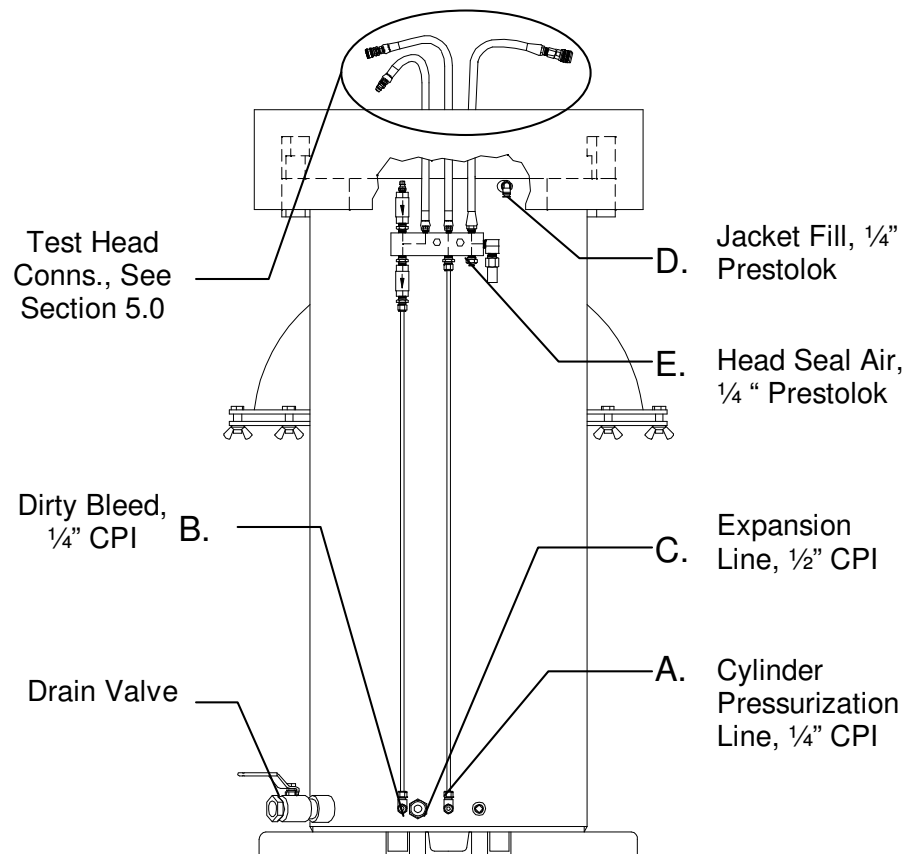


Figure 4 - 3

Test Jacket Plumbing Connections

4.3.1 Test Jacket Plumbing, continued

A. Cylinder Pressurization (High Pressure) Lines:

The ¼" by 0.065" wall stainless steel cylinder pressurization line originates from the high pressure valve manifold in the RECORTTEST III Control Console (see Section 4.3.3). This tubing connects to a ¼" CPI (compression) fitting on the bottom of the extension from each jackets' manifold block, see figure 4-3.

B. Dirty Bleed Lines:

Connect a ¼" by 0.065" wall stainless steel tubing line to a ¼" CPI (compression) fitting on the bottom of the extension from each jackets' manifold block, see figure 4-3. Manifold this line together with the dirty bleed line from the other jacket, and run a common line into the Control Console per Section 4.3.3.

C. Cylinder Expansion (Low Pressure) Lines:

Connect a ¼" clear poly Expansion line to the test jacket Prestolok connection on each jackets' manifold block, see figure 4-3. Connect the other end of the line to the appropriate jacket expansion valve in the Control Console per Section 4.3.3.

D. Jacket Water Make-up Lines

Connect a ¼" yellow poly Jacket Water Make-up (fill) line to the ¼" Prestolok fitting on the top of each jacket, see figure 4-4. Manifold the other end of the line together with the water make-up lines from the other jackets, and run a common line to the Jacket Water Make Up Valve on the RSP-10D per Section 4.3.2.

E. Head Seal Lines

Connect a ¼" clear poly Head Seal Air line to the ¼" Prestolok fitting on the manifold block of each jacket, see figure 4-3. Manifold the other end of the line together with the Head Seal Air lines from the other jackets, and run a common line to the Head Seal Air Out Valve on the RSP-10D per Section 4.3.2.

4.3.1 RSP-10D Plumbing:

Complete the required plumbing as described below. The locations for connecting the RSP-10D plumbing are indicated in figures 4-5 and 4-6. In addition, Table 4-2 summarizes the RSP-10D plumbing connections required.

- A. Connect a 1/2" poly tubing compressed air supply line to the Prestolok quick-connect on the RSP-10D, see figures 4-4 and 4-5. The compressed air supply should provide a minimum of 7.0 cfm at 120 psig, ref. Table 4-1.
- B. Connect a 1/2" poly tubing domestic water supply line to the Prestolok quick-connect on the RSP-10D, see figures 4-4 and 4-5. The water supply should provide a minimum of 6 gph @ 60 psig to the RSP-10D, ref. Table 4-1.

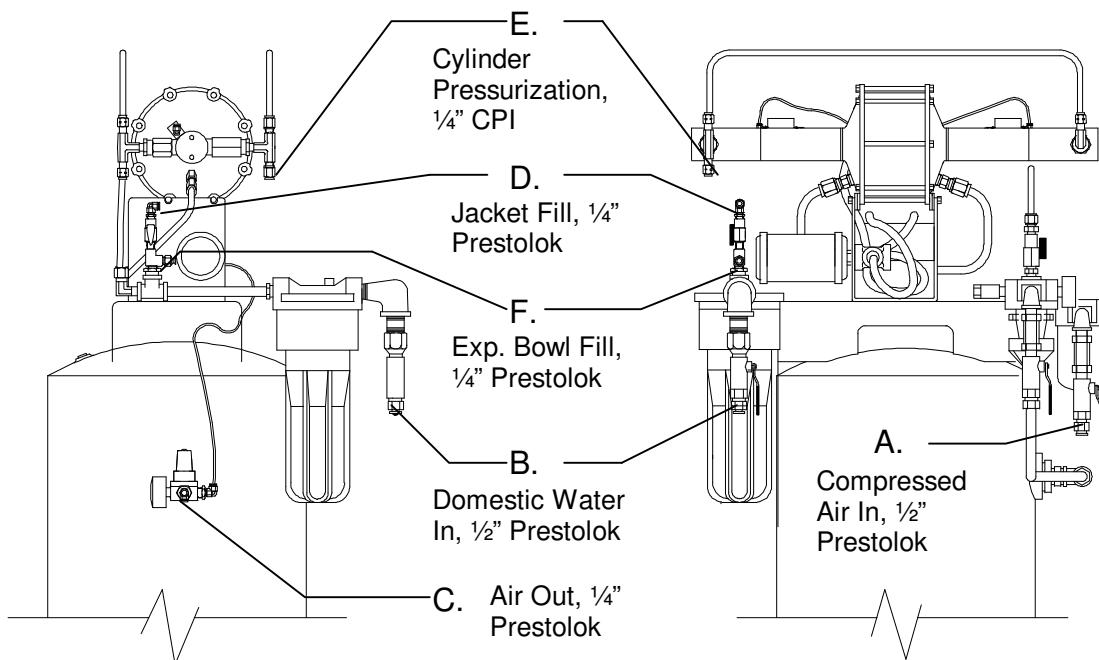


Figure 4 - 4
RSP-10D Plumbing Connections

- C. Use 1/4" poly tubing to Connect the Air to Control Valve stack line from air supply regulator on the RSP-10D (figures 4-4 and 4-5) to the Control Valve stack in the RECORTEST III Control Console (see Section 4.3.3). Connect a 1/4" poly Head Seal air supply (Section 4.3.1) line to the 1/4" Prestolok connection on the RSP-10D air supply regulator.

4.3.2 RSP-10D Plumbing, continued

- D. Connect the ¼" poly Jacket Fill common header (ref. 4.3.1) to the ¼" Prestolok fitting on the RSP-10D, see figure 4-4.
- E. Connect a ¼" by 0.065 wall stainless steel high pressure water line from the RECORTTEST III Control Console (ref. Section 4.3.3) to the ¼" Cylinder Pressurization CPI fitting on the RSP-10D (figure 4-4).

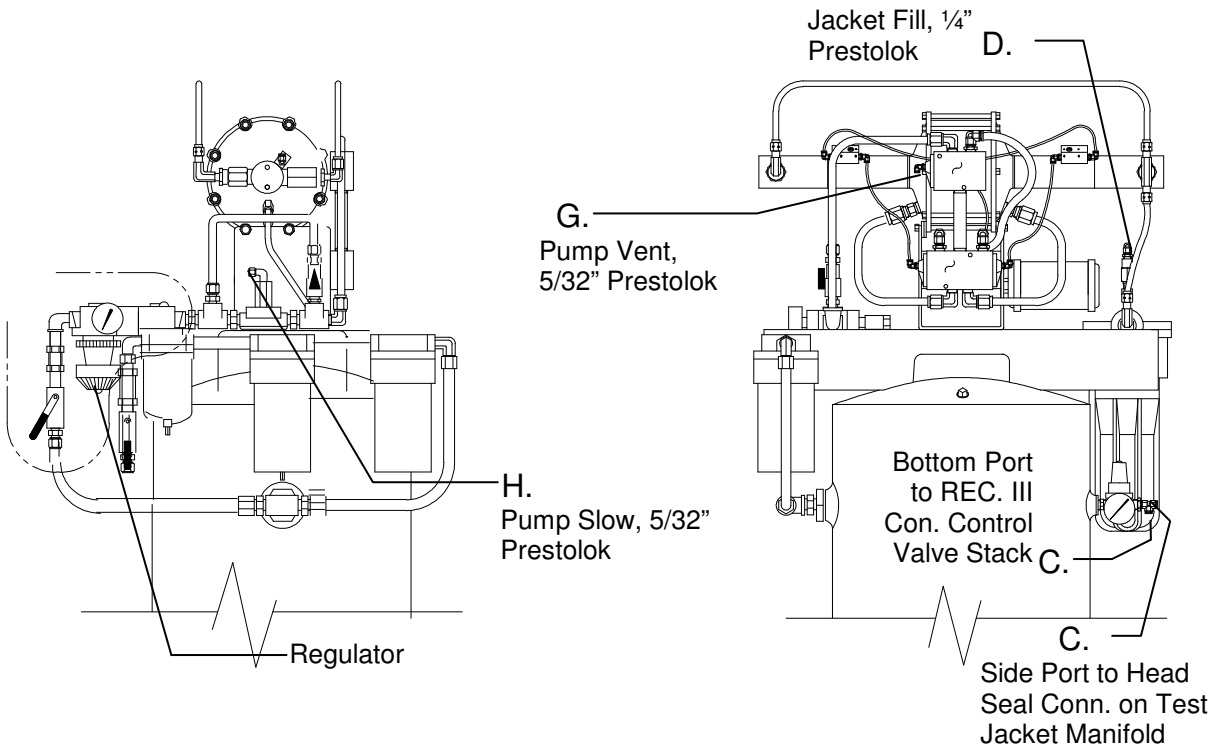


Figure 4 - 5: RSP-10D Plumbing Connections

- F. Connect a ¼" poly line from the Bowl Fill Valve in RECORTTEST III Control Console (ref. 4.3.3) to the ¼" Prestolok Expansion Bowl Fill fitting on the RSP-10D, see figure 4-4.
- G. Use a 5/32" poly line to connect the Pump Vent Line from Control Valve #7 in the Control Console to the Pump Vent Valve ¼" Prestolok fitting on the RSP-10D.
- H. Use a 5/32" poly line to connect the Pump Slow Line from Control Valve #9 in the Control Console to the Pump Slow Valve ¼" Prestolok fitting on the RSP-10D.

4.3.2 Recortest III Control Console Plumbing

Figure 4-6 shows the field plumbing connections required inside the RECORTTEST III Control Console. Note that all lines are to be routed through the plumbing port in the bottom of the Control Console. Complete the plumbing connections to the RECORTTEST III Control Components as described below.

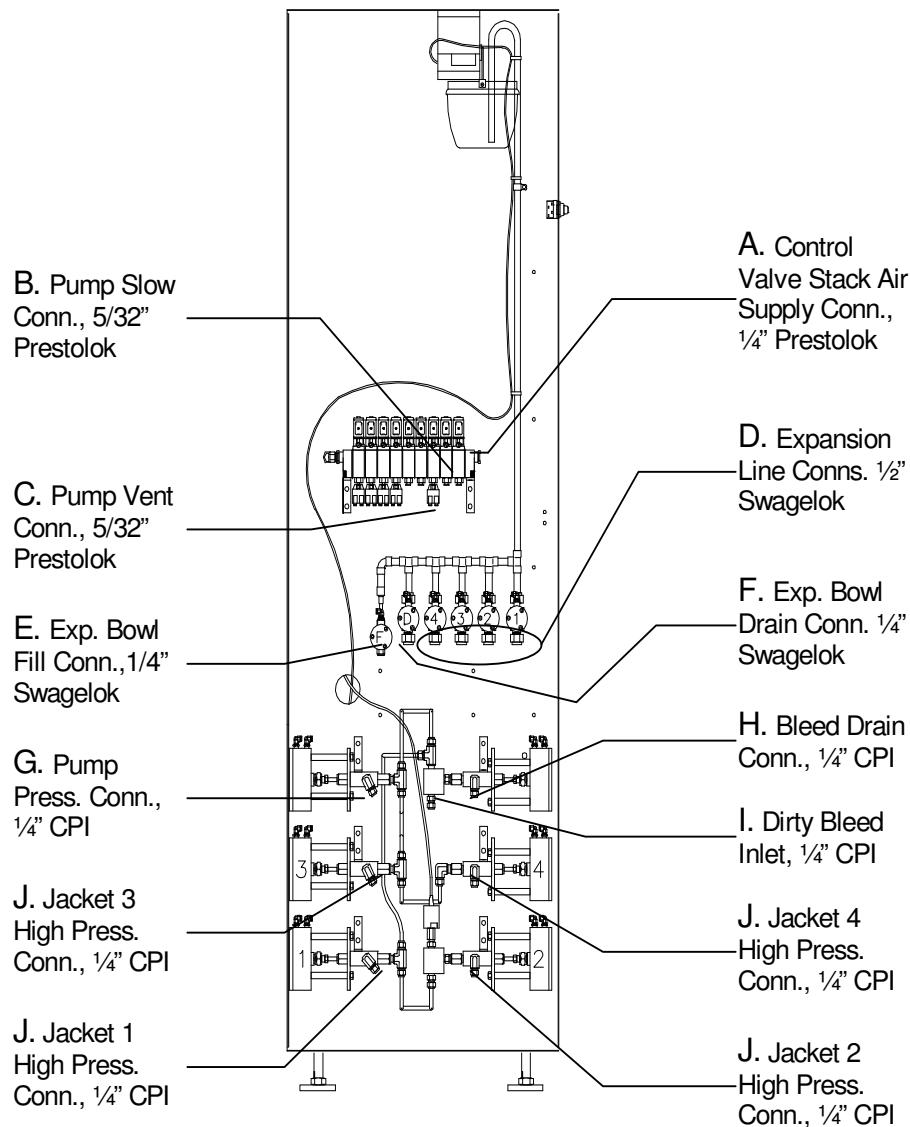


Figure 4 - 6

Recortest III Control Console Plumbing Connections

4.3.3 Recortest III Control Console Plumbing, continued

- A. Connect the ¼" poly tubing line from the RSP-10D air out (ref. 4.3.2.C) to the E/P Control Valve Stack air supply Prestolok connection, figures 4-6 and 4-7.
- B. Route a 5/32" poly control air signal line from the Pump Slow control valve (E/P valve # 9) Prestolok fitting to the Prestolok fitting on the RSP-10D Pump Slow Valve, ref. 4.3.2.H, see figure 4-7.
- C. Route a 5/32" poly control air signal line from the Pump Vent control valve (E/P valve # 7) Prestolok fitting to the Prestolok fitting on the RSP-10D Pump Vent Valve, ref. 4.3.2.G, see figure 4-7
- D. Connect the ½" poly Cylinder Expansion lines from the test jackets (ref 4.3.1.C) to the ½" Swagelok fittings on the Cylinder Expansion Valves, see figures 4-2, 4-3 and 4-6.
- E. Connect the ¼" poly Expansion Bowl Fill line from the RSP-10D (ref 4.3.2.F) to the ¼" Swagelok fitting on the Expansion Bowl Fill valve, see figure 4-6.
- F. Route a ½" poly tubing line from the ½" Swagelok fitting on the Expansion Bowl Drain Valve (in the control enclosure, see figure 4-6) to an adequate drain, usually located in the test pit.
- G. Connect the ¼" by 0.065 wall stainless steel Cylinder Pressurization line from the RSP-10D (ref. 4.3.2.E) to the ¼" CPI fitting on the Pump Valve in the Control Console, see figures 4-2, 4-4 and 4-6.
- H. Route a ¼" by 0.065 wall stainless steel Cylinder Pressure Bleed Line from Bleed valve in the Control Console to an adequate drain, usually located in the test pit, see figures 4-2 and 4-6.
- I. Connect the ¼" by 0.065 wall stainless steel Common Dirty Bleed Line from the Test Jacket Manifold Blocks (ref.4.3.1.B) to the Bleed valve inlet, see figures 4-2 and 4-6.
- J. Connect the ¼" by 0.065 wall stainless steel Cylinder Pressurization lines from the Test Jacket manifold blocks (ref. 4.3.1.A) to the ¼" CPI fittings on the Jacket valves in the Control Console, see figures 4-2, 4-3 and 4-6.

4.3.3 Recortest III Control Console Plumbing, continued

The Control Valve Stack consists of a series of 9 air pilot control valves. The air pilots operate the valves which mechanically control the test in response to commands from the computer. The functions of the Air Pilot Control Valves are described Table 4-2, and the required field plumbing connections are shown in figure 4-7, below.

Table 4 – 2

REC III Electro/Pneumatic Control Valves

VALVE NO.	VALVE NAME	FUNCTION
1	Jacket 1	Controls Test Pressure and Expansion for Jacket 1
2	Jacket 2	Controls Test Pressure and Expansion for Jacket 2
3	Bowl Drain	Controls Expansion Bowl Drain
4	Bowl Fill	Controls Expansion Bowl Fill
5	Test Pressure	Controls Test Pressure to Console and Pump Vent
6	Bleed	Controls Test Pressure Bleed
7	Pump Slow	Controls High Pressure Pump Slow

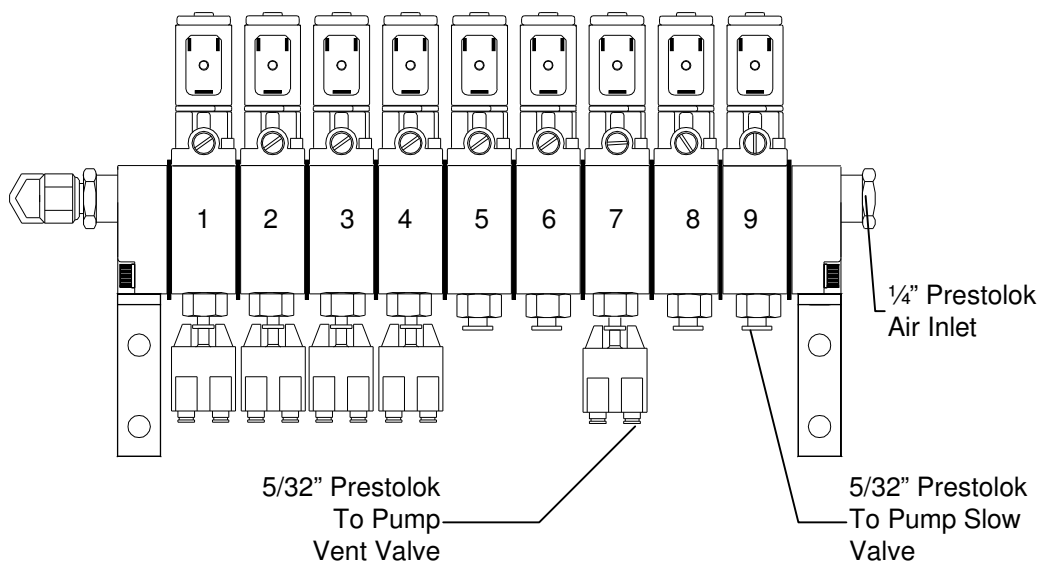


Figure 4 – 7

REC III Electro/Pneumatic Control Valves

After making the connections described in Sections 4.3.1 through 4.3.3, the field plumbing required for operation of the RECORTTEST III System should be complete. A summary table of the plumbing connections required is provided below.

4.3.4 Recortest III Field Plumbing Connection Summary

Table 4-3 summarizes the plumbing connections required.

Table 4 - 3
Plumbing Connection Summary

Line	Size/Mat'l	From	To	Remarks
Cylinder Pressurization	¼" .065w SS	Jacket 1	R3 Console Jckt 1 Valve	Ref. 4.3.1.A & 4.3.3.J
Cylinder Dirty Bleed	¼" .065w SS	Jacket 1	Common Dirty Bleed Header	Ref. 4.3.1.B & 4.3.3.H
Cylinder Expansion	¼" Clear Poly Tube	Jacket 1	R3 Console Exp. Valve 1	Ref. 4.3.1.C & 4.3.3.D
Jacket Make-up Water	¼" Yellow Poly Tubing	Jacket 1	Common Jacket Fill Header	Ref. 4.3.1.D & 4.3.2.D
Head Seal Air,	¼" Clear Poly Tube	Jacket 1	Common Air Supply Header	Ref. 4.3.1.E & 4.3.2.C
Cylinder Pressurization	¼" .065w SS	Jacket 2	R3 Console Jckt 1 Valve	Ref. 4.3.1.A & 4.3.3.J
Cylinder Dirty Bleed	¼" .065w SS	Jacket 2	Common Dirty Bleed Header	Ref. 4.3.1.B & 4.3.3.H
Cylinder Expansion	¼" Clear Poly Tube	Jacket 2	R3 Console Exp. Valve 2	Ref. 4.3.1.C & 4.3.3.D
Jacket Make-up Water	¼" Yellow Poly Tubing	Jacket 2	Common Jacket Fill Header	Ref. 4.3.1.D & 4.3.2.D
Head Seal Air,	¼" Clear Poly Tube	Jacket 2	Common Air Supply Header	Ref. 4.3.1.E & 4.3.2.C
Compressed Air Supply	½" Natural Poly Tubing	Shop Air Supply	RSP-10D	Ref. 4.3.2.A
Domestic Water Supply	½" Natural Poly Tubing	Shop Water Supply	RSP-10D	Ref. 4.3.2.B
Head Seal Air Supply	¼" Clear Poly Tubing	RSP-10D	Head Seal Air Supply Header	Ref. 4.3.2.C & 4.3.1.E
Control Valve Stack Air Supply	¼" Clear Poly Tube	RSP-10D	REC. III Console E/P Valve Stack	Ref. 4.3.2.C & 4.3.3.A
Jacket Fill Water Supply	¼" Yellow Poly Tubing	RSP-10D	Common Jacket Fill Header	Ref. 4.3.2.D & 4.3.1.D
Cylinder Pressurization	¼" .065w SS	RSP-10D	REC. III Console Pump Valve	Ref. 4.3.2.E & 4.3.3.G
Expansion Bowl Fill	¼" Clear Poly Tube	RSP-10D	REC. III Console Bowl Fill Valve	Ref. 4.3.2.F & 4.3.3.E
Pump Vent Control	5/32" Blue Poly Tubing	RSP-10D	REC. III Console E/P Valve # 7	Ref. 4.3.2.G & 4.3.3.C
Pump Slow Control	5/32" Blue Poly Tubing	RSP-10D	REC. III Console E/P Valve # 9	Ref. 4.3.2.H & 4.3.3.C
Cylinder Dirty Bleed Inlet	¼" .065w SS	Common Dirty Bleed Header	REC. III Console Bleed Valve Inlet	Ref. 4.3.3.I & 4.3.1.B
Expansion Bowl Drain	¼" Clear Poly Tube	REC. III Console Drain Valve	Pit Drain	Ref. 4.3.3.F
Bleed Valve Drain	¼" .065w SS	REC. III Console Bleed Valve	Pit Drain	Ref. 4.3.3.H

4.3.5 Auxiliary Equipment Plumbing

A. HYDRACLOSE[®] Test Heads

HYDRACLOSE[®] Test Heads do not require plumbing during system installation. See Section 5.0, Operations for instructions regarding connecting the test jacket hoses to the test head for cylinder testing.

B. PCT Plumbing

The PCT unit will require water and compressed air supplies. See the Galiso PCT Installation and Operations manual for instructions on setting up the PCT unit.

C. GVM-16 Plumbing

The GVM unit requires only compressed air. See the Galiso GVM Installation and Operations manual for instructions on setting up the GVM unit.

D. RCSG Plumbing

Connect a suitable line/hose to the 1/2" female NPT RCSG inlet. The domestic water supply must provide 4 gpm (per nozzle) @ 50 psi maximum for optimal filling system operation

E. CFS-2 Plumbing

Connect a suitable line/hose to the 1/2" male NPT CFS-2 inlet. The domestic water supply must provide 24 gpm @ 90 psi for optimal filling system operation

F. GAH Hoist Plumbing

Connect a 3/8" 90 psig air supply line to the Hoist air inlet connection.

4.4 Calibrated Cylinder, Preparation And Care

Remove the adapter and fill the Calibrated Cylinder with clean, filtered water. Add water as needed to completely fill the cylinder before testing. Replace the adapter in the Calibrated Cylinder.

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.

Keep a copy of the Cylinder Calibration Report close to the system to be used during verification of the test pressure reading and the expansion reading.

4.5 HYDRACLOSE[®] Test Head Preparation

An installed test head is depicted in figure 4-8. The top of the test spud must be securely attached to the Test Head. With GHH-6H 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 over-tighten the test spud. The top end of the test spud seals 100 PSI maximum.

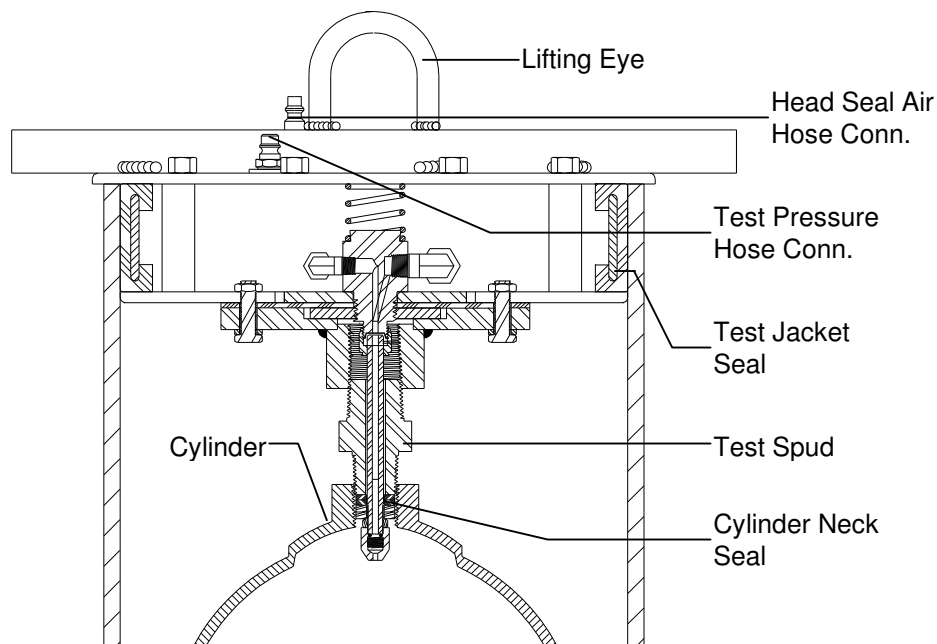


Figure 4 - 8
Test Head Installation

4.5 HYDRACLOSE[®] Test Head Preparation, continued

With GHH-6G Test Heads, “Quick Change” test spud snaps in place on the Test Head. Before attaching the GHH-6G 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 figures 4-8 and 4-9. 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.

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.

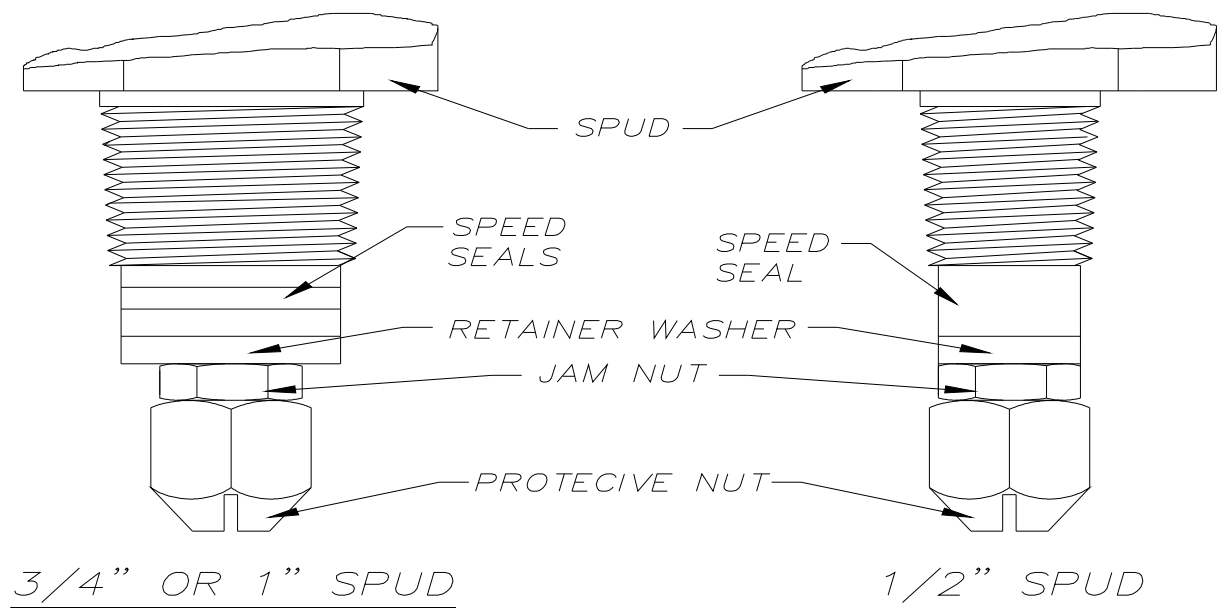


Figure 4 - 9: Test Spud

The $\frac{1}{2}$ " inch spud requires only one $\frac{1}{2}$ " inch Speed Seal. The $\frac{1}{2}$ " inch Speed Seal is manufactured as one unit since $\frac{1}{2}$ " inch cylinder neck threads are generally shorter than $\frac{3}{4}$ " inch and one inch neck threads.

4.5 HYDRACLOSE[®] Test Head Preparation, continued

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.

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

Inspect the threads on the bottom of the test spud regularly. If the threads become excessively worn, replace the test spud.

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.

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 "O"-Ring seal in the Quick Connect Fittings should be changed when wear prevents proper sealing.

The metal surfaces of the Test Head should be kept clean and free of corrosion. Metal surfaces should be painted with a high quality, cold galvanizing, metal primer. The inside upper 12 inches of the test jackets should be painted with cold galvanizing metal primer to protect the sealing area.

NEVER pressurize the Test Head without providing an adequate constraint for the Speed Seals and the test boot. 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 PSI sealing pressure, there is over 3,000 pounds force exerted by the sealing boot on the test head. Test Head testing and maintenance systems are available from Galiso.

4.5 HYDRACLOSE[®] Test Head Preparation, continued

The test jacket terminal block is equipped with a safety relief valve for seal pressure set at 100 PSI to prevent over-pressurization of the sealing apparatus.

!CAUTION!

The HYDRACLOSE[®] Test Head must be securely engaged with 3 to 5 threads in the cylinder neck in order to safely seal (see Section 3.0, Safety). All cylinders should be inspected before testing to insure that the neck threads are not excessively worn or damaged. Cylinders with inadequate neck threads should be condemned.

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). 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 onto 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.

4.6 Expansion Bowl Setup

The following paragraphs describe installation of the Expansion Bowl.

- A. Remove the packing materials from the Expansion Bowl and install the Expansion Bowl in the Control Console as shown in Figure 4-6.
- B. Remove the two (2) corks from the Load Cell on the bowl mounting side.

!CAUTION!

Do Not Over tighten the bolt which holds the Expansion Bowl to the Load Cell. The Expansion Bowl Bolt should only be hand tight, over-tightening the Expansion Bowl bolt can seriously damage the system.

- C. The Expansion Bowl bolt should be loose enough to allow the Expansion Bowl support to be hooked over the bolt as shown below. The bolt should not be tight enough to restrict the travel of the Expansion Bowl.

4.6 Expansion Bowl Setup, continued

- D. The "Speed Seal" should be positioned between the Load Cell and the Expansion Bowl Support to cause friction between the two assemblies. The purpose of the "Speed Seal" is dampen any swinging of the bowl.

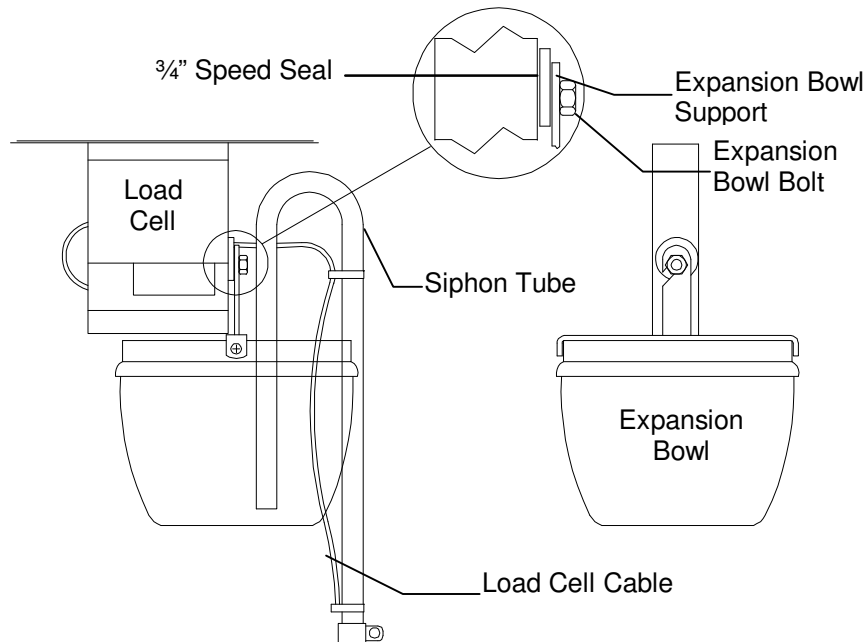


Figure 4 - 10

Expansion Bowl Assembly

- E. The bolt should just be snug, so that if bumped, the bowl is free to swing. The Speed Seal should create enough friction to only allow the bowl to swing once, and then come back to rest at its centered position. If the bowl continues to swing, the bolt is too loose. If the bowl moves, but stays pitched at an angle, not returning to its centered position, the bolt is too tight.

Proper adjustment of the bolt is crucial to the stability of the expansion readings for the RECORTTEST III System.

4.7 Electrical Connections

120 VAC 60 Hz power is required for the RECORTTEST III Control console and the PCT unit. Follow the instructions provided below to insure all devices have the required electrical power.

- A. Plug the RECORTTEST III Control Console power cord into a dedicated AC power circuit (5.0 Amps @ 120 VAC, 60 Hz required). This power circuit should be equipped with a separate 15 amp breaker.
- B. Plug the Uninterruptable Power Supply (UPS) and the Cabinet Exhaust Fan into the power strip mounted inside the RECORTTEST III Control Console. Note that the UPS is fused at 6.0 Amps.
- C. Turn OFF and then plug the Printer, Computer, Display Monitor and Control Power Supply into the UPS.
- D. Plug the main power cord for the PCT into a suitable receptacle (0.5 Amps @ 120VAC, 60 Hz)

With the completion of the above steps, all RECORTTEST III System electrical devices are ready to be turned on and pre-operationally tested.

4.8 Preparations for Testing

- A. Turn on the air and water supplies to the RSP-10D utility module.

!CAUTION!

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.

- B. Fill the test jackets with water. Check the test jackets to ensure the burst disks are properly installed. 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 RECORTTEST III Test System with an improper burst disk in place.
- C. Attach a HYDRACLOSE[®] Test Head to the Calibrated Cylinder and install the test head and calibrated cylinder in the test jacket using the GAH Hoist. Complete the test connections in accordance with Section 5.0, Operations.

4.9 Printer Set Up

The RECORTTEST III Printer is a high speed dot matrix printer which prints a record of test specifications and results. The following instructions describe only the basic operation procedure required to operate the printer with the RECORTTEST III Test System. For further instructions, refer to the printer manufacturer's manual supplied with the printer. The following steps describe basic printer setup.

- A. Plug the parallel interface connection from the control computer into the printer.
- B. Locate the On/Off switch on the printer and turn the printer off. Plug the Printer into a UPS inside the control enclosure.
- C. Load the form-feed printer paper into the printer. Roll the paper to the second set of perforations. Place the perforation line directly in line with the top of the tear-off guide.
- D. Toggle the On/Off switch (located at the left front of the printer) to the On position. The Printer Select/Online and Power Lamp should be lit. If not, check to make sure that the paper is properly loaded. Install all covers on the printer, and close the door on the rear of the Control Console.
- E. Refer to the manual supplied with the printer for any additional instructions.

5.0 SYSTEM START UP

Turn on electricity, computer and display monitor. Before performing system checkout and verification check, ensure all air and water valves are closed.

Read all instructions before attempting to operate the Recortest III Test System.

Bring up the Main Menu on the Display Monitor. The Main Menu will appear on the Display Monitor when power to the system is first turned on, when the system is reset, or after exiting from another menu.

Reset the Date and Time if required. These functions are found in the Edit Menu. The Control Computer uses date and time when it prints a date and time on each cylinder report. Once date and time are set, they will continue to run until they are reset. Circumstances such as Daylight Savings Time (U.S.) may require the date and time to be reset.

Set the System Parameter. To enter the Parameters Function from the Main Menu, use the Arrow Keys to highlight the Edit Menu, then press **Enter**. Using the Arrow Keys, select the Parameters Function and then press **Enter**. Refer to Section 9.1, Display Monitor, Parameters Function, to determine how to set System Parameters.

4. Turn on Air supply to the system. Check Control Air Pressure 80 to 90 PSI. **NOTE:** Check oil level in lubricator.

5. Turn on Water.

NOTE: Always turn on the air supply before turning on the water supply to the system.

6. Go to the Edit Menu and press **Enter**. Then select Hardware using the Arrow Keys and press **Enter**. Press F10.

7. When the Main Menu appears on the Display Monitor, highlight the Calibrate Menu by using the Arrow Keys and press **Enter**. Then select the Verify Function with the Arrow Keys and press **Enter**.

A. Normally the verification program is used for checking the calibration of the system. In this case, the verification program will be used to flush trapped air from the system.

8. The Display Monitor will prompt the operator to select which test jacket will be used for the verification program. Type in the number of the test jacket, the system will automatically enable that test jacket for the verification program.

5.0 SYSTEM START UP, continued

- 9 Next, the Display Monitor will cue the operator to load the Calibrated Cylinder into the enabled test jacket.
 - A. If the Calibrated Cylinder is not yet loaded into the test jacket, attach the test head to the water filled Calibrated Cylinder (See section 2.3 Hydroclose Test Head) and load the cylinder and test head into the test jacket.
 - B. Attach the Head Seal Hose and Test Pressure Hose to Hydroclose Test Head
10. When the Calibrated Cylinder has been loaded into the test jacket, press any key to continue with the verification program. The Verification Function will appear on the Display Monitor, as shown in Figure 10.2
11. The Verify function will allow the operator to manually control pressurization of the Calibrated Cylinder. Use the **F1**, **F2**, **F3**, and **F6** Function Keys to control pressurization of the Calibrated Cylinder. The pressure and expansion readings will be shown above the Function Key Labels. The effects of the Function Keys that are used during Verify are shown below and on the next page.

F1 STOP PUMP: The **F1** key will stop the pump from further pressurizing the cylinder.

F2 Pump FAST: The **F2** key will cause the pump to enter the Pump Fast Mode.

F3 Pump SLOW: The **F3** key will cause the pump to enter the Pump Slow Mode.

F4 ZERO: The **F4** key will zero the Expansion and Pressure Reading.

F5 AUTO: The **F5** key will allow the operator to enter a specific test pressure for verification purposes. When **F5** is pressed, the display will prompt the operator to enter a verification pressure. Type in the pressure and press

F6 BLEED: The **F6** key will cause the system to release all pressure from the cylinder.

F8 B/PSI: The **F8** key changes units from Bar to PSI.

F9 INCR: The **F9** key allows the operator to set the expansion increments used in the Verify procedure.

F10 ABORT/Exit: *The **F10** key will abort the verification program and exit to the Main Menu.*

5.1 PURGING AIR FROM EXPANSION LINES:

- A. Go into Verify for Jacket 1. When using Verify, you **MUST** have a cylinder loaded into the jacket with the Test Head attached. As an alternative, you can manually activate the air pilot control valve for jacket 1 by pressing the manual override button on the air pilot valve and turning it one quarter turn clockwise.

NOTE: If there is not a cylinder in the jacket with the Head Seal attached, this will drain the water out of the Expansion Bowl, putting **MORE** air into the expansion line. To avoid this, first fill the bowl with water using the Expansion Bowl Valve and the Bowl/Jacket Fill Valve (see step B).

- B. Using the Bowl Fill Air Pilot Control Valve, fill the expansion bowl with water by pressing the manual override button. Take care not to overflow the expansion bowl.
- C. Remove the Head Seal hose from the Hyrdaclose Head in the selected jacket to allow the water from the bowl to flow down into the jacket and flush any trapped air from the expansion line.
- D. As soon as the Head Seal hose is removed from Hyrdaclose head, it is necessary to monitor the level of water in the expansion bowl, and by using the Bowl Fill Air Pilot Control Valve, keep the level above half full.
- E. Maintain the level in the Expansion Bowl (see step B), allowing the water to continue flowing into the jacket for at least 15 to 20 seconds.
- F. After 15 to 20 seconds, replace the Head Seal Hose. If there is not a cylinder in the jacket, release the Air Pilot Control Valve for the selected jacket. If the Bowl fill Air Pilot Valve was locked on, remember to release the manual override on that valve, so that the bowl does not overflow.
- G. Release all Air Pilot Valve override buttons, and/or exit Verify.
- H. Repeat steps A through G for jacket #2

NOTE! Take care not to overflow the Expansion Bowl, or to drain it completely.

6.0 SYSTEM OPERATIONS

This section contains the procedures that should be followed in order to insure maximum accuracy and efficiency of the Recortest III Hydrostatic Test System.

6.1 Requirements Before Testing

The following items are listed to ensure that the system is ready for cylinder testing.

- A. Verify system installation is complete in accordance with Section 4.0 of this manual and any installation drawings specifically prepared for your system.
- B. Take care not to disturb the Expansion Bowl Assembly, located in the upper right hand corner of the Control Console side enclosure. Excessive force to the Expansion Bowl can seriously damage the Load Cell Assembly.
- C. Do not lean on the Control Console or test jackets while a test is in progress. Weight applied against the side of the Control Console can cause the Expansion Bowl to sway and affect the accuracy of expansion readings.
- D. The RECORTTEST printer must be kept clean and dry in order for the manufacturer's warranty to be valid. In accordance with the manufacturer's warranty, the customer will be responsible for repair of any damage due to neglect or abuse of the printer.
- E. The water supply to the RSP-10D 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.
- F. Always turn off the air pressure to the RSP-10D before turning on the power to the control computer. As soon as the main menu appears, turn the air back on.

6.2 Test Cylinder Installation

The following steps describe installation of the test cylinder.

- A. Install the HYDRACLOSE[®] Test Head by screwing the test spud into the cylinder neck, engaging with 3 to 5 neck threads, see Figure 6-1 (see also Sections 3.2 and 4.3).
- B. Attach the hoist to the test head with attached cylinder and carefully load it into the Test Jacket, see figure 6-2.
- C. After the test head is in place in the test jacket, the Test Pressure, Dirty Bleed (if applicable) and the Head Seal Hoses are connected. Attach Head Seal Hose first. See figure 6-3 for hose connection details.

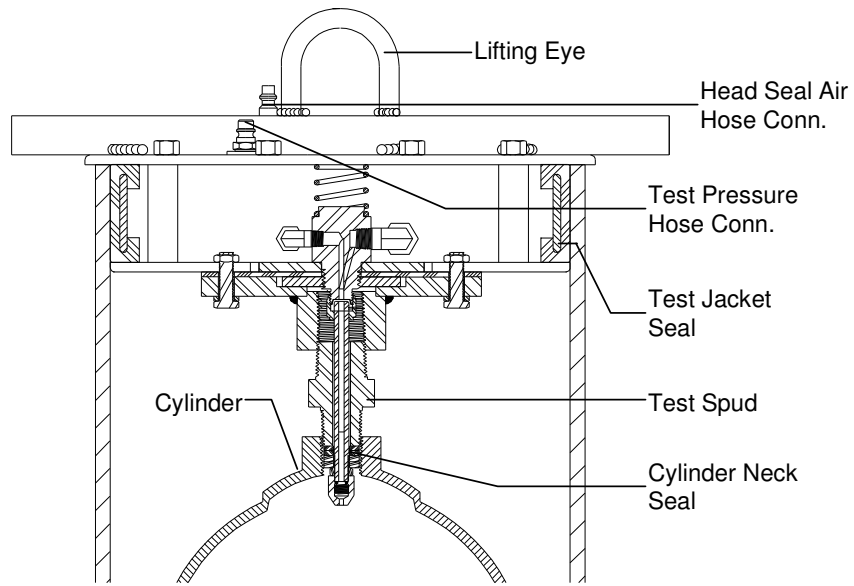
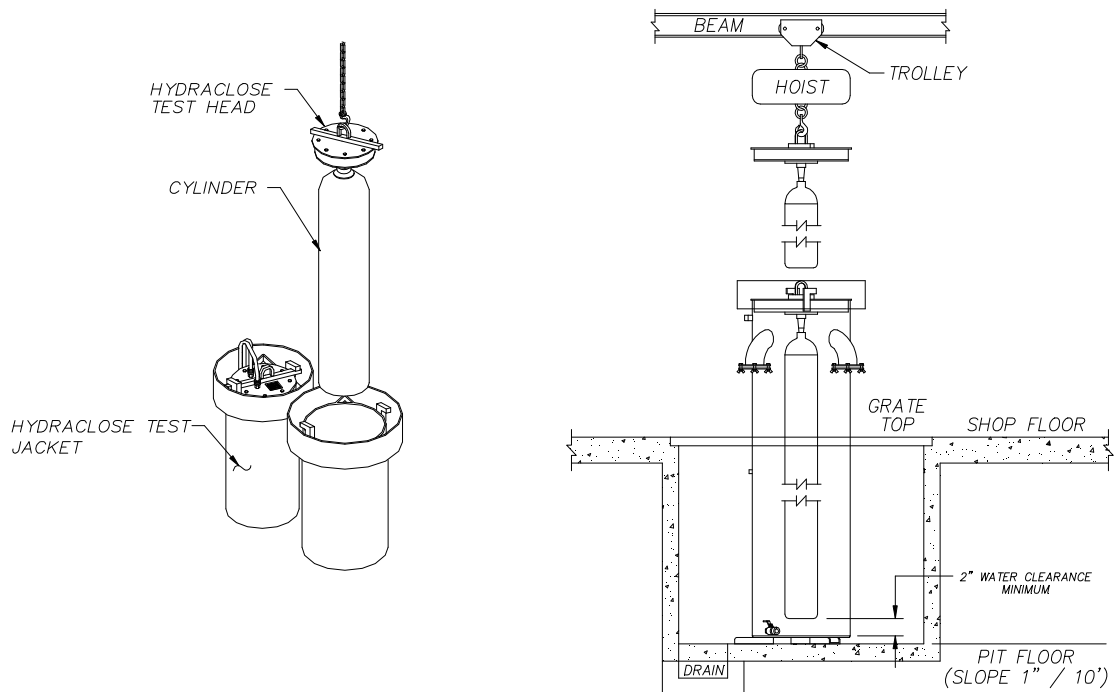


Figure 6 - 1

Figure 6 - 2



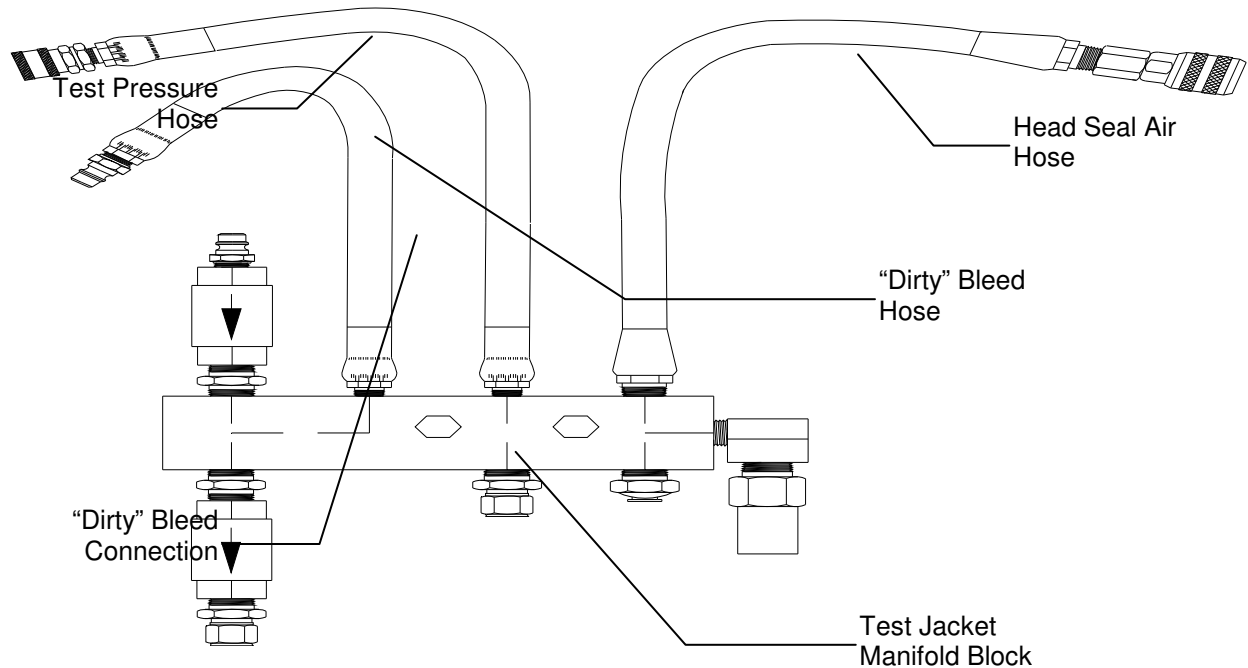


Figure 6 - 3

6.3 Testing Sequence

Prior to performing any test, the system will need to be checked out. The Calibrated Cylinder, installed in accordance with section 6.2 must be used.

6.4 Pump Air Pressure Adjustment

The intensifier pump will supply water at a pressure that is 100 times greater than the regulated input air pressure. For example, if the Air To Pump Regulator is set at 50 PSI, the pump will be capable of attaining pressures up to approximately 5,000 PSI.

Note that the Air To Pump Regulator should be set to allow the pump to attain a maximum pressure that is slightly higher than the desired test pressure. For example, if a test pressure of 6,000 PSI is desired, the Air To Pump Regulator should be set at approximately 65 PSI. This will allow the pump to achieve a maximum pressure of 6,500 PSI.

This is especially critical when testing small cylinders. As an example, when testing medical E or D size cylinders with a test pressure of 3360, the Air To Pump
6.4 Pump Air Pressure Adjustment, continued

6.4 Pump Air Pressure Adjustment, continued

Regulator should be set so that test pressure will not exceed 3,500 PSI. (The Calibrated Cylinder must be used to determine the stall pressure since it will be over the test pressure of the cylinders being tested.)

Setting the Air To Pump Regulator in this fashion will cause the pump to naturally slow down as it approaches test pressure, and pressure spikes will be smoothed out, making it much easier to consistently hit the target pressure.

Locate the Air To Pump Regulator on the Pump Assembly. Adjust the Air to Pump Regulator to allow the pump to achieve the appropriate pressure for the cylinders to be tested.

6.5 Pump Speed Adjustment

The air driven intensifier pump, which is mounted on top of the RSP-10D Utility Support Package, supplies filtered water at pressures up to 10,000 PSI for use in the hydrostatic test process. In order to enable the RECORTTEST III computer to accurately control pressurization of the cylinder, the pump speed must be correctly adjusted to compensate for the cylinder test pressure and size/volume. As a rule, the pump speed should be readjusted whenever there is a change in the size of cylinders being tested, or the test pressure used. The test pressure (air to pump) regulator should always be properly adjusted.

Adjustment of the pump speed is especially critical when the system is being used to test small cylinders. Due to their small volume, small cylinders will require only a few strokes of the pump in order to achieve test pressure, therefore, the pump speed must be slowed down to prevent over-pressurization of the cylinder.

When testing larger cylinders, adjustment of the pump speed is less critical. The larger volumes require a longer pressurization time, allowing more latitude in control of the pump. For large cylinders the pump speed should be set fast enough to rapidly pressurize the cylinder without overshooting the desired test pressure.

During the normal test cycle, pressurization of the test is divided into two separate modes, the Pump Fast Mode and the Pump Slow Mode. Both the Pump Fast speed and the Pump Slow speed must be adjusted in order for the system to operate properly.

6.5 Pump Speed Adjustment, continued

- Pump Fast Mode:

During the Pump Fast Mode the pump runs fast to provide the bulk of the pressure used in the hydrostatic test. The Pump Fast Mode stops when the pressure in the cylinder is 200 PSI short of the desired test pressure. The Pump Fast Speed Control Valve (see Figure 4-5) controls the speed at which the pump runs during the Pump Fast Mode.

- Pump Slow Mode:

During the Pump Slow Mode the pump runs slowly to allow the system to more accurately control final pressure of the cylinder. The Pump Slow Speed Control Valve (see Figure 4-5) controls the speed at which the pump runs during the Pump Slow Mode.

If the system consistently over pressurizes or under pressurizes the cylinder, or requires an unusually long period of time to pressurize the cylinder, the Pump Speed probably needs to be adjusted.

6.6 Pump Speed Adjustment Procedure

The air driven intensifier pump, which is mounted on top of the RSP-10D Utility Support Package, supplies filtered water at pressures up to 10,000 PSI for use in the hydrostatic test process. In order to enable the RECORTTEST III computer to accurately control pressurization of the cylinder, the pump speed must be correctly adjusted to compensate for the cylinder test pressure and volume. As a rule, the pump speed should be re-adjusted whenever there is a change in the size or test pressure of cylinders being tested.

- A. When the cylinder has been loaded into the test jacket, press any key to continue with the Verify program. The Verify Function Screen will appear on the Display Monitor.
- B. From the Main Menu, select the Calibrate Menu by using the Arrow Keys and pressing Enter. Highlight the Verify Function with the Arrow Keys and press Enter. The system will prompt the operator to select which test jacket will be used for the verify program. Type in the number of the test jacket, the system will automatically enable that test jacket.
- C. The system will prompt the operator to load a cylinder into the enabled test jacket. The cylinder to be used for pump speed adjustment should be representative of the type of cylinder that will be tested. For example, if the system is being prepared to test small Medical E cylinders, then a small Medical E cylinder should be used for pump speed adjustment. Likewise, if the system is being prepared to test large cylinders, a large cylinder should be used for pump speed adjustment. It is preferable to use a cylinder which has already been tested.

6.6 Pump Speed Adjustment Procedure, continued

! CAUTION !

Do Not Exceed 90% of the Test Pressure for the Cylinder being used for Pump Speed Adjustment

- D. Attach the water filled cylinder to the test head and load the cylinder and test head into the enabled test jacket.
- E. Attach the Head Seal Hose to the test head, and then the Test Pressure Hose to the test head.
- F. The Verify Function will allow the operator to manually control pressurization of the cylinder. Using the Function Keys to control pressurization. The pressure and expansion readings will be shown above the Function Key Labels. The effects of the Function Keys that are used for pump speed adjustment in the Verify mode are found in Section 5.2:
- G. Close the Pump Fast Speed Control Valve and the Pump Slow Speed Control Valve.
- H. Perform the following steps to adjust the Fast Mode pump speed:
 - 1. Press the F2 key to initiate the Pump Fast command. Since the Pump Fast Speed Control Valve has been closed, the pump will not begin pumping, however, water will be introduced into the cylinder.
 - 2. Slowly open the Pump Fast Speed Control Valve until the pressurization speed is approximately 200-500 psi per second (no more than 200 psi/sec for small cylinders).
 - 3. When the pressure approaches 200 psi below the test pressure, press the F1 Function Key to stop the pump. Take care not to over pressurize the cylinder.
 - 4. When the pump speed has been adjusted properly, during the Pump Fast Mode you should be able to see the pressure readings increase in approximately 100 psi increments, such as 2210, 2350, 2430, 2585. If you cannot see each of the "hundreds" going by, or if the numbers are erratic, such as 2150, 2565, 2230, 2770, the pump speed is set too fast and should be re-adjusted.

7.0 Control Console Keypad

K. Perform the following steps to adjust the Slow Mode pump speed:

1. Slowly open the Pump Slow Speed Control Valve until the Pump Slow Mode pump speed is approximately 20 psi per second.
2. With the cylinder at a pressure that is approximately 200 psi below the test pressure, as described in step 6.4. Press the F3 key to initiate the Pump Slow command. Since the Pump Slow speed Control Valve has been closed, the pressure should not change.
3. If the pressure approaches the cylinder test pressure, press the F1 key to stop the pump. Take care not to over pressurize the cylinder.
4. When the Pump Slow Mode pump speed has been adjusted to 20 psi per second, press F1 to stop the pump and then press F6 to release pressure from the system.
5. During the Pump Slow Mode, you should see the pressure increase in approximately 10 psi increments, such as 3311, 3322, 3330, 3341, etc. For small cylinders and composite cylinders, you will want to slow the Pump Slow Mode down to the point that you can watch the pressure climb in one or two psi increments.

L. Press the F10 key to exit the Verify routine and return to the Main Menu.

M. Verify that all pressure has been released from the cylinder and then remove the Test Pressure Hose and the Seal Pressure Hose from the test head. Remove the cylinder and test head from the test jacket and remove the test head from the cylinder.

The membrane switch keypad, located on the face of the Recortest III Control Console, allows the operator to input commands and test specifications to the control computer. The keypad is used for entering test specifications into the computer, initiating or aborting the test cycle, initiating the command to print a test report, and controlling various test functions. The keypad also controls the position of the cursor on the Display Monitor for the purpose of editing or altering test specifications.

The keypad includes keys for the alphabetical characters **A** to **Z**, the numerals **0** to **9**, ten functions keys, arrow keys, delete, enter, and space keys, and a range of program and arithmetic operator keys.

The functions of the keys are described following Figure 7-1 below.

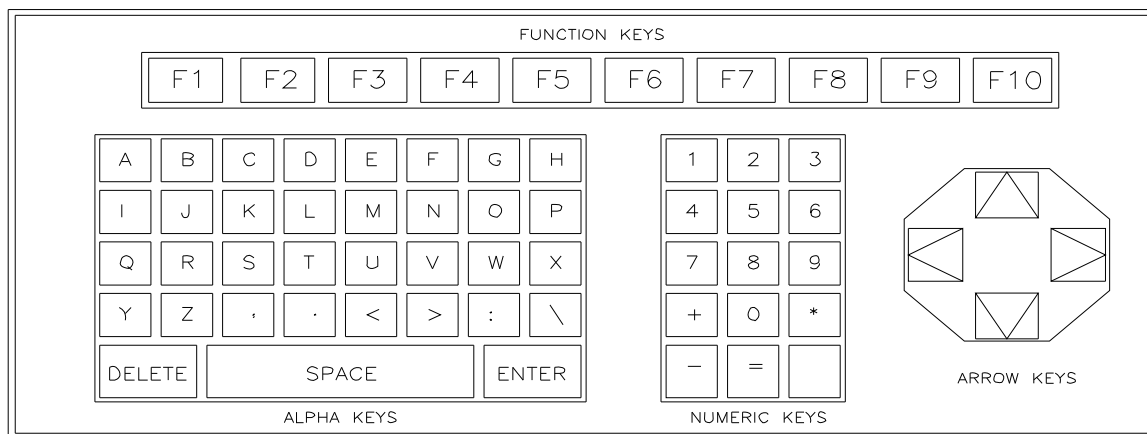


Figure 7-1
Control Console Keypad

1. **ALPHA KEYS:** The Alpha Keys are used to enter literal data (such as Remarks and Cylinder Code) into the computer.
2. **NUMERIC KEYS:** The Numeric Keys are used to enter numeric data (such As Cylinder Serial Number) into the computer
3. **FUNCTION KEYS:** The Function Keys are used to initiate commands which are described at the bottom of the Display Monitor. The commands initiated by the Function Keys will change at various points in the operation cycle. The bottom portion of the Display Monitor will provide a description of the commands that correspond to each key at all times when they are active.
4. **ARROW KEYS:** The Arrow Keys control the position of the cursor on the Display Monitor screen. The cursor is the blinking line that indicates the position of the next character to be typed. The Arrow Keys will move the cursor in the direction indicated by the arrow on the key. The Arrow Keys are useful for correcting and changing test specifications shown on the Display Monitor.

5. **DELETE KEY:** Each time the Delete Key is pressed, the cursor will move left one space and erase the character which occupied that space. The Delete Key is used to correct errors made while entering data.
6. **SPACE BAR:** The Space Bar functions like a space bar on a typewriter. While entering test specifications, the operator may use the Space Bar to enter a space between two characters.
7. **ENTER KEY:** The Enter Key is used to enter test specifications into the Recortest III computer and to scroll past test specifications cues that do not need to be changed.
 - A. During the entry of test specifications, the computer will cue the operator to enter a specification. The operator then types the specification into the computer. The computer will then show the specification on the Display Monitor. If the specification shown is correct, press the Enter Key to enter the specification into the computer.
 - B. The Enter Key may also be used to scroll past test specification cues which do not need to be changed. If the Enter Key is pressed without typing in a response to the cue, the computer will continue to use the last response that was entered for that cue. For example, if the test operator only needs to change the cylinder serial number at the beginning of the test, he can use the Enter Key to by pass specifications such as cylinder rating that may not need to be changed.
8. **PROGRAM OPERATOR KEYS:** With the exception of the decimal point and comma, the program operator keys are not normally used during hydrostatic testing. Do not use comma, period or colon in any of the remark or specifications fields.
9. **ARITHMETIC OPERATOR KEYS:** The arithmetic operator keys are not normally used during hydrostatic testing, except for entering the Plus (+) and Star (*) specifications.

8.0 CONTROL CONSOLE DISPLAY MONITOR

The Display Monitor is a 15" SVGA monitor which is used to display data, specifications, and other test related messages. It is also used to cue the operator to enter test specifications and display function key definitions.

Operator cues or prompts are of three types, menus, function keys and data entry prompts. Menus typically consist of a list of options available to the operator. To select one, move the cursor to the desired menu and depress **Enter**. Selection of one menu entry will often cause another list of options to be displayed.

Function key prompts are displayed as a row of colored blocks at the bottom of the screen. There are ten blocks, each labeled with a function key name, **F1** through **F10**. Each block may have, in addition to the function key name, another label which briefly describes its function. The part of the screen above the row of function key prompts may be used for displaying information or for a data entry prompt.

Data entry prompts cue the operator to enter information needed for specification or description of the hydrostatic test. Typically, the prompt looks like a form to be filled in by the operator. Each entry has a caption and highlighted field for the information to be entered. Usually, the fields are filled either with default information or with information from a preceding test cycle.

If the system has only high pressure capability, the operator need only depress the "EXIT" key. Otherwise, if for example, the system has both high and low-pressure hydrotest capabilities, the operator must choose the channels that need to be verified or calibrated. To make this choice he needs to remember the name of the file to be used and then press **F7** to "SWITCH." The "STD.HWC" file is **ALWAYS** for the standard high-pressure test capabilities. The names of the other files will indicate their function, for example, for the low-pressure test capabilities, the file is named "LOPRESS.HWC."

The next screen appearing on the Display Monitor is the Main Menu. The Main Menu lists commands that may be used to enter other modes of the operational program. The commands that are listed on the Main Menu may only be actuated while the Main Menu appears on the Display Monitor. From the Main Menu, the operator may initiate all other phases of the Recortest III Operational Program. Main Menu commands will allow access to the Files Menu, Edit Menu Calibrate Menu, Test Cylinders Menu and Info Menu. The Main Menu is discussed in detail in Control Console Display Monitor, Main Menu, later in this section.

8.0 CONTROL CONSOLE DISPLAY MONITOR, continued

FILES MENU: The Files Menu allows the user to archive (copy) the test results file to a preformatted "DOS" diskettes, and run reports of the test results using the Control Computer. The Files Menu is also used to load cylinder information from an optional handheld PC, download a cylinder table to the optional handheld PC or to quit to "DOS."

EDIT MENU: The Edit Menu is used to set Date and Time, change parameters, run reports of the test results, change the hardware configuration, or look up information on the Cylinder Table Code. There is also a menu entry with the title "Edit Voice File," but it is for experimentation with voice entry of cylinder data and is not operational as of this date.

CALIBRATE MENU: The Calibrate Menu is used during the verification and calibration of the pressure and expansion readings. Verify is discussed in Section 12.

TEST CYLINDERS MENU: The Test Cylinder Menu allows the operator to enter the hydrostatic testing mode. Operation of the system in the Test Cylinders mode is discussed in detail in Display Monitor, Test Cylinder Function, later in this section.

INFORMATION MENU: This menu is currently listed on the Main Menu, but is non-functional at this time.

The operation procedure and Keypad commands for the Main Menu are discussed below.

1. The Main Menu will appear on the Display Monitor for the first time after exiting from the hardware configuration screen. It appears again after exiting from any submenu or other operational mode.
2. Following is a description of the keypad commands that may be actuated while The Main Menu (see figure 8-1 below) is on the Display Monitor.
3. To select a submenu, use the arrow keys to highlight the desired option and press **Enter**.

SAVE ABORTS: When a test is aborted the test will be on your report. This is required in the U.S.A.

COMPANY NAME: Key in the company name (up to 40 characters). Press **Enter**.

ADDRESS LINES (2): Key in the company address, including phone number on the three lines (up to 40 characters each line), and press **Enter** after each line.

After the last address line has been edited, a cue appears asking the operator if the information is correct. **Y** should be entered if no more changes are needed. Pressing **N** followed by **Enter** will return the cursor to the first parameter line.

When you have responded with a **Y** to the previous cue, another cue appears asking if you want to save the changes to disk. If you press **Y** followed by **Enter**, the changes will be saved on disk and will take effect immediately. Otherwise, they will be abandoned.

Return to Main Menu to begin System Operations Section 5.1.4

10.1 Test Jacket Selection

The Recortest III Control Computer allows the test operator to select which test jacket will be used for the hydrostatic test. The operator may select Test Jacket No. 1, Test Jacket No. 2, or both test jackets. Jackets selected for testing are labeled “enabled” on the Display Monitor. When the Test Jacket is enabled, the computer will accept test specifications for that jacket.

During the standard hydrostatic test procedure, both jackets are normally enabled. Both jackets are then loaded with cylinders and the specifications for both cylinders are entered. Next, the **F2** Function Key is pressed to begin the test in Jacket 1. After the test in Jacket 1 is complete, the test in Jacket 2 begins automatically (On the Recortest/Open Systems, the hoses must be switched to Jacket 2, then any key must be pressed to continue).

Following is a brief description of the procedure for enabling the test jacket prior to the hydrostatic test.

1. While the test Cylinders Function appears on the Display Monitor, the Function Key Labels at the bottom of the screen will describe the purpose of each Function Key. **F4** and **F5** are used to enable and disable the test jackets.
2. **F4** controls Jacket No. 1 and **F5** control Jacket No. 2. Both **F4** and **F5** function like a toggle switch. Press the key once to enable the jacket; press the key a second time to disable the jacket.
3. The Jacket Selector Indicator at the top of the jacket specification column will appear in capital letters, framed by a green box, when the corresponding test jacket is enabled. The Jacket Selector Indicator will appear in lower case letters without the green box when the corresponding test jacket is disabled.
4. Note that at least one test jacket must always be enabled.

10.2 Test Cylinders Function, Specification Cues:

While the Test Cylinders Screen is shown on the Display Monitor, all test specifications and cues will be shown in the box at the top of the screen that is surrounded by a double red line. Note that each line displays specifications for both test jackets when both jackets are enabled. Each specification shown on the Display Monitor is followed by a blue box, which indicates the length of the specification. A dark blue box will appear beside the first specification and all of the other boxes will be light blue. The cursor will appear inside the of the dark blue box. The cursor indicates the position of the next character that will be typed on the Display Monitor.

The meanings of the specification cues and the procedure for responding to the cues are discussed below.

1. **REMARKS:** This cue allows the operator to enter a remark to describe the condition of the cylinder. For example, the "Remarks" cue may be used to enter the results of the visual inspection. The Remark may be up to 14 characters long. Type in a remark, and press **Enter**.
2. **SERIAL NUMBER:** this cue records the serial number of the cylinder. The Serial Number may be up to 12 characters long. Type in the Serial Number and press **Enter**.
3. **CYLINDER CODE:** The cylinder code is used to automatically enter preset specifications for Cylinder Size, D.O.T./I.C.C. Rating, Test Pressure, Maximum Elastic Expansion, and Test Time. See Section 19 of this manual for a complete listing of the standard cylinder codes which are supplied with the Recortest III operating program.
 - A. Refer to the chart in Section 19 of this manual to determine the appropriate cylinder code. Type in the cylinder code (up to four characters) and then press **Enter**. The cylinder codes are determined by the software which is loaded into the system. If you require additional cylinder codes, use the Edit/Lookup Table Function found on the Main Menu.
 - B. When cylinder code (excluding "M") is entered, the computer will skip the remaining specification cues and proceed to the visual inspection results.
 - C. To override the cylinder code and enter the specifications manually, press the "**M**" key and then **Enter** when the computer cues you to enter the cylinder code. This will allow you to enter specifications for any type of cylinder that is not included in the cylinder code table shown in Section 19.
 - D. If a previously stored code is entered, the information on the next four lines automatically appears on the screen.

4. **CYLINDER SIZE:** This cue records the dimensions of the cylinder. The description of the cylinder size may be up to 14 characters long. Type in the dimensions of the cylinder and press **Enter**.
5. **D.O.T./C.T.C. RATING:** This cue records the Department of Transportation rating. The D.O.T./C.T.C. Rating may be up to eight characters long. Enter the D.O.T./C.T.C. rating of the cylinder and press **Enter**.
6. **TEST PRESSURE:** This cue determines the pressure at which the cylinder will be tested. The Test Pressure may be up to five characters long, the maximum test pressure of the Recortest III is 10,500 PSI. Enter the desired Test Pressure and press **Enter**.
7. **MAX. ELASTIC EXP:** This cue determines the maximum allowable elastic expansion for the cylinder being tested. The Maximum Elastic Expansion may be up to four characters long, with a decimal point followed by one character. Enter Maximum Elastic Expansion and press **Enter**.
 - A. If the cylinder's elastic expansion exceeds this value, the computer will determine that the cylinder is not suitable for the "Plus" or "Star" marking.
8. **TEST TIME:** This cue determines the amount of time that the pressure will be held inside of the cylinder before it is released. The test time may be any value between Zero and 999 seconds. Type in the desired Test Time and press **Enter**.

10.3 Test Cylinders Function, Test Results

All test results will be shown in the box at the bottom of the screen that is surrounded by a double red line. Each line displays results for both test jackets when both jackets are enabled. The individual lines of the test box are described below.

1. **INSPECTION – DISPOSITION:** This line is used to enter the results of the visual inspection of the cylinder and to report the results of the hydrostatic test.
 - A. If the cylinder has passed visual inspection, press **Enter**. The letters "PA" will appear next to the cue.
 - B. If a cylinder has failed the Visual inspection, type the letters "FV" and press **Enter**. If the letters "FV" are entered on the Inspection line, the computer will record the specifications without running the test press any key to return to the "Remarks" cue. When the test results are printed, the report will show that the cylinder failed visual inspection and was not tested.
 - C. If the cylinder fails the hydrostatic test the "PP" code will change to another Disposition Code to indicate the status of the cylinder. Following is a description of the Disposition Codes.

PP: Passed**FP: Failed Excessive Permanent Expansion****FE: Failed Excessive Elastic Expansion****FV: Failed Visual Inspection****PPFE: Passed, Exceeded Reject. Elastic Expansion Limit****TP: Test Aborted, Passed Visual**

2. **TEST NUMBER / STARTING TIME:** This line displays the Test Number and the time that the test is started. The Test Number is the number of tests that have been performed since entering the Test Cylinders Function. The Test Number is displayed first, followed by the Starting Time.
3. **PRESSURE / DURATION:** This line displays the current pressure of the cylinder being tested and the elapsed test time. The test pressure is shown in PSI and the test time is shown in seconds. Pressure is displayed first, followed by Duration.
4. **TOTAL EXP/ PERM. EXP:** This line displays the Total/ Permanent Expansion of the cylinder in cubic centimeters.
5. **PERM/FAIL % EXP:** This line displays the Percent Permanent/Fail Expansion of the cylinder.
6. **ELAST. EXP/REE: Allowable Elastic expansion.**

10.4 Test Cylinder Function, Test Indicators and Control Labels

The Test Cylinder Function includes several features which communicate messages to the operator concerning the status of the test, the tasks performed by the Function Keys, and other instructions and warnings. The test indicators and Function Key Labels are discussed below and on the following pages.

1. **MESSAGE LINES:** The message lines located in the lower left hand of the screen are used by the computer to communicate instructions and warnings to the test operator.
2. **EXTENDED CYLINDER INFORMATION:** If the Extended format Test Report has been selected in the Parameters Function (see Display Monitor, Parameters Function Section 8-6), the system will prompt the user to enter the additional specifications in the message area at the bottom of the Test Menu. Key in each specification and press **Enter**. The additional specifications will be included when the Test Report is printed.

10.4 Test Cylinder Function, Test Indicators and Control Labels

3. **JACKET INDICATORS:** The Jacket Indicators display the current status of the two test jackets. When a test jacket has been enabled (selected for testing) the indicator at the top of the jacket specification column on the Test Cylinders Menu will appear enclosed in a green box and the letters of the indicator will be in upper case.
 - A. **Enabled:** This message indicates that the corresponding test jacket has been enabled to test and must receive test specifications before the test may begin.
 - B. **Disabled:** This message indicates that the corresponding test jacket has not been enabled to test.
4. **PRESS START TO BEGIN TEST:** This message will be displayed when all specifications have been entered into the computer and the system is ready to perform the test.
5. **TEST STATUS INDICATOR:** The Test Status Indicator displays messages which inform the test operator of the current status of the test in each jacket.
 - A. **Test In Progress:** This message is displayed in blinking white text on a red background while a test is running in the corresponding Test Jacket.
 - B. **Test Completed:** This message is displayed in green when the test has been completed and all results have been recorded. The "Test Completed" message indicates that the system is ready to begin the next test.
 - C. **Test Aborted:** This message is displayed when the test is aborted before it is finished. The "Test Aborted" message appears when the operator aborts the test or when the system aborts the test due to a leak or other problem. It is displayed in blinking white text on a red background
6. **FUNCTION KEY LABELS:** The Function Key Labels describe the purpose of the Function Keys at various phases of the operation cycle. While the Test Menu is on the Display Monitor, the function Keys will perform the tasks as follows:
 - F1 ABORT TEST:** The **F1** key is used to Abort the test. If **F1** is pressed while a test is in progress, it will cause the system to abort the test and return to the first test specification cue.
 - F2 START:** The **F2** key is used to begin the test. This option will not show until a jacket has been enabled and all information has been loaded.

F4 JACKET 1: The **F4** key functions like a toggle switch. Press **F4** once to enable Jacket 1, press **F4** a second time to disable Jacket 1

F5 JACKET 2: The **F5** key functions like a toggle switch press **F5** once to enable Jacket 2, press **F5** a second time to disable Jacket 2

F6 CUTOFF FUNCTION: The **F6** key initiates the Cutoff Function. The Cutoff Function allows the user to stop the pump at any specified point to avoid under or over pressurization of the cylinder. If the system consistently over or under pressurizes each cylinder tested and you properly readjusted the pump speed, you may initiate the Cutoff Function as follows.

1. Enter the test specifications , then press **F6**. A message will appear at the bottom of the Test Cylinders Function which asks for the cutoff point.
2. If the cylinder was overpressurized, the cutoff point should be a negative value. For example, if the test pressure was 3000 PSI and the cylinder was overpressurized to 3050 PSI , enter “-30.” The pump will stop at 2970 PSI and the final stroke of the pump should bring the pressure to approximately 3020 PSI. In some cases, a positive value may be entered as the cutoff point. Key in “-“ or “+” and the cutoff value then press **Enter**.
3. The pump will stop at the test pressure, plus or minus the cutoff value that was entered.

F7 STD: This key is non functional at this time

F8 PERMHLD: Pressing **F8** causes a small window with two entries to pop up. The entries are prompts for the relief pressure and the post relief hold time. The former is the pressure at which the cylinder will be assumed to be at zero gauge pressure. The default value is 2 PSI, rather than zero, because occasionally it will take the transducer a moment to flex completely back to its Zero State, even though pressure has completely relieved. The maximum value which can be entered here is 6 PSI.

The post relief hold time is the time delay between when the pressure is effectively relieved and when the permanent expansion is measured. It is sometimes useful to enter a nonzero hold time to allow the cylinder to completely settle before the permanent expansion is measured.

F9 is non functional at this time.

F10 EXIT: Press **F10** key to exit the Test Menu and return to the Main Menu.

Operator may elect to archive or print report at this time.

11.0 ARCHIVE FUNCTION

The Archive Function allows the user to archive (copy) the test results file to a preformatted "DOS" diskette. Archive test data can be stored and used later to perform statistical analysis or to maintain a data base history of all cylinders tested. To archive test data proceed as follows.

1. If the Main Menu is not shown on the display Monitor, press **F10** to return to Main Menu.
2. Load the preformatted diskette (see Section 8-1, File Menu, Format Disk Function) into the disk Drive.
3. Select the files Menu by using the Arrow Keys, press **Enter**. Use the Arrow Keys to highlight the Archive Function and press **Enter**. The system will ask for the password. Type in the password and press **Enter**.
4. The Archive File Screen will appear showing the drive, path and filename the systems will use to save the results. The System, will ask "Is this correct (Y/N)?" Type **Y** if you want to save to this file and press **Enter**. Type **N** if you want to use a name other than what is displayed, and press **Enter**. You will be asked for a new file name. Input the file name you have chosen and press **Enter**. The system will ask "Is this correct (Y/N)?" Repeat this step if the name is still not correct.
5. The system will display a message indicating that the archive process is complete and ask whether to save or delete test results that are stored in the system. If a test report containing the archived test results has already been printed, the user may wish to delete the test results stored in the system memory. Press **N** to delete test results, the system will ask "Are you sure? Y/N," as a precaution to prevent accidental deletions. Press **Y** to save test results, then press **Enter**.
6. The system will exit the Archive Function and the Main menu will appear on the display Monitor. Remove the Archive diskette from the disk Drive and store the archive diskette in cool , dry place.
7. As Archive disks accumulate, they should be stored off the premises, in case of fire.

The purpose of the Verify and Calibration Procedure is to check and, if necessary, adjust the accuracy of the system pressure and expansion readings. The Calibration of the system should be verified at the beginning of each workday.

For the purpose of clarity, the Calibration Procedure is divided into three separate procedures; Pressure and Expansion Reading Verification (Verify Function), Expansion Calibration (Expansion Calibration Function), and Pressure Reading Calibration (Pressure Calibration Function). Pressure and Expansion Reading Verification are discussed in this section, Expansion Calibration is discussed in Section 13 and Pressure Calibration is discussed in Section 14.

The verification procedure is performed at the beginning of each day to check the calibration of the system in accordance with D.O.T./I.C.C. regulations. Normally, the verification procedure will show that the system is reading accurately and the calibration of the system will not need to be adjusted. However, if the verification procedure indicates that the pressure and expansion readings shown on the Display Monitor are not accurate, the readings may be adjusted by following the calibration procedures.

12.1 Verify Function

1. Bring up the Main Menu on the Display Monitor. The Main Menu will appear on the Display Monitor when power to the system is first turned on, or after exiting from another menu.
2. When the Main Menu appears on the Display Monitor, use the Arrow Keys to select the Calibrate Menu and press **Enter**. Highlight the Verify Function with the Arrow Keys and press **Enter**.
3. The Display Monitor will prompt the operator to select which test jacket will be used for the verification program. Type in the number of the test jacket, the system will automatically enable those test jackets for the verification program.
4. Next, the Display Monitor will cue the operator to load the Calibrated Cylinder into the enabled test jacket.
 - A. If the Calibrated Cylinder is not yet loaded into the test jacket, attach the water filled Calibrated Cylinder to the test head and load the cylinder and test head into the test jacket.
 - B. Attach the Master Gauge Assembly to the test head as shown in Figure 2-6.
 - C. Attach the Test Pressure Hose to the Master Gauge Assembly as shown in Figure 2-6. Attach the Head Seal Hose to the test head.

12.1 Verify Function, continued

- When the Calibrated Cylinder has been loaded into the test jacket, press any key to continue with the verification program. The Verify Function Menu will appear on the Display Monitor, as shown in Figure 12-1, below.

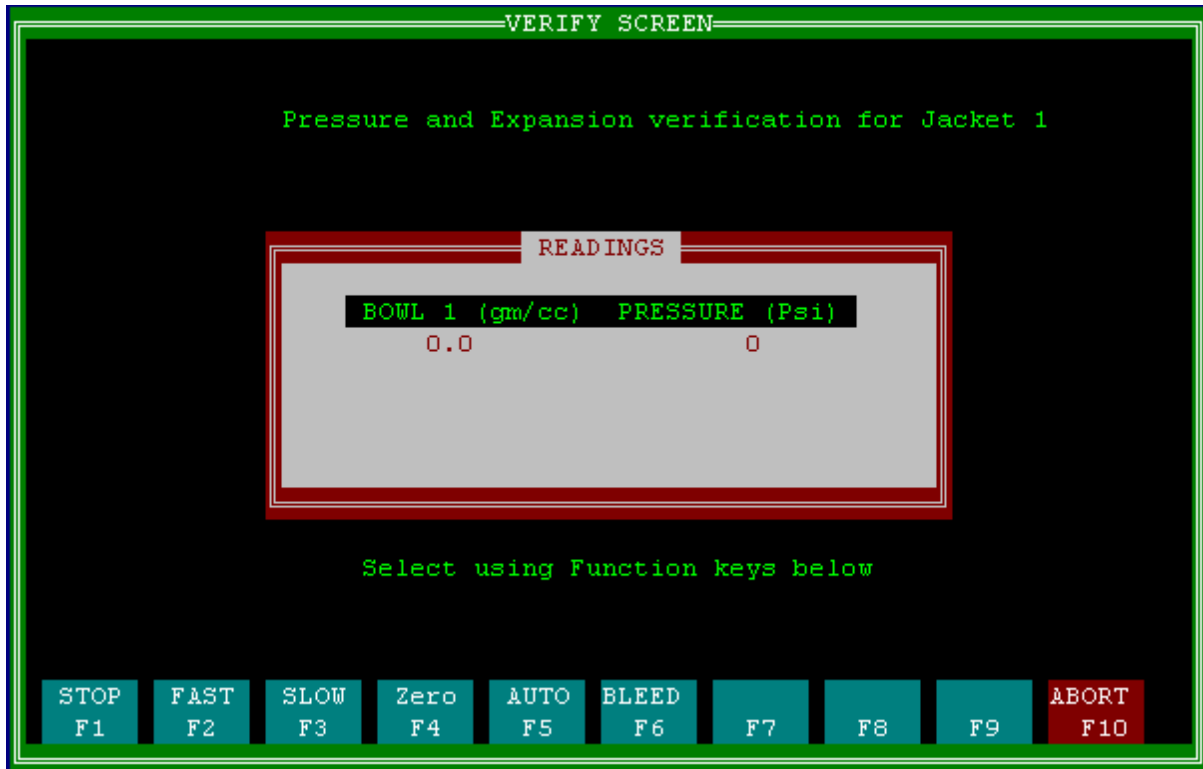


Figure 12-1: Verify Screen

- The Verify Function Menu will allow the operator to manually control pressurization of the Calibrated Cylinder. The Function Keys control pressurization and initiate additional program commands. The pressure and expansion readings will be shown above the Function Key Labels. The effects of the Function Keys are shown below.

F1 STOP Pump: The **F1** key will stop the pump from further pressurizing the cylinder.

F2 Pump FAST: The **F2** key will cause the pump to enter the Pump Fast mode.

F3 Pump SLOW: The **F3** key will cause the pump to enter the Pump Slow mode.

12.1 Verify Function, continued

F4 Zero: The **F4** key will zero the Expansion and Pressure Readings.

F5 Auto: The **F5** key will allow the operator to enter a specific test pressure for verification purposes. When **F5** is pressed, the display will prompt the operator to enter a verification pressure. Type in the pressure and press **Enter**. The system will automatically pressurize the cylinder to that pressure.

F6 BLEED: The **F6** key will cause the system to release all pressure from the cylinder.

F7 Not used at this time

F8 PSI/BAR: Allows operator to switch between PSI and Bar units as desired.

F9 INCR: The **F9** key allows the operator to set the expansion increments used in the Verify Function.

F10 ABORT: The **F10** key will abort the verification program, and exit to the main menu.

12.2 Expansion Reading Verification:

Proceed as follows to check the display monitor expansion reading.

- A. A set of precision laboratory weights, (2) 50gram weights are required to verify and calibrate the system expansion reading. A Calibration Weight Set may be purchased at most laboratory supply stores or from Galiso (37-11-8015).
- B. Press **F4** to Zero the readings. The display Monitor Expansion reading will return to zero.
- C. Open the door on the left hand side of the Recortest III Control console and locate the Expansion Bowls and the Load Cell Assembly. See Figure 2-2 in Section 2.
- D. Carefully place (2) 50 gram weights on the cross piece which supports the Expansion Bowls. See Figure 12-2
- E. Check the Display Expansion reading. The Display Expansion reading should read the weight total +/- 0.5 gm/cm which reflects the load on the cross piece.
- F. If the Display Expansion reading matches the calibration weight within +/- 0.5 gm/cm calibration of the expansion reading is NOT required.

12.2 Expansion Reading Verification, continued:

- G. If the Display Expansion reading does not match the calibration weight within ± 0.5 gm/cm, then the Display expansion reading is in need of calibration. Calibrate the Display expansion reading as described in Section 8.
- H. Remove the Calibration Weights from the Expansion Bowls.

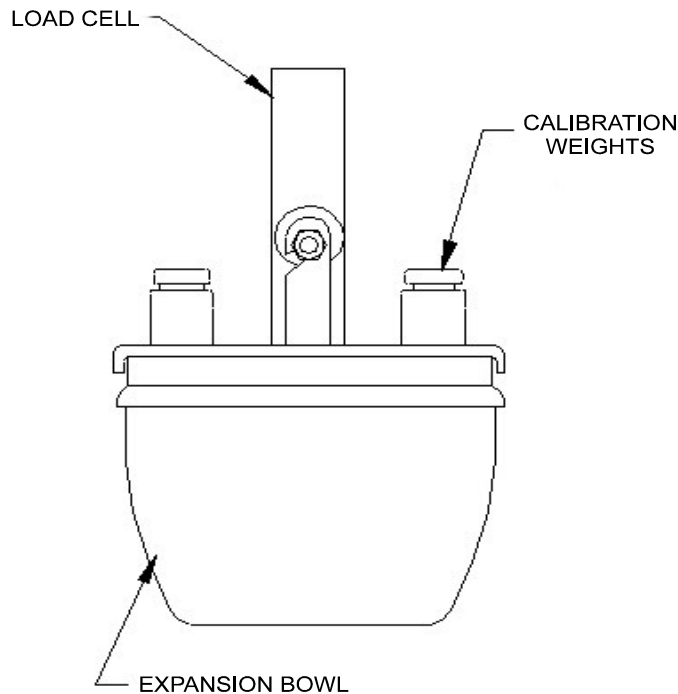


Figure 12-2
Expansion Bowl

12.3 Pressure Reading Verification:

Proceed as follows to check the Display Monitor pressure reading against the Master Gauge pressure reading.

- A. Press **F5**. The computer will prompt the operator to enter a pressure. Type in the pressure (in PSI) and press **Enter**. The system will pressurize the Calibrated Cylinder to that pressure. Make certain this pressure does not exceed the Calibrated Cylinder.
- B. Check the reading of the Master Gauge, the Master Gauge pressure reading should match the Display Monitor pressure reading within 1 percent of the total pressure reading.
- C. If the Master Gauge pressure reading (as corrected by the Gauge Certification Sheet) matches the system pressure reading with 1%, the system pressure reading is accurately calibrated and no adjustment of the system pressure reading is required.

12.3 Pressure Reading Verification, continued:

- D. If the Master Gauge pressure reading does not match the system pressure reading within 1%, the system pressure reading is in need of calibration. Calibrate the pressure reading as described in Section 14.0, Pressure Calibration.

- E. Press **F6** to release pressure from the Calibrated Cylinder, the Display Monitor pressure reading will return to Zero.

Press **F10** to abort the verification program and exit to the Main Menu.

1. Bring up the Main Menu on the Display Monitor. The Main Menu will appear on the Display Monitor when power to the system is first turned on, or after exiting from another menu.
2. When the Main Menu appears on the Display Monitor, use the Arrow Keys to select the Calibrate Menu and press **Enter**. Highlight the Expansion Calibration and press **Enter** to begin the Expansion Calibration (Load Cell) program. A bowl selection option will now be given. Select which bowl to use, by pressing **1** or **2**. After selecting the bowl to use, the selected bowl will now drain.

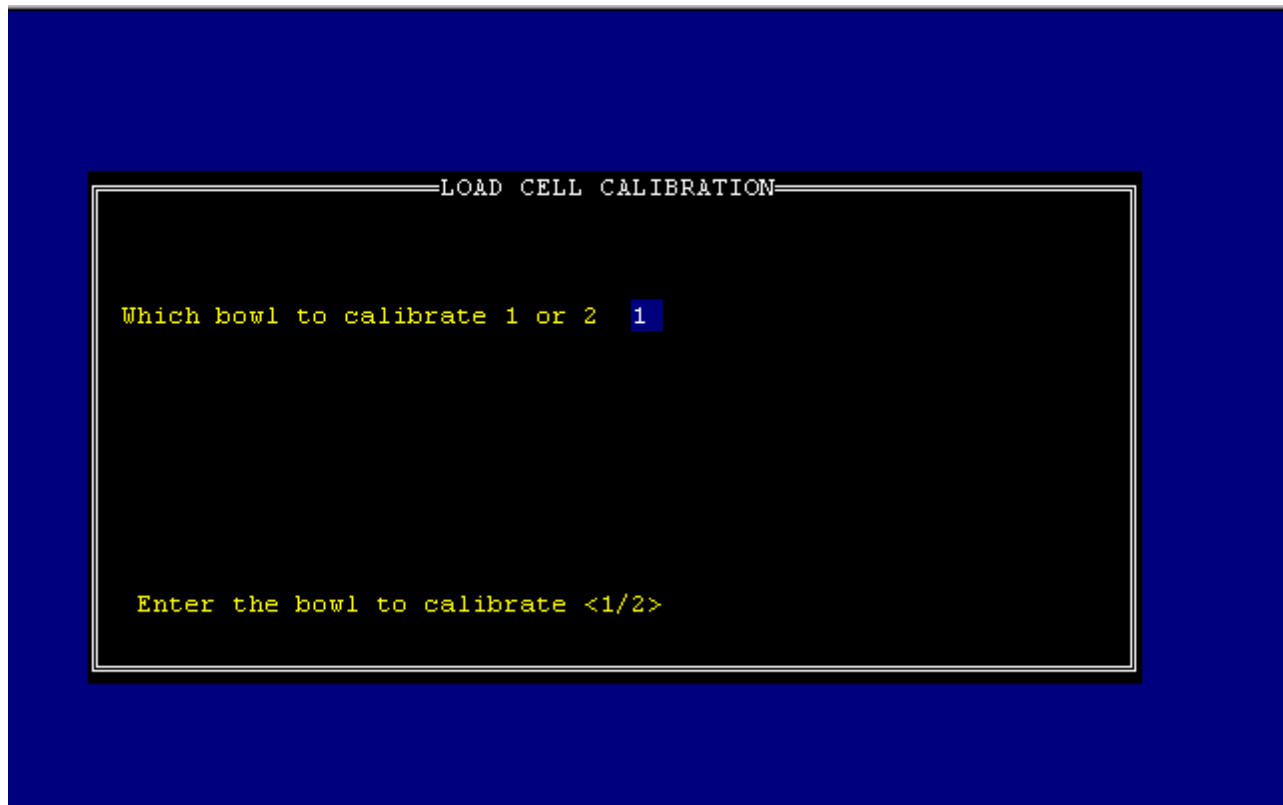


Figure 13-1
Load Cell Calibration

3. The Display Monitor will prompt the operator to place the calibration weights on the Expansion Bowl.
 - A. A set of precision laboratory weights (Calibration Weight Set is required to verify and calibrate the Display Monitor expansion reading. The Calibration Weight Set should provide two 50 gram weights.
 - B. Open the door on the left hand side of the Recortest III and locate the Expansion Bowl and Load Cell Assembly.
 - C. Carefully place two 50 gram test weights on the cross piece which supports the Expansion Bowl as shown in Figure 12-2.
4. The Display Monitor will prompt the operator to enter the calibration weight. Type in the calibration weight and press **Enter**.
5. The Display Monitor will show several diagnostic values and then display a message indicating that the Expansion Calibration program has been completed. Remove test weights
 - A. If the Display Monitor shows a message, which indicates that there has been an error in the expansion calibration procedure, repeat Steps 1-4, above.
 - B. If the Display Monitor continues to indicate that there has been an error in the expansion calibration procedure, contact Galiso Inc. for further instructions.
6. Press any key to exit from the Expansion Calibration procedure to the Main Menu.

1. Bring up the Main Menu on the Display Monitor. The Main Menu will appear on the Display Monitor when power to the system is first turned on, or after exiting from another menu.
2. When the Main Menu appears on the Display Monitor, use the Arrow Keys to select the Calibrate Menu and press **Enter**. Highlight the Pressure Function and press **Enter** to begin the Pressure Calibration program.
3. The Display Monitor will prompt the operator to select which test jacket will be used for the pressure reading calibration program. Type in the number of the test jacket (1-4), and press **Enter**.
4. Next the Display Monitor will cue the operator to load the Calibrated Cylinder into the selected jacket.
 - A. If the Calibrated Cylinder is not yet loaded in the test jacket, attach the water filled Calibrated Cylinder to the test head (**see Figure 4-8**) and load the cylinder and test head into the test jacket.
 - B. Attach the Master Gauge Assembly to the test head as shown in Figure 2-6. Attach the Head Seal Hose to the test head.
- C. Attach the Test Pressure hose to the Master Gauge Assembly as shown in Figure 2-6.
5. When the Calibrated Cylinder has been loaded into the test jacket, press any key to continue with the Pressure Calibration program. The Pressure Calibration Menu will appear on the Display Monitor, as shown in Figure 14-1, below.

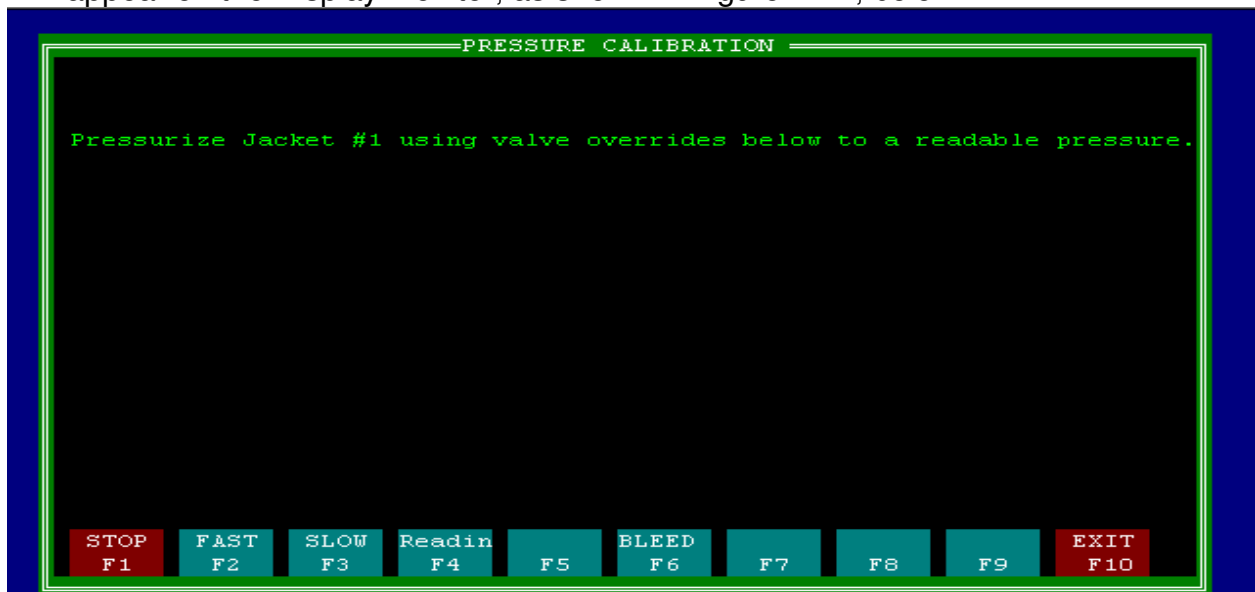


Figure 14-1
Pressure Calibration

6. The Pressure Calibration Menu will allow the operator to manually control pressurization. The Function Keys control pressurization and initiate additional program commands. The effects of the Function Keys are shown below.

F1 STOP Pump: The **F1** key will stop the pump from further pressurizing the cylinder.

F2 Pump FAST: The **F2** key will cause the pump to enter the Pump Fast Mode.

F3 Pump SLOW: The **F3** key will cause the pump to enter the Pump Slow Mode.

F4 Reading: The **F4** key will prompt the operator to check the Master Gauge pressure reading and enter the pressure reading into the computer. The computer will use the Master Gauge pressure reading to calibrate the Display pressure reading and automatically release press.

F6 BLEED: The **F6** key will cause the system to release all pressure from the cylinder.

F10 EXIT: The **F10** key will exit to the Main Menu.

7. Next, the computer will cue the operator to use the Function Keys to pressurize the cylinder to a measurable pressure.
 - A. Carefully pressurize the cylinder using the **F2** key for fast pressurization, the **F3** key for slow pressurization, and the **F1** key to stop pressurization.
 - B. Pressurize the cylinder until the Master Gauge Assembly indicates a readable pressure (i.e. 5000 psi). Press the **F1** key to stop pressurization.
 - C. Be careful not to exceed the range of your calibrated cylinder.

8. Press the **F4** Key. The computer will prompt the operator to enter the Master Gauge pressure reading. Type in the Master Gauge pressure reading (as corrected by the Gauge Certification Sheet) and press **Enter**. This Display Monitor will show several diagnostic values and then indicate that the pressure reading has been properly calibrated.
 - A. If the Display Monitor shows an error message, repeat the calibration procedure using a different pressure. If the Display Monitor continues to show the error message, contact Galiso Inc. for further instructions.
9. When the pressure calibration procedure is complete, allow the system to release pressure from the cylinder, then press any key to exit the Pressure Calibration program and return to the Main Menu.

1. Cylinders to be tested must be subjected to an internal and external visual inspection in accordance with CGA pamphlet C-6, "Standard for Visual Inspection of Compressed Gas Cylinders."
 - A. 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.
 - B. Any cylinders that do not pass the inspection should be removed from further service. It is not necessary to test obviously defective cylinders.
2. **CAUTION:** The Hydraclose Test Head must be securely engaged with 3 to 5 threads in the cylinder neck in order to safely seal. All cylinders should be inspected before testing to insure that the neck threads are not excessively worn or damaged. If the cylinder has inadequate neck threads, either the neck threads should be re-tapped or the cylinder should be condemned. There is no need to test an obviously defective cylinder.
3. Prior to hydrostatic testing, each cylinder should be tapped with a 1/2 pound machinist's hammer. If the cylinder has a dull or dead ring, it should be internally cleaned by tumbling or other suitable means. If the dull or dead ring persists after the cylinder has been internally cleaned, the cylinder must be condemned.
 - A. Internal cleaning of the cylinder should be performed prior to hydrostatic testing. Internal cleaning methods such as tumbling with abrasives or shot blasting can slightly weaken the cylinder wall
4. Remove the cylinder valve and tag it with the cylinder serial number so that the valve may 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.
5. If the cylinder has contained a flammable gas it must be washed prior to internal visual inspection. Fill the cylinder with water and then dump it out, or purge cylinder with clean, dry air or Nitrogen.

6. Use a Galiso Opti-Lite, Fiber Optic Inspection Light or low voltage bulb (to prevent the possibility of electrical shock) 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.
If the cylinders to be tested are for oxygen use, Galiso offers a Ultra-Violet inspection light which radiates a brilliant light indicating oil or grease contamination presence.
7. Cylinders that pass visual inspection should be filled with clean, filtered water and allowed to stand for at least three (3) hours, or as long as necessary, to allow the temperature of the water in the cylinder to stabilize at room temperature.
 - A. Add water as needed to **completely** fill the cylinder before testing.
 - B. The Galiso ACF Automated Cylinder Filling Station rapidly fills the cylinder with water and shuts off when the cylinder is full.
 - C. The temperature of the water in the cylinder should be within five (5) degrees Fahrenheit of the temperature of the water in the test jacket. A large variation of the two water temperatures will cause inaccurate test results.
8. The exterior of each cylinder should be cleaned of dirt, scale, grease, oil and any other contamination before the cylinder is loaded into the test jacket. The test jacket should be cleaned periodically to remove any accumulation of dirt or debris as needed, or at least once every three (3) months.

1. Bring up the Main Menu on the Display Monitor. The Main Menu will appear on the Display Monitor when power to the system is first turned on, or after exiting from another menu.
2. When the Main Menu appears on the Display Monitor, locate the Test Cylinders Menu by using the Arrow Keys and press **Enter**. Highlight the Test Cylinders Function and press **Enter**.
3. Use the **F4** and **F5** Function Key to enable both test jackets.
 - A. When the test jacket is enabled, the Jacket Enable Indicator at the top, enclosed in a green rectangle and the word "Enabled" will appear at the bottom of the specification column

If the cylinder has failed the test, the Disposition Code that appears on the Inspection – Disposition line will change to a Disposition Code, which indicates the reason that the cylinder failed the test. The meanings of the Disposition Codes are given below.

PA : Passed

FP : Failed 10% Permanent Expansion

FV : Failed Visual Inspection (not valid when manufacturing cylinders.)

PAFE : Passed Hydrostatic (10% Perm.). Failed Elastic Expansion (not valid when manufacturing cylinders.).

4. The Test Menu will display a series of test specification cues. Refer to section 10-2 for a description of the Test Menu and an explanation of the meaning of each cue.
 - A. The cursor will first appear next to the "Remarks" cue for the cylinder to be tested in Jacket #1. Type in appropriate remarks (i.e. cylinder owner, etc.) and then press **Enter**.
 - B. The cursor will appear beside the "Serial Number" cue. Type in the cylinder serial number of the cylinder to be tested in Jacket #1 and press **Enter**.

- C. Next the cursor will appear beside the “Cylinder Code” cue.
- i. See section 19 “Cylinder Code Table” for a complete listing of the cylinder codes that are supplied with the standard Recortest III operating software. Type in the appropriate cylinder code and then press **Enter**. When a cylinder code is used, the remaining specification cues will be answered automatically and the cursor will appear in the Test Result box on the Inspection – Disposition line. Proceed to Step 6 below.
 - ii. If you wish to test a cylinder with specifications that are **NOT** included in the Cylinder Code Table, type in the letter **M** and press **Enter**. The cursor will appear beside the next specification cue. Specifications may then be entered manually as described in Steps 5D through 5H below.
- D. Next the cursor will appear beside the “Cylinder Size” cue. Type in the dimensions of the cylinder and then press **Enter**.
- E. The cursor will then appear beside the “D.O.T./C.T.C. Rating” cue. Enter the D.O.T./C.T.C. rating of the cylinder and then press **Enter**.
- F. The cursor will appear beside the “Test Pressure” cue. Type in the test pressure and then press **Enter**.
- G. Next the cursor will appear beside the “Max Elastic Exp” cue. Enter the maximum allowable elastic expansion and then press **Enter**.
- H. The cursor will then appear beside the “Test Time” cue. Type in the desired test time and press **Enter**. If the **Enter** is pressed before a test time is entered, the system will set test time at 30 seconds.
6. After all test specifications have been entered, the cursor will appear in the Test Result Box on the Inspection – Disposition line. This line is for recording the results of the Visual Inspection of the cylinder (see Cylinder Preparation, Step 6, on 13-1 of this section) and for reporting the results of the hydrostatic test.
- A. If the cylinder has passed Visual Inspection, simply press **Enter**., the computer will automatically enter the letters “PA” (Pass) on the Inspection – Disposition line.

- B. If the cylinder has failed Visual Inspection, type in the letters “FV” (Fail) and press **Enter**. The system will skip the remainder of the test cycle for that cylinder and include the cylinder in the final test report along with a test result code noting the cylinder has failed the visual examination.
7. If the Extended Inputs option was selected in Parameters Function, the following cue will also need to be answered by the operator:
- H. **Owner:** The owner of the cylinder.
 - I. **Owner’s Account Number:** The owner’s account number.
 - J. **Cylinder Mfg:** The cylinder manufacturer (up to 8 characters).
 - K. **Year of Mfg:** and manufacture date (up to 8 characters).
 - L. **Gas Service:** The type of gas that the cylinder has contained (up to 7 characters).
 - M. **Enter Plus/Star:** Includes a note in the test report which indicates if the cylinder will be Plus/Star stamped (up to 2 characters).
 - N. **Operator:** operator initials
8. After the results of the visual inspection have been entered, the cursor will appear next to the “Remarks” cue in the Jacket 2 specification column. Repeat steps 5 and 6 above to enter all specifications for they cylinder that will be tested in Test Jacket 2.
- A. If you notice an entry mistake after entering specifications for Jacket 1 and/or Jacket 2, press the **F1 / Abort** key to return to the first specification cue.
9. The first test should be on the user’s calibrated cylinder, in order to have record showing that the system is accurate to 1%.

The Test Report may be printed daily or whenever conditions demand. All specifications and results that have been entered since the last Test Report was printed are stored on the system hard drive. After the Test Report has been printed, the operator has the options to save all data that was just printed, or erase the file from the hard disk drive to make room for new data.

The printed Test Report is then filed by the operator in accordance with D.O.T. CFR 49 Section 173.34 (e) (5). A sample copy of the Recortest III Test Report is shown below

GALISO INC
22 PONDEROSA CT
MONTROSE, COLORADO 81401 USA

HIGH PRESSURE CYLINDER RETEST REPORT
 PPP - Pass Visual,passed%Perm,Passed REE FAA - Failed Visual,Abort%Perm,Abort REE PPF - Pass Visual,Pass 10% Perm, Fail REE
 PAA - Pass Visual,Abort % Perm, Abort REE PFA - Pass Visual, Fail % Perm, Abort REE

DOT/CTC Registration #???? Test Date: 08/02/2004 Operator Signatures:_____ DATE:_____

I hereby certify that all the following tests were made under my supervision and in accordance with DOT/CTC Regulations.

Test #	Time	Serial #	Cylinder Size	Gas Service	Cylinder MFG. Date	Rating	Pressure Test Unit	Pressure Actual Unit	Test Time	Expansion Total	Expansion Perm	Expansion %Perm	Expansion Elas	Ree	Disp	Remark
1	14:53	12	400			3AA-3600	6000 PSI	0 PSI	30	0.0	0.0	0.0	0.0	230.0	FAA	GH
2	14:53	12	400			3AA-3600	6000 PSI	0 PSI	30	0.0	0.0	0.0	0.0	230.0	FAA	GH
DM					/											

FIGURE 17-1:Recortest III Test Report

The standard Recortest III Test Report contains the following specifications for each cylinder tested.

The Extended Recortest III Test Report can be selected from the Parameters Menu and lists the following additional specifications; cylinder manufacturer, date of manufacture, cylinder service, capacity and eligibility for plus stamp. Test results for each cylinder include the total expansion, permanent expansion, percent permanent expansion, elastic expansion and a disposition code which indicates the status at the end of the test. The Test Report also includes the D.O.T./C.T.C. Registration Number of the facility, the date of the test, and the time of the test.

The following is a description of the procedure for printing a Test Report.

1. Bring up the Main Menu on the Display Monitor. The Main Menu will appear on the Display Monitor when power to the system is first turned on, when the system is reset, or after exiting from another menu.
2. Prepare the Printer as described in Section 4.0, Printer Set Up. Line up the perforation between the first two sheets of paper with the top of the guide on the printer carriage head.
3. Select either the Files Menu or the Edit Menu with the Arrow Keys. Press Enter. Highlight the Report Function with the Arrow Keys and press Enter.
4. The system will ask "What files, including path and drive do you want to search?" Press Enter to select the file name showing on the screen. If the operator wants to search a different file or drive (such as the floppy drive), type in the file you want to search and press Enter.
5. A list of the current files will appear on the screen. Use the Cursor Control Keys to select the desired file and press Enter. Highlight the desired option, proceed with the commands at that option, then press Enter.
NOTE: Archived files on floppy disks can be accessed by using A:*.res.
6. The Primary Menu Screen will appear listing display options for running the report. Up to two options may be selected for a report.

PRINT THE WHOLE FILE: Will print a report of all information in the file.

DOT/CTC RATING: Prints a report only on selected cylinder specifications.

GAS SERVICE: Selects specified service products for the report

CYLINDER OWNER: Owner of Cylinder

DISPOSITION: Input a selected Disposition for a report on tested cylinder with a specific disposition (i.e. PA, FV).

REMARK: Input the Remark to search for.

RANGE OF TEST DATES: Choose the beginning and ending test dates you want included in the report.

OPERATOR: Retest Operator

CHANGE THE DATA FILE: Returns to the statement “What files, including path and drive do you want to search.” Refer to command number 4 on the previous page for instructions.

VIEW RECORDS: Allow the operator to view a record on a specific test. This command will also allow the operator to print a report on a selected tested cylinder

ARCHIVE FILE: Stores files onto hard-drive.

QUIT: Will return you to the Main Menu.

7. After the Test Report has been printed, the Display Monitor will show the message “Do you want to save old results to a unique file name? (Y/N).”
 - A. Press N to delete the information or Y to save the information.
 - B. If the information is continually saved and never deleted, the computer memory will eventually become full. If the computer memory becomes full, print a report and then press Y in response to the Delete/Save question.
8. When the Test Report is complete, tear off the report at the perforation. File the Test Report and maintain it for the life of the test.

This section describes the general maintenance requirements for the RECORTTEST III System.

18.1 RECORTTEST III Control Console Components:

Keep the Control Console clean and dry and free of dirt and debris. Regularly inspect the plumbing components of the Control Console for leaks. Also inspect the lines which connect the Control Console to the test jackets and pressure supply for leaks.

Regularly inspect the Expansion Bowl Assembly. Open the door on the side of the RECORTTEST III Control Console to gain access to the Expansion Bowl. Use a mirror to inspect the Expansion Bowl, if dirt and residue have accumulated in the Expansion Bowl, carefully remove the Expansion Bowl and clean it. Replace the Expansion Bowl as described in Section 4.5, Expansion Bowl Setup.

Inspect the high pressure control valves in the lower portion of the Side Valving Enclosure. The high pressure control valves are hard seat valves and therefore, any foreign material on the valve seat may cause the valve to leak. The computer will notify the operator when there is a system leak, however it cannot tell which or if a particular valve is leaking. To correct a leak, first tighten the Packing Adjustment Nut. If this fails to control the leak, inspect the valve seat and stem for wear. If the seat and stem appear to be in good condition, replace the valve packing material.

18.1.1 RECORTTEST Printer :

In order for the manufacturer's warranty to be valid, the Printer must be kept clean and dry. In accordance with the manufacturer's warranty, the customer will be responsible for repair of any damage due to neglect or abuse of the Printer. The Printer must be operated in a clean environment or housed in a protective enclosure (such as the RECORTTEST III Control Console with the rear door closed) to prevent dirt and debris from accumulating inside of the machine.

Refer to the manual supplied with the Printer for complete maintenance details and the manufacturer's warranty.

Replace the ribbon on the Printer when necessary.

18.2 HYDRACLOSE[®] Test Heads:

Change the "Speed Seals" when they become excessively worn or ragged to avoid leakage and damage to the 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 "O"-Ring seal in the Quick Connect Fittings should be changed when wear prevents proper sealing.

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.

18.3 HYDRACLOSE[®] Test Jackets :

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.

18.4 Calibrated Cylinder :

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.

18.5 Master Gauge Assembly :

In accordance with D.O.T. Regulations, the Master Gauge Assembly must be re-calibrated at least once per year.

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

18.6 High Pressure Pump :

The intensifier pump, mounted on the RSP-10D module, is used to develop the hydrostatic pressures used in cylinder testing. This pump requires continuous lubrication. Lubrication is provided by the filter/lubricator unit also mounted on the RSP-10D, see figure 18-1.

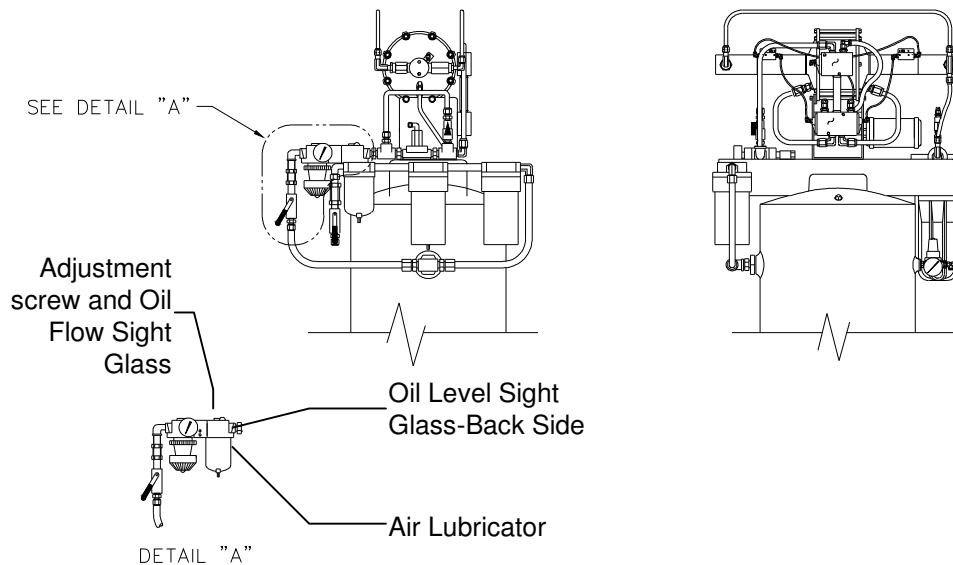


Figure 18 - 1
High Pressure Pump

Check the Air Lubricator oil level daily to ensure an adequate oil level. Fill as necessary with 10 weight non-detergent oil only.

Adjust the oil flow rate to approximately one drop for each twenty (20) pump strokes. The oil flow sight glass and oil flow adjustment screw are located on the top of the lubricator unit, see figure 18-1.

Every 3-4 months disassemble the intensifier pump and grease both hydraulic cylinders and the air cylinder. Use Dow Corning 33 lubricant only. Do **NOT** use petroleum based lubricants as they may contaminate cylinders used for oxygen service. Check and replace worn pump seals and packing as needed.

Also, it may occasionally become necessary to adjust the pump speed. Proceed as described in Section 5.4, Pump Speed Adjustment.

18.7 Auxiliary Equipment:

The maintenance requirements for auxiliary cylinder handling equipment which is typically used in conjunction with the RECORTTEST III System are described in their respective manuals. A listing of standard auxiliary equipment and their associated manual numbers is as follows:

<u>Equip. Model</u>	<u>Manual No.</u>
GVM-16G Valver	21-11-1002
PCT-122 Wash/Dry	21-11-1007

Additional equipment maintenance information is available from Galiso Customer Service at 1-800-854-3789.

18.8 Replacement Parts:

This section contains illustrations and tables identifying primary component spare parts for the RECORTTEST III system. If you have any questions or require any additional information regarding spare parts contact your Galiso Customer Service representative at 1-800-854-3789.

18.8.1 RECORTTEST III Console Replacement Parts:

RECORTTEST III TEST CONSOLE REPLACEMENT PARTS		
PART NUMBER	DESCRIPTION	QUANTITY
01-41-7084A	TRANSDUCER ASSY REC III	1
01-41-1330A	LOAD CELL ASSY REC III	1
01-43-1401B	BOARD ASSY RELAY OPTO REC III	1
37-11-8015	WEIGHT LAB 50G OHAUS	2
81-11-0166	VALVE AIR OPERATED 2 WAY NUPRO	2
81-11-0167	VALVE AO 2 WAY WHITEY	1
81-11-0224	VALVE E/P CONTROL 12 VOLT ARO	2
87-11-0048	KEYPAD MEMBRANE RECORTTEST III	1
81-11-0131	STEM VALVE SNO TRIK	2
81-11-0132	SEAL STEM SNOTRIK	4
81-11-0133	SEAT REPLACEABLE SNOTRIK	2
81-11-0197	STEM ACTUATOR SNOTRIK	1
81-11-0201	RING PACKING	2
81-11-0208	SPACER	1

**Table 18-1
Replacement Parts**

Recortest III Console

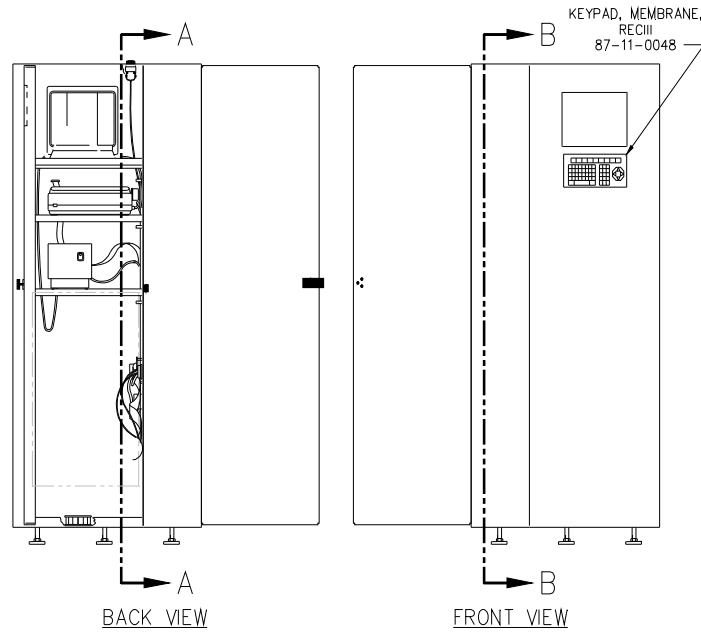


Figure 18 - 2

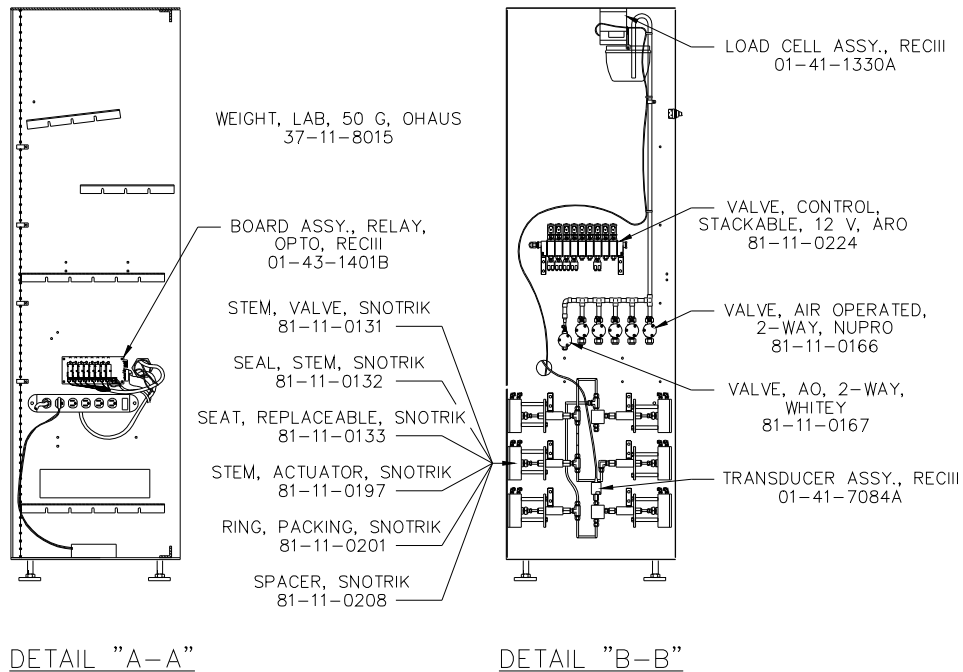


Figure 18 - 3

18.8.2 RSP-10D Replacement Parts:

RSP-10D replacement parts are tabulated below. Figures 18-4 and 18-5 depict the parts listed.

RSP-10D REPLACEMENT PARTS LIST		
ITEM NUMBER	DESCRIPTION	QUANTITY
40-11-3002	SEAL KIT	4
01-44-0536G	PUMP ASSY	1
36-11-0508	2" GAGE 160# G14397	1
36-11-0510	GAGE 300# G14399	1
36-11-0523	GAUGE 2" 160# 1/8" BKN	1
37-11-3002	REGULATOR MINI WATTS	1
37-11-3048	REGULATOR LARGE 125# 1/2'	1
40-11-3014B	SEAL KIT PUMP GDP-5SI	
54-11-0003	OIL NON DET. 10 WEIGHT	1 QUART
80-11-0040	FILTER	1
80-11-0042	FILTER 1/2"	1
80-11-0051	ELEMENT FILTER	1
80-11-0052	ELEMENT FILTER	1
80-11-0053	ELEMENT FILTER	1
80-11-0066	FILTER AIR LINE 1/2"	1
80-11-4009	FILTER ELEMENT WATER 5 MICRON	1
80-11-4024	LUBRICATOR 125 PSI 1/2 NPT	1
80-11-7001	MUFFLER 3/4" NPT	1
80-75-4008	HOUSING FILTER	1
81-11-0009	VALVE BALL 1/2 NPT	1
81-11-0023	VALVE CHECK OUT 11-5023S000	1
81-11-0024	VALVE CHECK IN 11-5024S000	1
81-11-0045	VALVE AIR PILOT 5 WAY	1
81-11-0077	VALVE CONTROL MINI 3W-5/32	2
81-11-0176	VALVE 2 WAY 1/2	1
01-31-1866A	VALVE HERION 1/2 3 WAY AIR PILOT	1
81-11-0216	VALVE PLUG 1/4 MPTX1/4 FPT	1
83-11-0030	VALVE CHECK 1/2" FPT	1
83-11-0047	SAFTEY VALVE 1/4" 125 PSI	1
83-11-2503	RELIEF VALVE 1/4"NPT 175PSI	1

Table 18-2
RSP-10D Replacement Parts

18.8.2 RSP-10D Replacement Parts, continued

RSP-10D

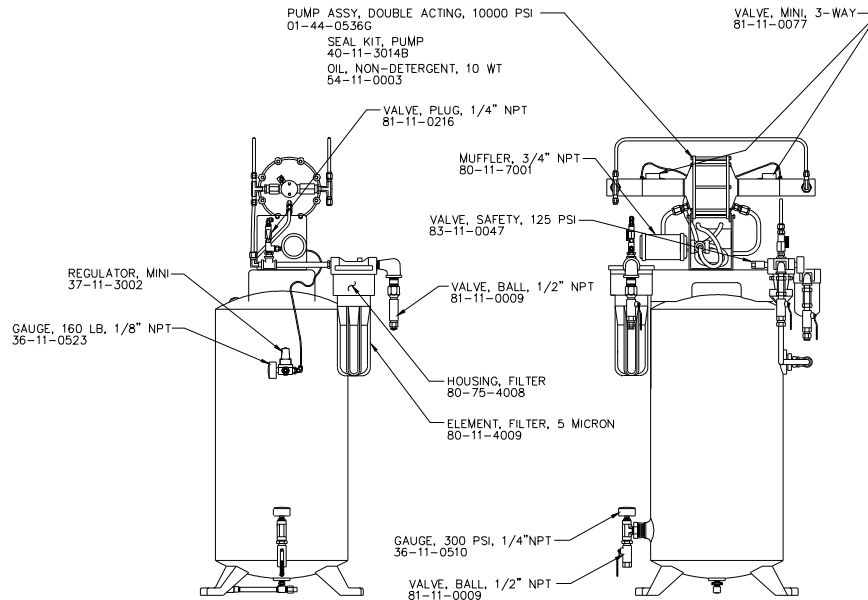


Figure 18 - 4

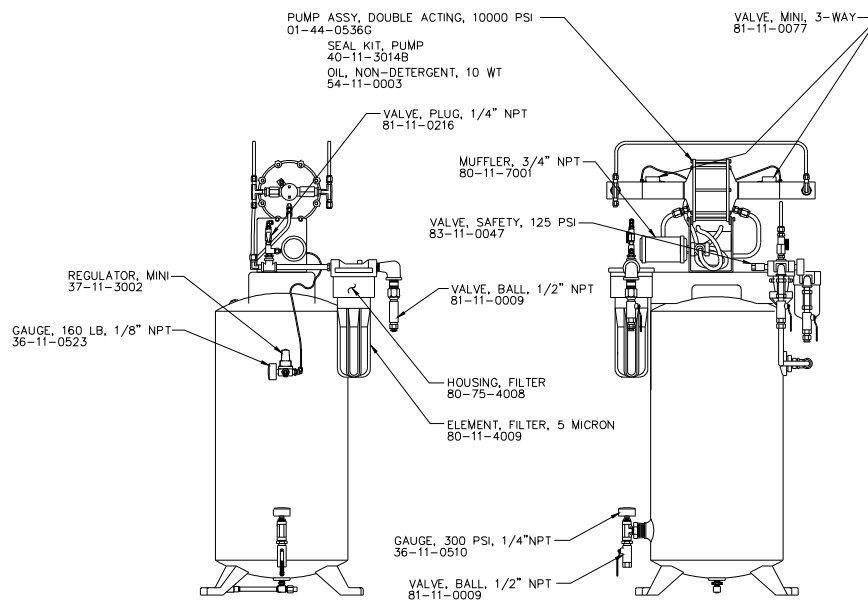


Figure 18 - 5

18.8.3 Other Replacement Parts

Additional replacement parts commonly required for RECORTTEST systems are listed below.

Additional RECORTTEST III Replacement Parts		
ITEM NUMBER	DESCRIPTION	QUANTITY
01-32-2534	SPEED SEALS, 3/4"	30
01-32-2493	BURST DISC, 6"	4

Table 18-3:Additional RECORTTEST III Replacement Parts

CYLINDER CODE TABLE

Code	Cylinder Size	DOT Rating	Test Pressure	Max. Expan.	Test Time	Cut Off	% Exp.
B	3 1/4 x 13	3AA-2015	3360	07.2	30	10	10
D	4 1/4 x 16-3/3AA	3AA-2015	3360	014.5	30	10	10
E	4 1/4 x 25-3/3AA	3AA-2015	3360	023.1	30	10	10
A1	20	3AA-2015	3360	018.2	30	10	10
A2	20	3AA-2015	3360	019.8	30	10	10
A3	40	3A-2015	3360	032.7	30	10	10
A4	40	3AA-2015	3360	041.3	30	10	10
A5	55	3A-2015	3360	045.0	30	10	10
A6	55	3AA-2015	3360	057.0	30	10	10
A7	55	3A-2015	3360	047.0	30	10	10
A8	80	3A-2015	3360	063.0	30	10	10
A9	80	3AA-2015	3360	080.0	30	10	10
A10	80	3A-2215	3700	058.0	30	10	10
A11	80	3AA-2215	3700	073.0	30	10	10
A12	110	3A-2015	3360	088.0	30	10	10
A13	110(CR-MO)	3A-2015	3360	110.0	30	10	10
A14	110	3AA-2015	3360	110.0	30	10	10
A15	125(CR-MO)	3A-2265	3775	110.0	30	10	10
A16	125	3AA-2265	3775	110.0	30	10	10
A17	150	3AA-2015	3360	133.0	30	10	10
A18	200	3A-800	3000	179.0	30	10	10
A19	200	3AA-1800	3000	225.0	30	10	10
A20	200	3A-2000	3333	178.0	30	10	10
A21	220	3A-2015	3360	178.0	30	10	10
A22	220(CR-MO)	3A-2015	3360	216.0	30	10	10
A23	220	3AA-2015	3360	216.0	30	10	10
A24	220(CR-MO)	3A-2260	3775	227.0	30	10	10
A24	250(W.D.)	3A-2260	3775	227.0	30	10	10
A25	250(CR-MO)	3A-2265	3775	227.0	30	10	10
A25	250(W.D.)	3A-2265	3775	227.0	30	10	10
A26	250	3AA-2265	3775	216.0	30	10	10
A27	300(CR-MO)	3A-2400	4000	257.0	30	10	10
A28	300	3A-2400	4000	0.0	30	10	10
A29	300	3AA-2400	4000	251.0	30	10	10
A30	400	3AA-2400	4000	343.0	30	10	10
A31	400	3AA-3500	5833	229.0	30	10	10
A32	400	3AA-3600	6000	230.0	30	10	10
A33	500	3AA-4500	7500	226.0	30	10	10
A34	660	3AA-6000	10,000	226.0	30	10	10
X	Calibration	3AA-6000	3,000	150.0	30	10	10

Table 19-1

PROBLEM	POSSIBLE CAUSE	SOLUTION (WHAT TO DO)
Expansion Increasing	Bowl Fill Valve Leaks	Remove valve from the expansion manifold and check to see if water is leaking through the valve.
	Head Seal Leak	Switch heads (if another is available. If problem ceases, repair faulty head. If another head is not available, using proper Head Retaining Device, leak check head around diaphragm and boot. If any leaks exist, repair head.
	Temperature Problem (problem will eventually stop as temperatures stabilize)	Check to see that all temperatures (incoming water, test jackets, filled cylinders, and ambient air temperature) are within 5 degrees of each other.
Expansion Decreasing in <u>ONE</u> Jacket only (negative expansion)	Head Boot not sealing against Jacket	Check inside sealing surface of Test Jacket to ensure that the surface is smooth
	Leak in expansion plumbing	Dry off all tubing with an air hose, and check for drops of water
	Opposite jacket expansion valve leaks	Remove 1/2" plastic tubing from the bottom of the valve, and check to see if water is dripping from the valve.
	Temperature problem (problem will eventually stop as temperatures stabilize)	Check to see that all temperatures (incoming water, test jackets, filled cylinders, and ambient air temperature) are within 5 degrees of each other.
Expansion Decreasing in <u>BOTH</u> jackets (negative expansion)	Bowl drain valve leaks	Remove 1/2" plastic tubing from the bottom of the drain valve, and check to see if water is dripping from the valve.
Expansion Unstable	Air trapped in expansion line	Flush expansion lines by filling with water, and removing the head seal to each jacket while it is selected in verify
	Damaged load cell	Remove expansion bowl from bolt on Load Cell, and see if expansion stabilizes without load. If expansion continues to drift, Load Cell may be damaged
	Vibration	Weigh Bowl must be stable. If there is a vibration coming through the floor, or other sources, this must be isolated

PROBLEM	POSSIBLE CAUSE	SOLUTION (WHAT TO DO)
Expansion does not change from zero, no matter what you do	Improper calibration factor set to zero	Recalibrate expansion following the procedure step by step as detailed in the instructions
	Cable not connected to the computer	Check load cell cable connection to the back of the computer
	Broken load cell	Unplug the load cell cable from the back of the computer. If reading then jumps to an enormous number, this could indicate a broken load cell
Pressure decreasing in <u>BOTH</u> jackets	Leak in high pressure bleed valve	Remove the 1/4" SST Tubing from the bleed valve (the line going out to the pit). If drops begin to form at elbow when the system is pressurized, the valve needs to be rebuilt (stem and/or seat)
Pressure decreasing in <u>ONE</u> jacket only	Leak in High pressure tubing	Check all connections from console out to jacket that has the leak
	OPPOSITE jacket high pressure valve leaks	Remove the 1/4" SST Tubing from OPPOSITE jacket high pressure valve (the line going out to the jacket). If drops begin to form at elbow when the system is pressurized, the valve needs to be rebuilt (stem and/or seat)
	Test head has high pressure leak	Switch test heads. If problem goes to the other jacket, test head needs rebuilding.
<u>Pressure</u> increasing	Pump is continuing to pump even though computer has tried to turn it off. (see also pressure unstable)	Pump control valve is stuck. Turn the air to the pump off. If this stops the increase, troubleshoot the control circuit from the control valve out to the pump.
<u>Pressure</u> unstable	Damaged pressure transducer	Attach master gauge to the system. Pressurize to a readable pressure and hold. If the pressure is stable on the gauge, but drifts on the transducer, replace the transducer.
<u>Pressure</u> does not change from zero, no matter what you do	Improper calibration factor set to zero	Recalibrate pressure, following the procedure step by step as detailed in the instructions
<u>Pressure and expansion</u> both readings are out of the ordinary i.e., both are unstable, or stay on zero	Possible damaged A/D card	Recalibrate both pressure and expansion, note the "Calibration Factors" of each, and call Galiso. Replace the A/D Card in computer

PROBLEM	POSSIBLE CAUSE	SOLUTION (WHAT TO DO)
Computer keyboard locks up	Power fluctuation	Reset the computer. If this problem becomes chronic, an uninterruptable power supply (UPS) may solve it. If not, check your incoming power
Computer new floppy disk will not format	Incompatible floppy disk	Check to see that the floppy disk that you are using is IBM compatible, with the specification: MFD-2HD or MF-2HD
Computer when the computer is tuned on, floppy disk light turns on, and computer seems to boot, but..... Monitor remains black	Monitor brightness adjustment is turned down	Adjust
	Monitor is not getting power: small green power light is on	Monitor may have a blown fuse. Factory repair is necessary
Monitor turns bluish color	Monitor is not getting signal from computer	Check to see that monitor cable from computer to monitor is properly connected
	Monitor card/ computer is not functioning	If possible, attach monitor and monitor card to another computer to verify each component.

1. **DURATION:** Galiso extends a one-year warranty from date of purchase, to the original purchaser, for all its manufactured products. For all spare parts purchases, Galiso extends the manufacturer's warranty or 90 days, whichever is longer. Soft goods parts, such as speed seals, washers, and O-rings, which are subject to wear in the normal course of operation, are not covered under this warranty. Collar Tooling products are warranted for six months.
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 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 are the responsibility of the customer requesting warranty service.

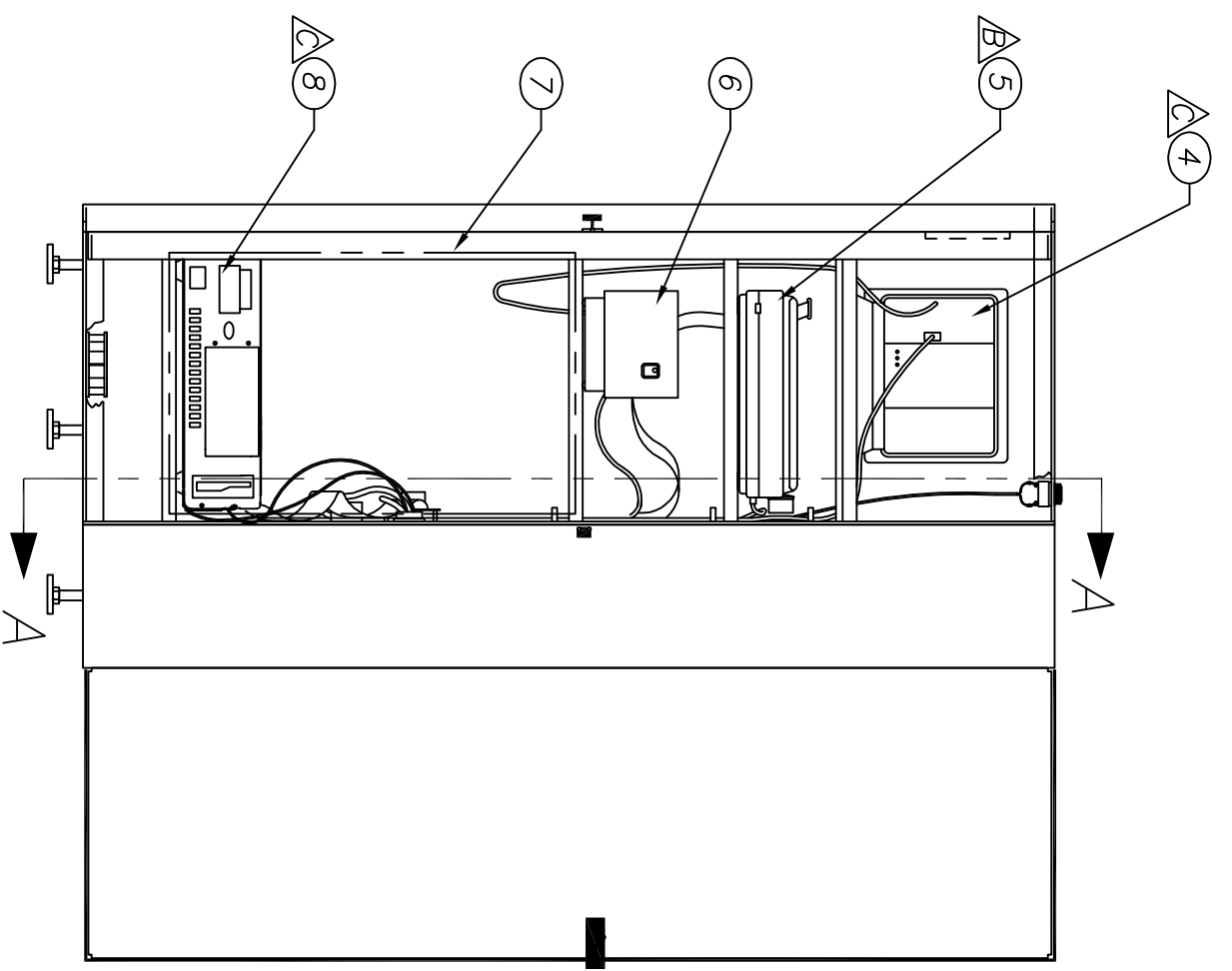
If the warranty determination indicates that the item is not covered by warranty, a repair/replacement cost estimate will be submitted to the purchaser for approval prior to initiating any repair work.

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.

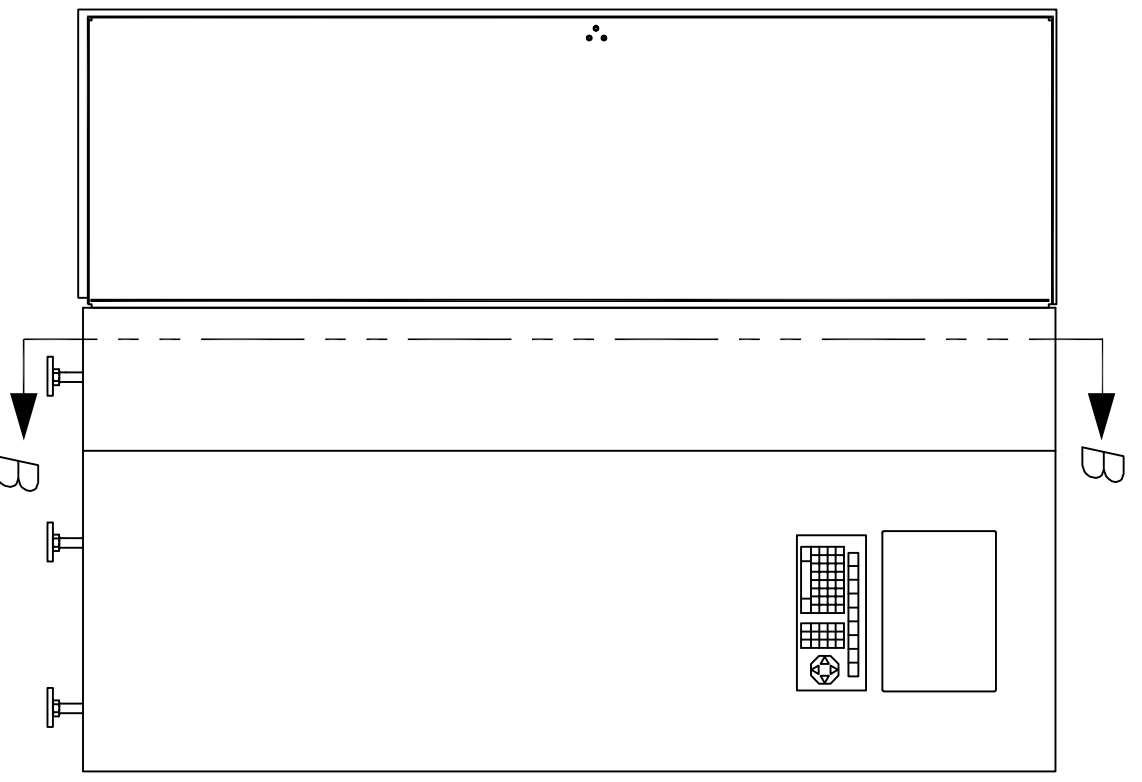
Galiso does not assume liability for any consequential, incidental, or special damages.

Liability under this warranty is limited to repairing, or replacing Galiso equipment items returned to the factory or an authorized facility.

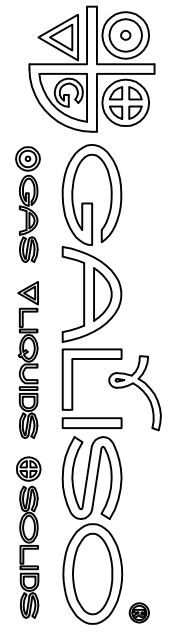
REV.	DESC.	DATE	BY:	APP.
A	ECN #93			
B	ECN #91	12-31-90	L.V.	
C	ECN #103	12-31-90	L.V.	



BACK VIEW



FRONT VIEW

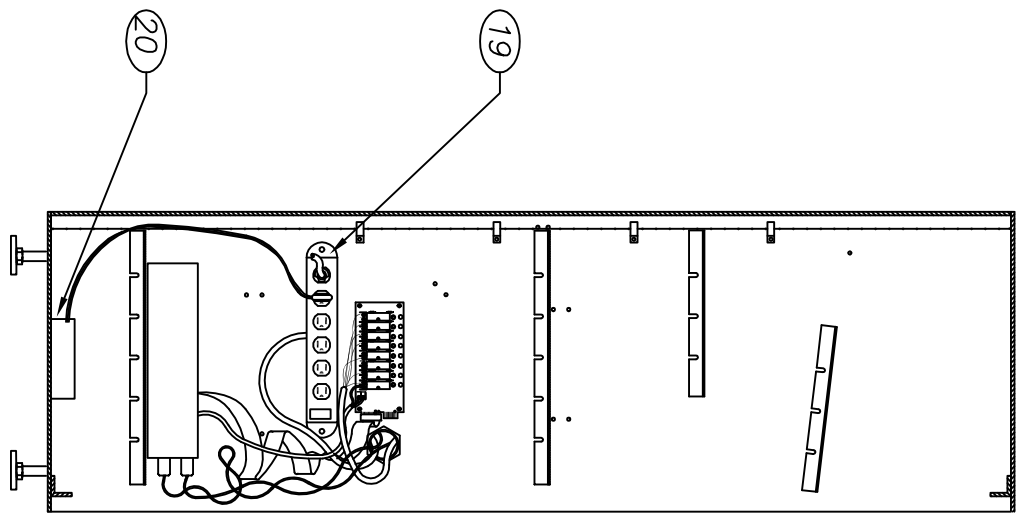


MATERIAL

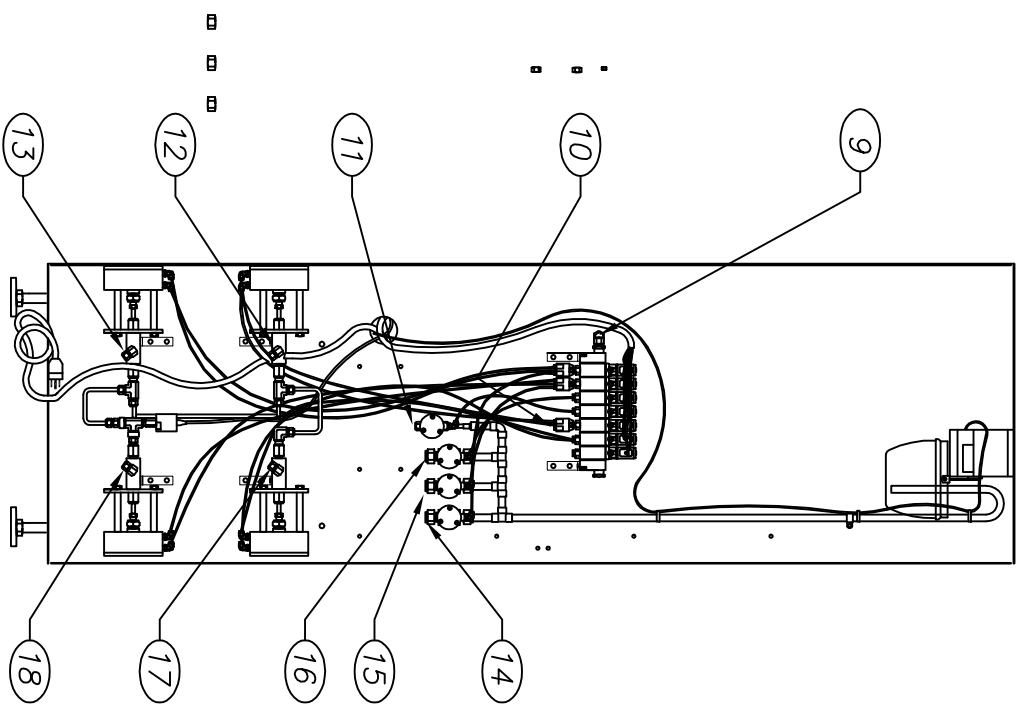
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.

RTT INSTALLATION				DRAWN		DATE
RECORTEST III				S. BROWN		5/4/90
DRAWING NUMBER	NEXT ASSEMBLY	SHEET	REVISION	CHECKED	ISSUED	DATE
01-73-1411		1 OF 3	C			
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:				SCALE	FILE NAME	
.X = ±				NONE	01731411	
				.XX = ±		
				.XXX = ±		

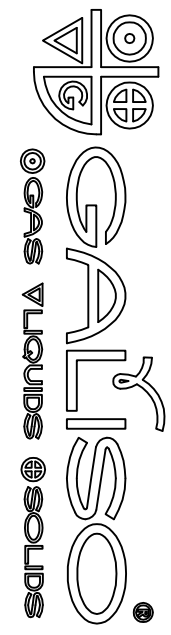
REV.	DESC.	DATE	BY:	APP.
A	ECN #93			
B	ECN #91	12-31-90	L.V.	
A	ECN #103	12-31-90	L.V.	



DETAIL "A-A"



DETAIL "B-B"



MATERIAL		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALSO INC.	
RTT INSTALLATION			
RECORTEST III			
DRAWING NUMBER	NEXT ASSEMBLY	SHEET	REVISION
01-73-1411		2 OF 3	C
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:			
.X = ±	.XX = ±	.XXX = ±	
DRAWN	CHECKED	ISSUED	DATE
S. BROWN			5/4/90
SCALE	FILE NAME		DATE
NONE	01731411		

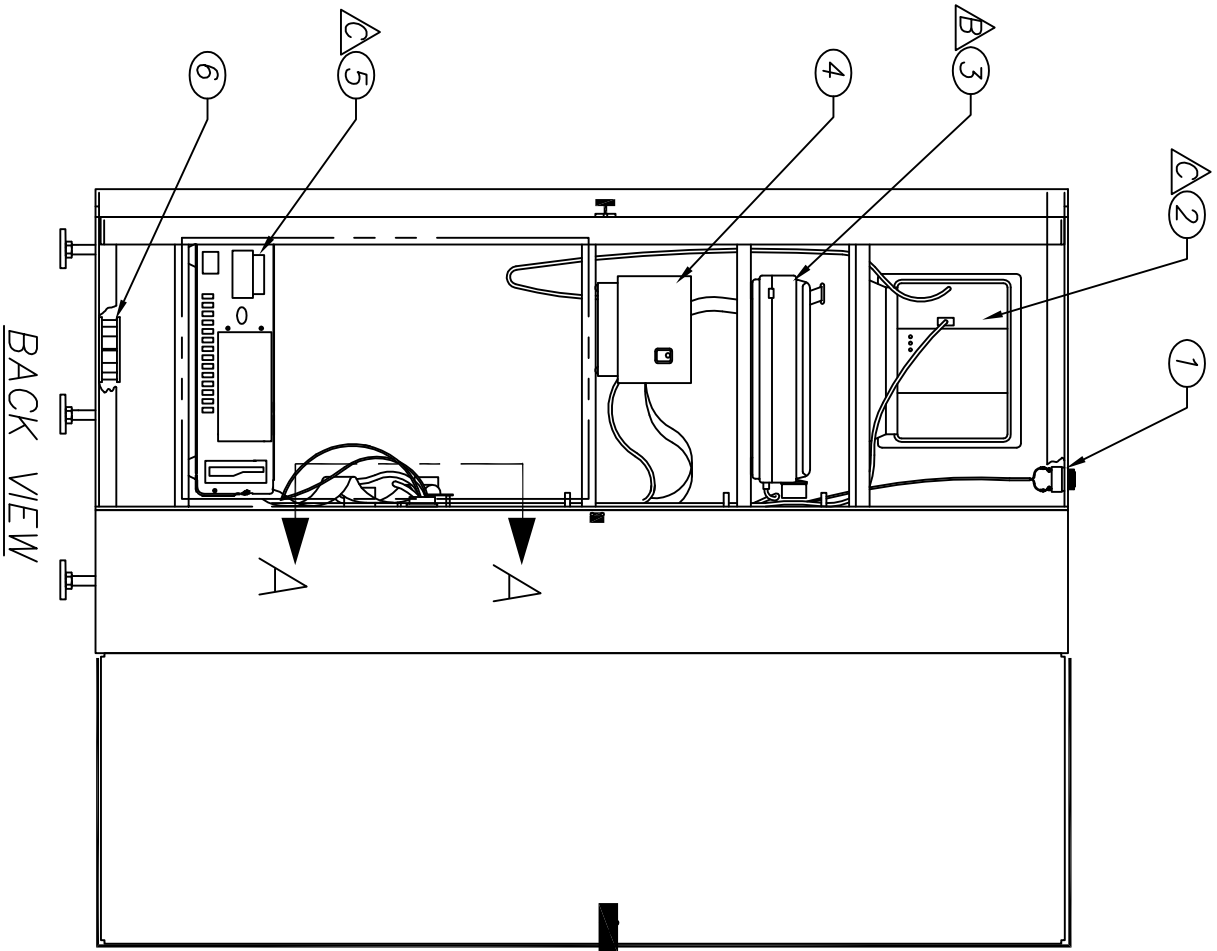
REV.	DESC.	DATE	BY:	APP.
A	ECN #93			
<u>A</u>	ECN #91	12-31-90	L.V.	
<u>A</u>	ECN #103	12-31-90	L.V.	

1. READ THE INSTRUCTIONS IN THE INSTALLATION MANUAL BEFORE ATTEMPTING TO INSTALL OR OPERATE THE RECORTEST III TEST SYSTEM
2. CAREFULLY UNCRATE THE RECORTEST III AND REMOVE ALL BANDING AND PADDING MATERIALS.
3. SELECT AN AREA TO INSTALL YOUR SYSTEM. A LOCATION THAT ALLOWS SUFFICIENT DRAINAGE TO PREVENT WATER FROM ACCUMULATING AROUND THE TEST SYSTEM. THE TEST SYSTEM MUST BE INSTALLED IN A LOCATION THAT DOES NOT ALLOW DIRECT SUNLIGHT TO SHINE ON THE CONTROL CONSOLE AND ALSO BE SHELTERED FROM BREEZES, WHICH COULD MOVE THE EXPANSION BOWL AND AFFECT THE TEST RESULTS
BOLT OR CLIP THE RECORTEST TO THE SHOP FLOOR
- A4. UNPACKAGE MONITOR AND POSITION INTO PLACE. (PLUG POWER TO ITEM #19)
- B5. UNPACKAGE PRINTER AND POSITION INTO PLACE. (PLUG POWER TO ITEM #19)
6. UNPACKAGE VOLTAGE REGULATOR AND POSITION INTO PLACE. (PLUG POWER TO ITEM #19)
7. REMOVE COVER PANEL TO PLACE ITEM #8. REPLACE AFTER CONNECTING ALL ELECTRICAL CONNECTIONS TO CPU, POWER STRIP, AND OPTO BOARD
- A8. UNPACKAGE CPU AND POSITION INTO PLACE. (PLUG POWER TO ITEM #6)
9. CONNECT CONTROL VALVE AIR LINE FROM RSP. (REF 01-71-1738 FOR PLUMBING DETAIL)
10. CONNECT PUMP VENT LINE FROM RSP. (REF 01-71-1738 FOR PLUMBING DETAIL)
11. CONNECT EXPANSION BOWL FILL LINE FROM RSP. (REF. 01-71-1738 FOR PLUMBING DETAIL)
12. CONNECT HIGH PRESSURE WATER FROM RSP. (REF. 01-71-1738 FOR PLUMBING DETAIL)
13. CONNECT HIGH PRESSURE LINE TO JACKET #1 (REF 01-71-1738 FOR PLUMBING DETAIL)
14. CONNECT EXPANSION LINE FROM JACKET #1. (REF 01-71-1738 FOR PLUMBING DETAIL)
15. CONNECT EXPANSION LINE TO JACKET #2. (REF 01-71-1738 FOR PLUMBING DETAIL)
16. CONNECT EXPANSION BOWL DRAIN LINE TO AN ADEQUATE DRAIN (REF 01-71-1738 FOR PLUMBING DETAIL)
17. CONNECT HIGH PRESSURE BLEED LINE TO AN ADEQUATE DRAIN. (REF 01-71-1738 FOR PLUMBING DETAIL)
18. CONNECT HIGH PRESSURE LINE TO JACKET #2. (REF 01-71-1738 FOR PLUMBING DETAIL)
19. 6 OUTLET POWER STRIP
20. AXIAL FAN (PLUG POWER TO ITEM #19)
21. FOR ELECTRICAL DETAIL REF ELECTRICAL SCHEMATIC 01-91-1743

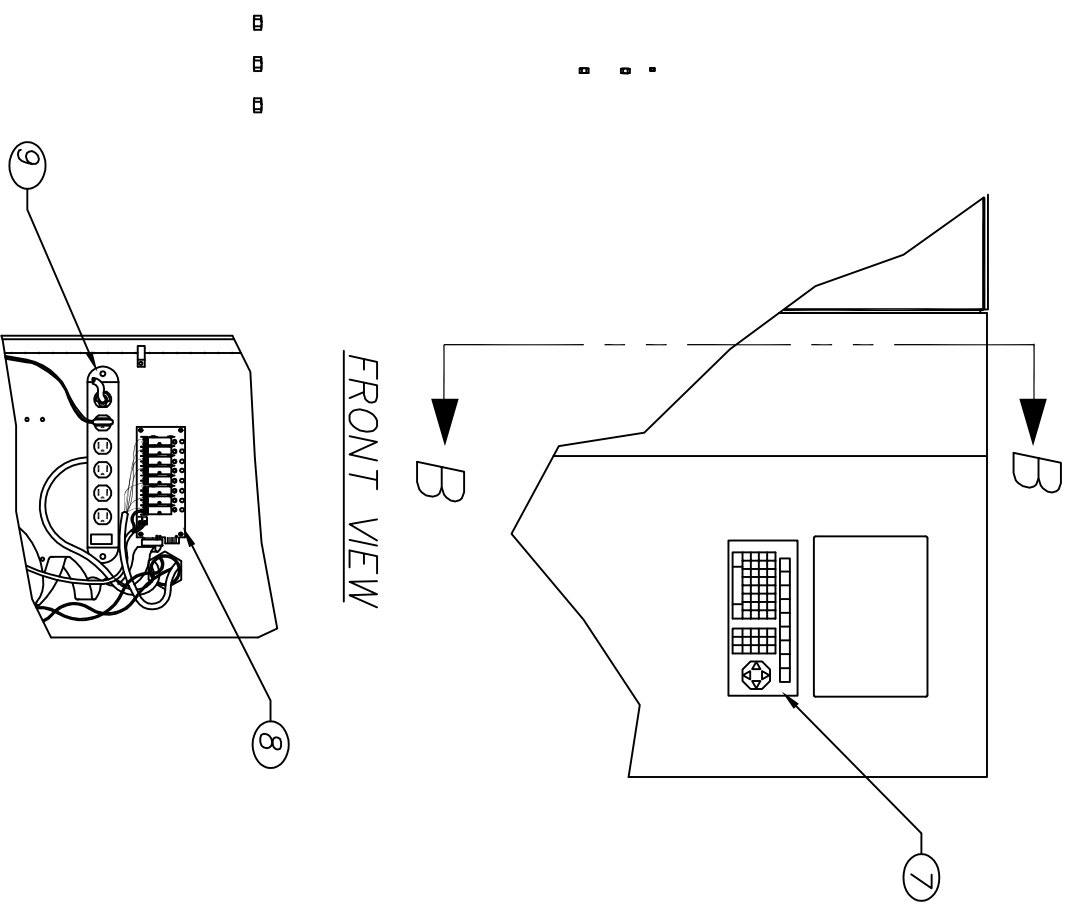
MATERIAL		DRAWN		DATE	
RTT INSTALLATION		S. BROWN		5/4/90	
RECORTEST III		CHECKED		DATE	
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.		DRAWING NUMBER	NEXT ASSEMBLY	SHEET	REVISION
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:		01-73-1411		3 OF 3	C
.X = ±		.XX = ±		.XXX = ±	
		ECN.	ISSUED	SCALE	FILE NAME
		#103	NONE		01731411



REV.	DESC.	DATE	BY:	APP.
A	ECN #93			
A	ECN #91	12-31-90	L.V.	
A	ECN #103	12-31-90	L.V.	

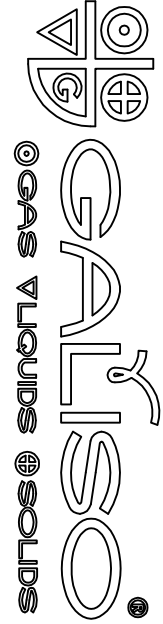


BACK VIEW



FRONT VIEW

DETAIL "A-A"



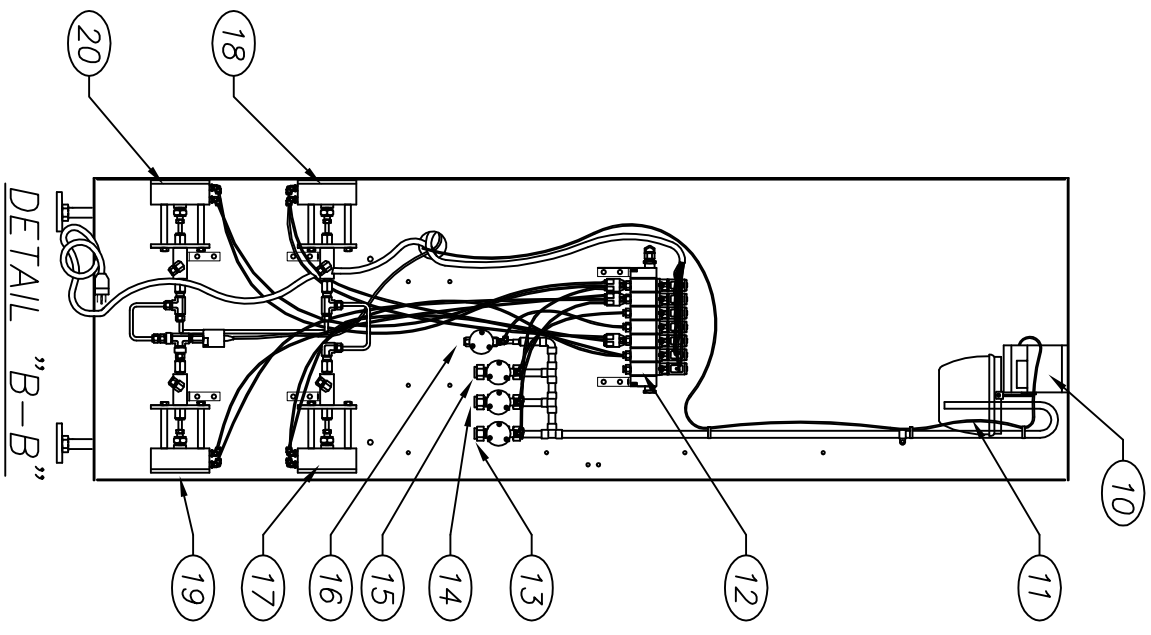
MATERIAL

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.

<p>RECORTEST III</p>				DRAWN	S. BROWN	DATE	5/7/90
				CHECKED		DATE	
DRAWING NUMBER	01-83-1411	NEXT ASSEMBLY		SHEET	1 OF 2	REVISION	C
<p>UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:</p> <p>.X = ± .XX = ± .XXX = ±</p>				SCALE	NONE	FILE NAME	01831411

- 1. BUZZER ASSEMBLY
- 2. MONITOR
- 3. PARALLEL PRINTER
- 4. VOLTAGE REGULATOR
- 5. CENTRAL PROCESSING UNIT ASSEMBLY
- 7. AXIAL FAN ASSEMBLY
- 7. MAMBRANE KEYPAD
- 8. OPTO RELAY BOARD ASSEMBLY
- 9. POWER STRIP
- 10. LOAD CELL ASSEMBLY
- 11. EXPANSION BOWL
- 12. CONTROL VALVE ASSEMBLY
- 13. EXPANSION VALVE (JACKET #1)
- 14. EXPANSION VALVE (JACKET #2)
- 15. EXPANSION DRAIN VALVE
- 16. EXPANSION FILL VALVE
- 19. HIGH PRESSURE BLEED VALVE
- 18. HIGH PRESSURE WATER VALVE (RSP-10D)
- 19. HIGH PRESSURE WATER VALVE (JACKET #2)
- 20. HIGH PRESSURE WATER VALVE (JACKET #1)

REV.	DESC.	DATE	BY:	APP.
A	ECN #93			
B	ECN #91	12-31-90	L.V.	
A	ECN #103	12-31-90	L.V.	

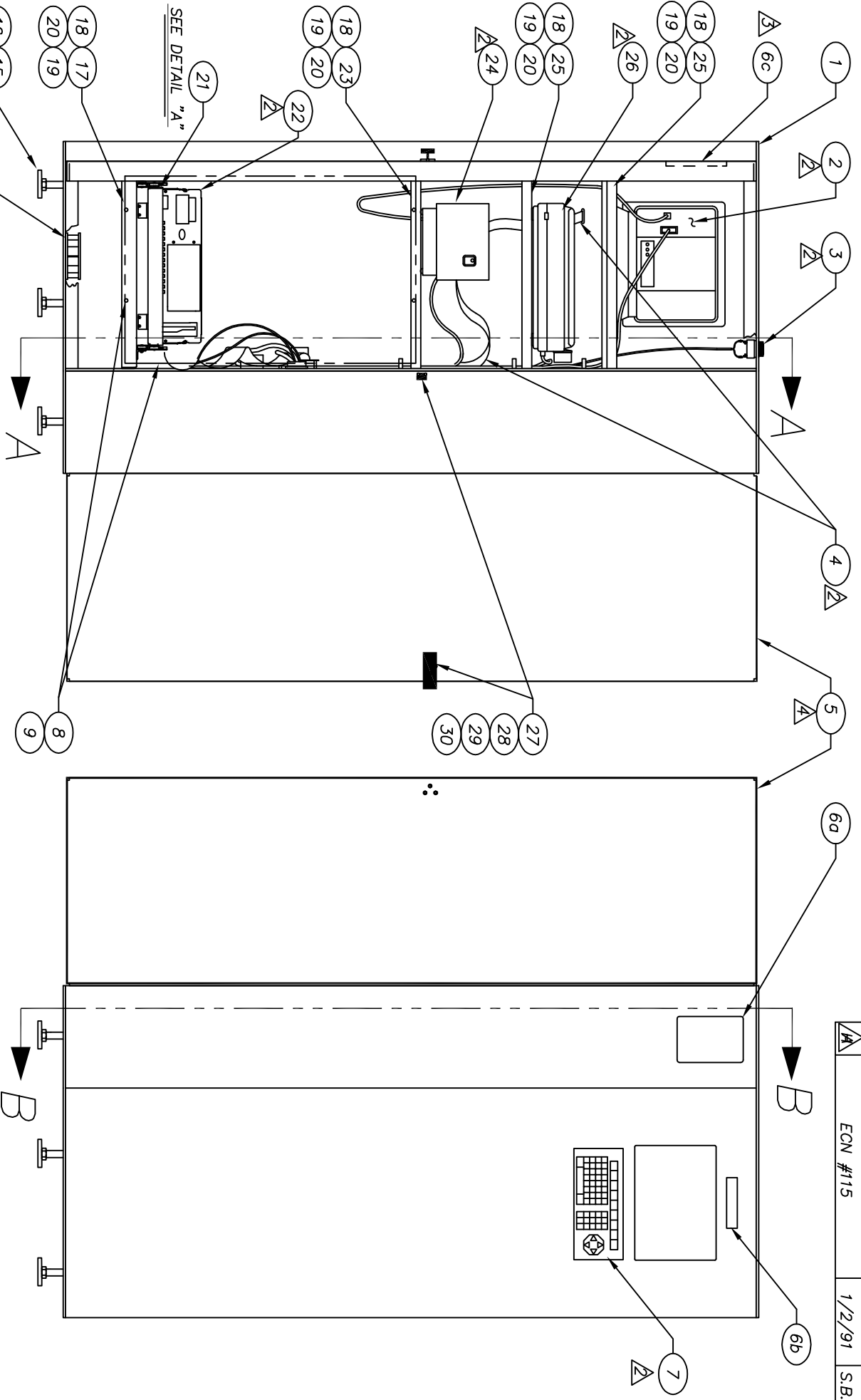


- 1. BUZZER ASSEMBLY
- 2. MONITOR
- 3. PARALLEL PRINTER
- 4. VOLTAGE REGULATOR
- 5. CENTRAL PROCESSING UNIT ASSEMBLY
- 7. AXIAL FAN ASSEMBLY
- 7. MAMBRANE KEYPAD
- 8. OPTO RELAY BOARD ASSEMBLY
- 9. POWER STRIP
- 10. LOAD CELL ASSEMBLY
- 11. EXPANSION BOWL
- 12. CONTROL VALVE ASSEMBLY
- 13. EXPANSION VALVE (JACKET #1)
- 14. EXPANSION VALVE (JACKET #2)
- 15. EXPANSION DRAIN VALVE
- 16. EXPANSION FILL VALVE
- 19. HIGH PRESSURE BLEED VALVE
- 18. HIGH PRESSURE WATER VALVE (RSP-10D)
- 19. HIGH PRESSURE WATER VALVE (JACKET #2)
- 20. HIGH PRESSURE WATER VALVE (JACKET #1)

MATERIAL		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF CAUSO INC.	
DRAWING NUMBER 01-83-1411		NEXT ASSEMBLY	
RECORD TEST III		SHEET 2 OF 2	
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE: .X = ± .XX = ± .XXX = ±		REVISION C	
E.C.N. #103		ISSUED	
SCALE NONE		CHECKED	
FILE NAME 01831411		DATE 5/7/90	



REV. 	DESC.	DATE	BY: APP.
	ECN #115	1/2/91	S.B.



SEE DETAIL "A"

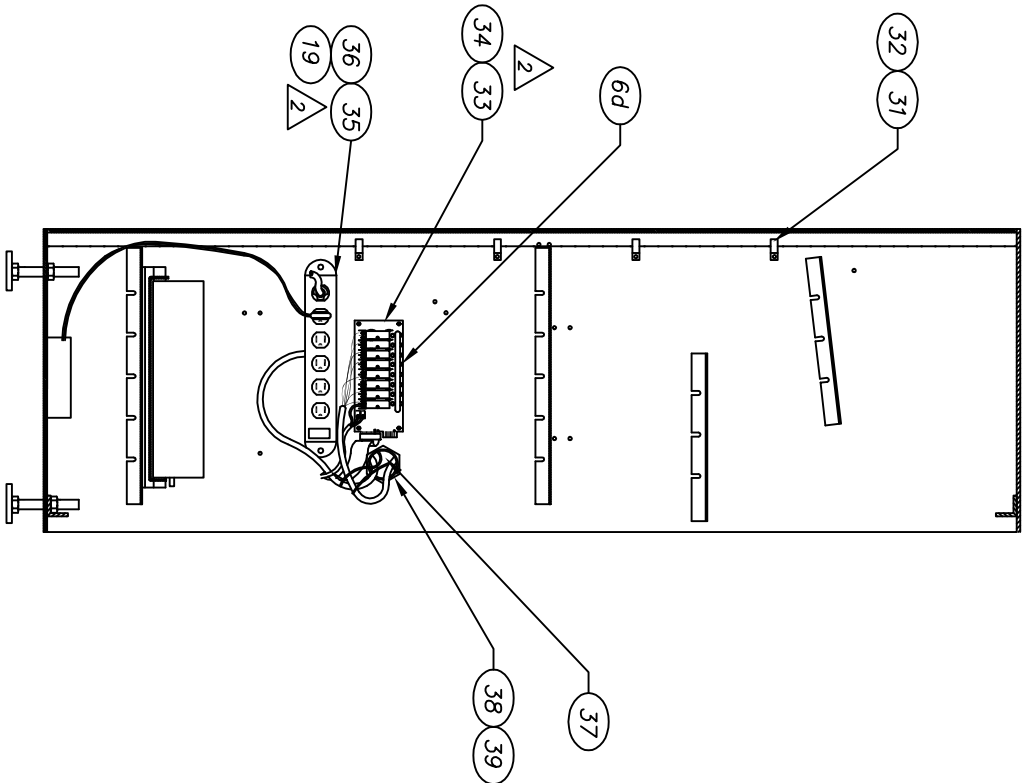
BACK VIEW

FRONT VIEW

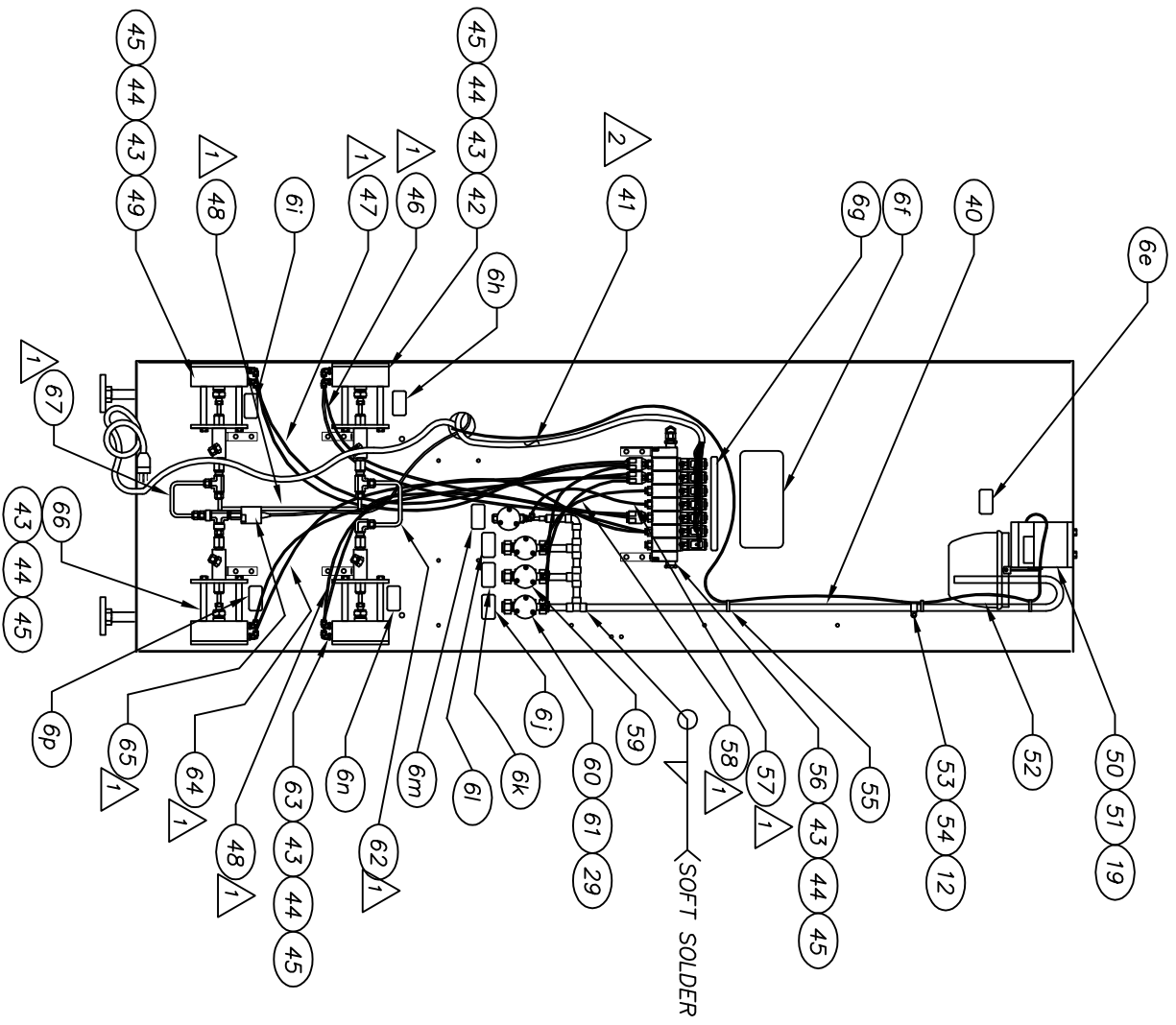


MATERIAL		DRAWING NUMBER		SHEET		REVISION		DRAWN		DATE	
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.		01-53-1411		1 OF 4		H		S. BROWN		5/1/90	
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE: .X = ± .XX = ± .XXX = ±		NEXT ASSEMBLY						CHECKED		DATE	
		RTT FINAL ASSY						ISSUED		DATE	
		RECORTEST III						SCALE		FILE NAME	
								NONE		01531411	

REV.	DESC.	DATE	BY: APP.
	ECN #115	1/2/91	S.B.



DETAIL "A-A"



DETAIL "B-B"



MATERIAL		DRAWING NUMBER		DRAWN		DATE
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.		01-53-1411		S. BROWN		5/1/90
DRAWING NUMBER		NEXT ASSEMBLY		CHECKED		DATE
01-53-1411		RECORTEST III		ISSUED		DATE
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:		SHEET		REVISION		SCALE
.X = ±		2 OF 4		H		NONE
.XX = ±		REVISION		ECN.		FILE NAME
.XXX = ±		#115		#115		01531411

△G	ECN #112	1/2/91	S.B.	REV.	DESC.	DATE	BY: APP.
△H	ECN #115	1/2/91	S.B.	A	ECN #93		
△B					ECN #59	1/2/91	S.B.
△C					ECN #75	1/2/91	S.B.
△D					ECN #91	1/2/91	S.B.
△E					ECN #94	1/2/91	S.B.
△F					ECN #103	1/2/91	S.B.

ITEM QTY	UNIT	PART NUMBER	DESCRIPTION	MATERIAL
1	EA.	01-43-1318 B	CABINET WELD ASSEMBLY	REC III
2	EA.	86-11-9076	MONITOR, 14" ZENITH	ZCM-1492
3	EA.	01-42-1406 A	BUZZER ASSEMBLY	REC III
4	EA.	01-42-1389 A	KEYPAD RIBBON CABLE ASSEMBLY	REC III
5	EA.	42-11-0501	TRIMLOK, 360° LONG	REC III
6	EA.	43-41-8010 A	REC III LABEL KIT	REC III
6a	EA.	01-32-2670 A	QUICK REF. CHART	
6b	EA.	43-11-0047	NAMEPLATE, GALSSO LOGO	
6c	EA.	43-11-0060	SERIAL NUMBER NAMEPLATE, GALSSO	
6d	EA.	43-31-6160 A	OPTO CARD IDENTIFICATION LABEL	REC III
6e	EA.	43-31-6150 A	EXPANSION BOWL LABEL	REC III
6f	EA.	43-31-6161 A	CONTROL VALVE STACK FUNCTION KEY LABEL	REC III
6g	EA.	43-31-6151 A	CONTROL VALVE STACK LABELS	REC III
6h	EA.	43-31-6156 A	HIGH PRESSURE PUMP LABEL	REC III
6i	EA.	43-31-6158 A	JACKET #1 LABEL	REC III
6j	EA.	43-31-6155 A	JACKET #1 EXPANSION VALVE LABEL	REC III
6k	EA.	43-31-6154 A	JACKET #2 EXPANSION VALVE LABEL	REC III
6l	EA.	43-31-6153 A	EXPANSION BOWL DRAIN LABEL	REC III
6m	EA.	43-31-6152 A	EXPANSION BOWL FILL LABEL	REC III
6n	EA.	43-31-6157 A	BLEED LABEL	REC III
6p	EA.	43-31-6159 A	JACKET #2 LABEL	REC III
7	EA.	87-11-0048	KEYPAD, MEMBRANE	REC III
8	EA.	01-32-1412 D	COVER PANEL	REC III
9	EA.	62-33-0000	BOLT, HEX HD, 1/4"-20 x 1/2"LG	SST
10	EA.	01-41-1746 A	AXIAL FAN ASSEMBLY	
11	EA.	58-11-4020	WEATHER STRIP, 1/2" x 1/2" x 12"LG.	SPRUGE RUBBER
12	EA.	63-71-0096	STAND OFF, #6 x 1/2"LG	NYLON
13	EA.	60-83-5130	SCREW, #6-32 x 2 1/4"LG, SLTD PAN HD.	ZINC
14	EA.	60-83-0514	NUT, HEX, #6-32	ZINC
15	EA.	68-11-0200	BASE, NUTSOR, 1/2"-13	ZINC
16	EA.	62-83-0804	NUT, HEX, 1/2"-13	ZINC
17	EA.	01-41-7021 A	COMPUTER SHELF ASSY	REC III
18	EA.	62-33-0800	NUT, HEX, 1/4"-20	SST
19	EA.	63-33-0001	WASHER, LOCK, 1/4"	SST
20	EA.	63-33-0020	WASHER, FLAT, 1/4"	SST
21	EA.	01-41-1792 A	COMPUTER DRAWER SLIDE ASSY	REC III
22	EA.	01-41-1784 B	CPU ASSEMBLY	REC III
23	EA.	01-41-7022 A	COMPONENT SHELF ASSY	REC III
24	EA.	37-11-3047	REGULATOR, VOLTAGE	REC III
25	EA.	01-32-1407 C	PRINTER SHELF	REC III
26	EA.	94-11-0018	PRINTER, PARALLEL	NY1000II

- △ FEMALE HALF NOT USED ON DRAWER SLIDE ASSY 01-41-1792 A.
- △ TRIMLOK IS TO BE PLACED ON ALL 4 SIDES OF DOOR (TYP 2 DOORS)
- △ MOUNT SERIAL NUMBER PLATE WITH SILICON ADHESIVE P/N 40-92-3001 TO INSIDE OF DOOR.
- △ FOR ELECTRICAL DETAIL REF ELECTRICAL SCHEMATIC 01-91-1743 G.
- △ REF PLUMBING SCHEMATIC 01-91-1741 B, FOR LENGTHS OF TBG & CONNECTIONS.

NOTES:



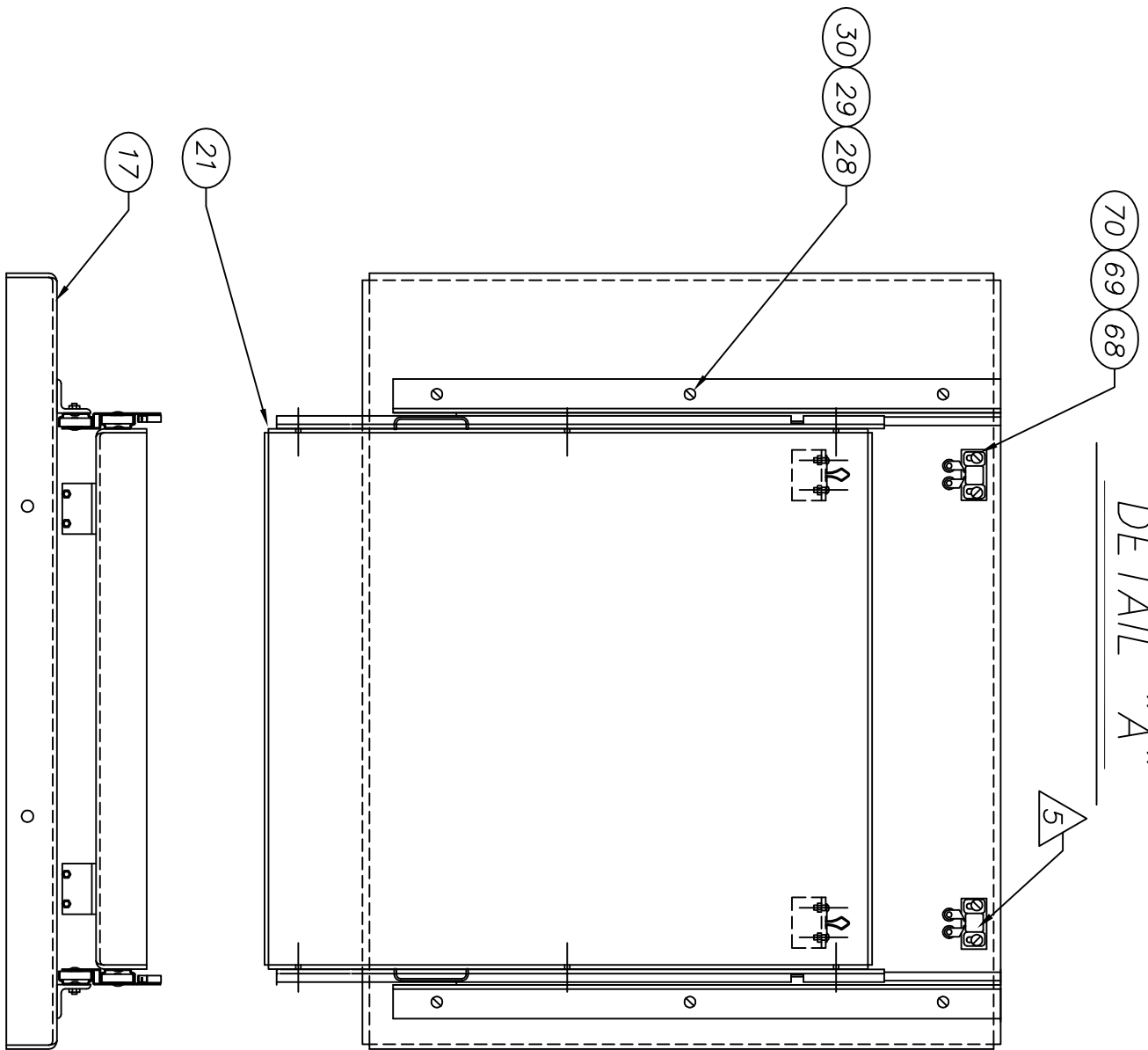
ITEM QTY	UNIT	PART NUMBER	DESCRIPTION	MATERIAL
27	EA.	65-11-0006	LATCH, ADJUSTABLE DRAW	ZINC
28	EA.	60-83-5242	SCREW, SLTD PHD, 10-24 x 1/2"LG	ZINC
29	EA.	63-83-0085	WASHER, LOCK, #10	ZINC
30	EA.	60-83-0527	NUT, HEX, 10-24	ZINC
31	EA.	61-71-0008	CLIP, WIRE HARNESS, 1"Ø	ZINC
32	EA.	60-83-5123	SCREW, SLTD PHD, #6-32 x 1/2"LG	ZINC
33	EA.	01-43-1401 B	OPTO RELAY BOARD ASSEMBLY	REC III
34	EA.	60-83-5129	SCREW, SLTD PHD, #6-32 x 1 1/4"LG.	ZINC
35	EA.	92-11-5015	POWER STRIP, VOLTAGE SURGE SUPPRESSOR	ZINC
36	EA.	62-83-0000	BOLT, HEX HD, 1/4"-20 x 1/2"LG	ZINC
37	EA.	54-99-5013	PUTTY, PLUMBERS	150# PVC
38	EA.	90-00-0023	NUT, LOCK, 1 1/2"	REC III
39	EA.	74-72-2876	ADAPTER, MALE, 1 1/2"	REC III
40	EA.	01-32-1403 B	EXPANSION SIPHON TUBE	REC III
41	EA.	01-42-1322 A	ARO VALVE CABLE ASSEMBLY	REC III
42	EA.	01-42-1398 B	PRESSURIZATION VALVE ASSY	REC III
43	EA.	62-83-0800	NUT, HEX, 1/4"-20	ZINC
44	EA.	63-83-0001	WASHER, LOCK, 1/4"	ZINC
45	EA.	62-83-0002	BOLT, HEX HD, 1/4"-20 x 3/4"LG.	ZINC
46	EA.	34-71-8507	TBG, 5/32"O.D. x 60" LONG.	LEGRISS BLUE
47	EA.	34-71-8524	TBG, 5/32"O.D. x 15" LONG	LEGRISS RED
48	EA.	01-31-1797 A	JKT #1 PRESSURIZATION VALVE TO JKT #1 VALVE LINE	REC III
49	EA.	01-42-1363 B	JKT #1 PRESSURIZATION VALVE TO JKT #1 VALVE LINE	REC III
50	EA.	01-42-1428 C	LOAD CELL ASSEMBLY	REC III
51	EA.	62-33-0002	BOLT, HEX HD, 1/4"-20 x 3/4"LG	SST
52	EA.	01-42-1324 A	EXPANSION BOWL ASSY	REC III
53	EA.	61-11-5025	CLAMP, CABLE, 1/2"	ZINC
54	EA.	60-83-3127	SCREW, SLTD RHDD, #6-32 x 1"LG.	ZINC
55	EA.	61-71-6000	WIRE, TIE, 5.5" LONG	NYLON
56	EA.	01-43-1386 B	12 V CONTROL VALVE ASSEMBLY	REC III
57	EA.	34-71-8508	TBG, 5/32"O.D. x 12" LONG	LEGRISS GREEN
58	EA.	34-71-8523	TBG, 5/32"O.D. x 12" LONG	LEGRISS YELLOW
59	EA.	01-31-1360 A	SPACER BLOCK	REC III
60	EA.	01-42-1397 B	EXPANSION MANIFOLD VALVE ASSEMBLY	REC III
61	EA.	60-83-3270	SCREW, SLTD RHDD, #10-32 x 3/4"	ZINC
62	EA.	01-31-1796 A	PRESSURIZATION VALVE TO BLEED VALVE LINE	REC III
63	EA.	01-42-1399 B	BLEED VALVE ASSEMBLY	REC III
64	EA.	34-71-8509	TBG, 5/32"O.D. x 8 1/2" LONG	LEGRISS ORANGE
65	EA.	01-42-1402 B	TRANSUDGER ASSEMBLY	REC III
66	EA.	01-42-1400 C	JKT #2 PRESSURIZATION VALVE ASSEMBLY	REC III
67	EA.	01-31-1798 A	JKT #1 VALVE TO JKT #2 VALVE LINE	REC III
68	EA.	60-83-5185	SCREW, SLTD PHD, 8-32 x 1/2"LG	ZINC
69	EA.	60-83-0521	NUT, HEX, 8-32	ZINC
70	EA.	63-83-0084	WASHER, LOCK, #8	ZINC

MATERIAL		DRAWING NUMBER		REVISION		SCALE		DATE	
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALSSO INC.		01-53-1411		H		NONE		5/1/90	
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:		NEXT ASSEMBLY		3 OF 4		ISSUED		CHECKED	
.X = ±		.XX = ±		.XXX = ±		S.BROWN		DATE	

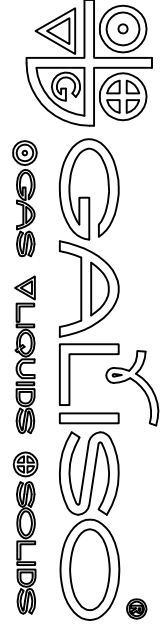
RTT FINAL ASSY

RECORTEST III

DETAIL "A"

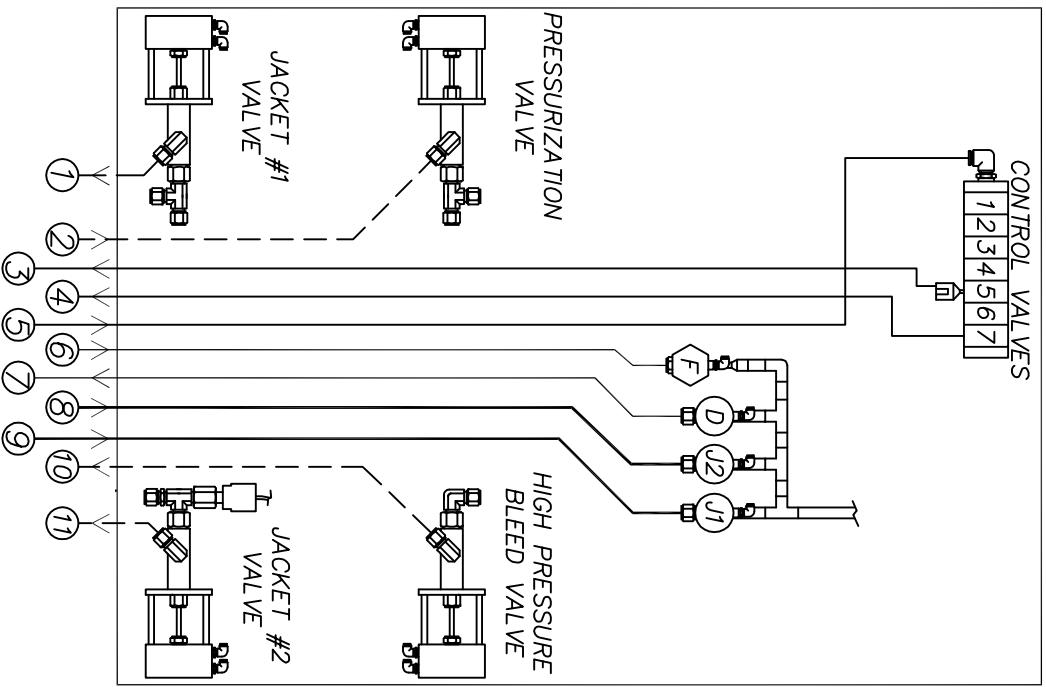


REV.	DESC.	DATE	BY:	APP.
A	ECN #93			
B	ECN #59	1/2/91	S.B.	
C	ECN #75	1/2/91	S.B.	
D	ECN #91	1/2/91	S.B.	
E	ECN #94	1/2/91	S.B.	
F	ECN #103	1/2/91	S.B.	
G	ECN #112	1/2/91	S.B.	
H	ECN #115	1/2/91	S.B.	



MATERIAL		DRAWING NUMBER		SHEET		REVISION		DRAWN		DATE	
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.		01-53-1411		4 OF 4		H		S. BROWN		5/1/90	
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE: .X = ± .XX = ± .XXX = ±		NEXT ASSEMBLY						CHECKED		DATE	
RTT FINAL ASSY		RECORTEST III						ISSUED		DATE	
								SCALE		FILE NAME	
								NONE		01531411	

RECORTTEST III

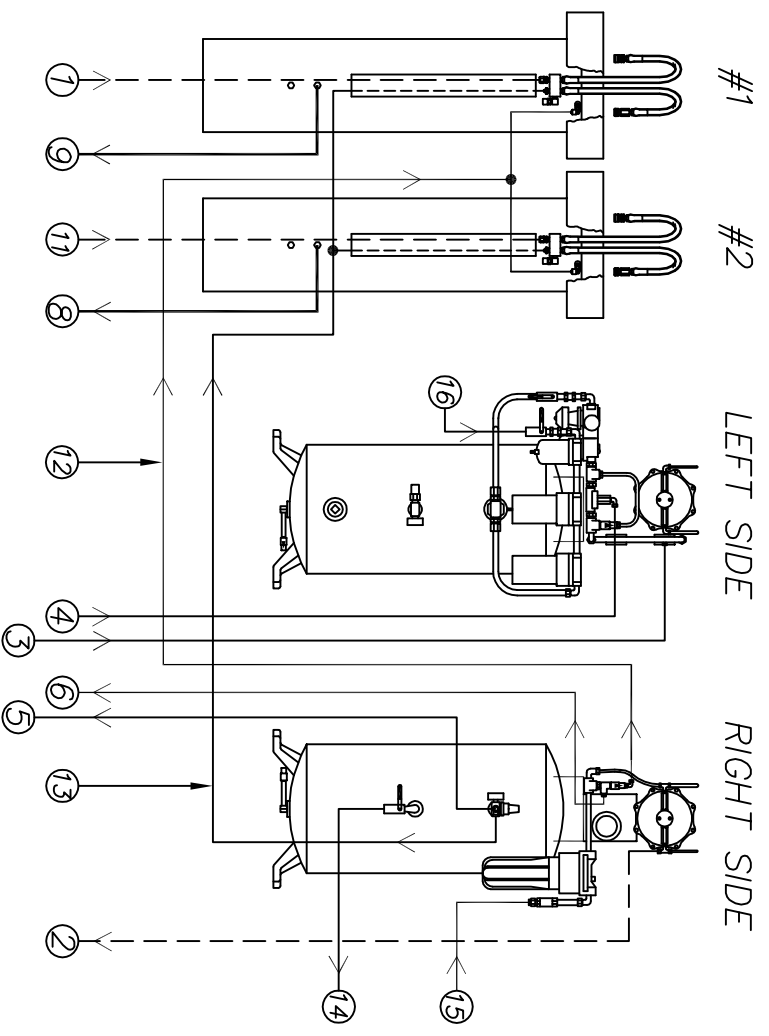


NOTES:

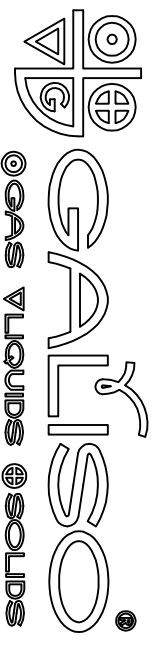
- H.P. WATER
- AIR
- WATER

TEST JACKETS

RSP-10D



REV.	DESC.	DATE	BY:	APP.
A	NPR #38			
B	ECN #93	9-30-91	TR	



MATERIAL		DRAWN		DATE	
RECORTTEST III PLUMBING INSTALLATION		T. REY		1-11-90	
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.		CHECKED		DATE	
DRAWING NUMBER 01-71-1738		NEXT ASSEMBLY		SCALE NONE	
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE: .X = ± .XX = ± .XXX = ±		SHEET 1 OF 3		FILE NAME 01711738	
REVISION B		ISSUED		DATE	
ECN #93		SCALE NONE		DATE	

REV.	DESC.	DATE	BY:	APP.
A	NPR #38			
B	ECN #93	9-30-91	TR	

- ① "HIGH PRESSURE LINE" FROM JACKET #1 VALVE (REC. III) TO H.P. CONNECTION (JACKET #1).
P/N 34-37-0936, TUBING, 1/4 x .065W, 304 SST.
- ② "HIGH PRESSURE WATER TO TEST LINE" FROM H.P. PUMP (RSP-10D) TO PRESSURIZATION VALVE (REC. III).
P/N 34-37-0936, TUBING, 1/4 x .065W, 304 SST.
- ③ "PUMP VENT LINE" FROM CONTROL VALVE #4 (REC. III) TO PUMP VENT VALVE (RSP-10D).
P/N 34-71-8507, TUBING, 5/32, BLUE PLASTIC.
- ④ "PUMP SLOW LINE" FROM CONTROL VALVE #6 (REC. III) TO PUMP SLOW VALVE (RSP-10D).
P/N 34-71-5507, TUBING, 5/32, BLUE PLASTIC.
- ⑤ "AIR TO CONTROL VALVES LINE" FROM RECORTTEST AIR SUPPLY REGULATOR (RSP-10D) TO CONTROL VALVES (REC. III)
P/N 34-71-8543, TUBING, 1/4, GREEN PLASTIC.
- ⑥ "EXPANSION BOWL FILL LINE" FROM EXPANSION BOWL FILL CONNECTION (RSP-10D) TO BOWL FILL VALVE (REC. III).
P/N 34-71-8543, TUBING, 1/4, GREEN PLASTIC.
- ⑦ "EXPANSION BOWL DRAIN LINE" FROM EXPANSION BOWL DRAIN VALVE (REC. III) TO AN ADEQUATE DRAIN.
P/N 34-71-8506, TUBING, 1/2, NATURAL PLASTIC.
- ⑧ "EXPANSION LINE" FROM EXPANSION CONNECTION (JACKET #2) TO JACKET #2 EXPANSION VALVE (REC. III).
P/N 32-71-8506, TUBING, 1/2, NATURAL PLASTIC.
- ⑨ "EXPANSION LINE" FROM EXPANSION CONNECTION (JACKET #1) TO JACKET #1 EXPANSION VALVE (REC. III).
P/N 32-71-8506, TUBING, 1/2, NATURAL PLASTIC.
- ⑩ "HIGH PRESSURE BLEED LINE" FROM H.P. BLEED VALVE (REC. III) TO AN ADEQUATE DRAIN.
P/N 34-37-0936, TUBING, 1/4 x .065W, 304 SST.
- ⑪ "HIGH PRESSURE LINE" FROM JACKET #2 VALVE (REC. III) TO H.P. CONNECTION (JACKET #2).
P/N 34-37-0936, TUBING, 1/4 x .065W, 304 SST.
- ⑫ "JACKET WATER MAKE UP LINE" FROM JACKET WATER MAKE UP VALVE (RSP-10D) THRU 1/4" UNION TEE TO JKT'S #1 & #2 WATER MAKE UP ELBOW. (WATER MAKE UP LINES TO EACH JKT MUST BE EQUAL IN LENGTH)
P/N 34-71-8543, TUBING, 1/4, GREEN PLASTIC.
- ⑬ "HEAD SEAL PRESSURE LINE" FROM RECORTTEST AIR SUPPLY REGULATOR (RSP-10D) THRU 1/4" UNION TEE TO HEAD SEAL CONNECTIONS (JKT'S #1 & #2).
P/N 34-71-8543, TUBING, 1/4, GREEN PLASTIC.
- ⑭ "AUXILIARY AIR SUPPLY" FOR PCT, VALVER AND HOIST.
1/2" PIPE (SUPPLIED BY CUSTOMER).
- ⑮ "WATER IN" FROM CUSTOMERS FACILITY.
3/4" PIPE (SUPPLIED BY CUSTOMER).
- ⑯ "AIR IN" FROM CUSTOMERS FACILITY.

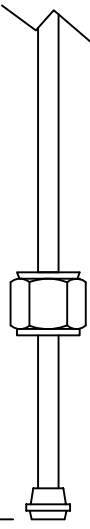
RECORTTEST III PLUMBING INSTALLATION

MATERIAL		DRAWN		DATE	
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.		T. REY		1-11-90	
DRAWING NUMBER	NEXT ASSEMBLY	CHECKED	ISSUED	SCALE	FILE NAME
01-71-1738				NONE	017711738
SHEET	REVISION	DATE	DATE		
2 OF 3	B				
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:		ECN			
.X = ±		#93			
.XX = ±					
.XXX = ±					

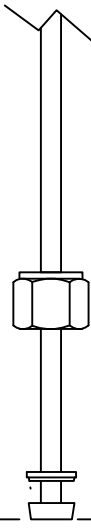
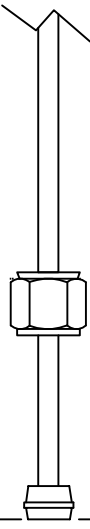


REV.	DESC.	DATE	BY:	APP.
A	NPR #38			
B	ECN #93	9-30-91	TR	

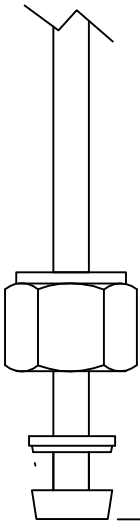
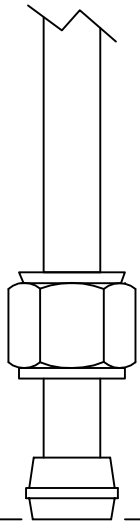
1/4" SST TUBING



1/4" PLASTIC TUBING



1/2" PLASTIC TUBING



TUBING MUST
BOTTOM OUT
INSIDE SLEEVE.
(BOTH ENDS)

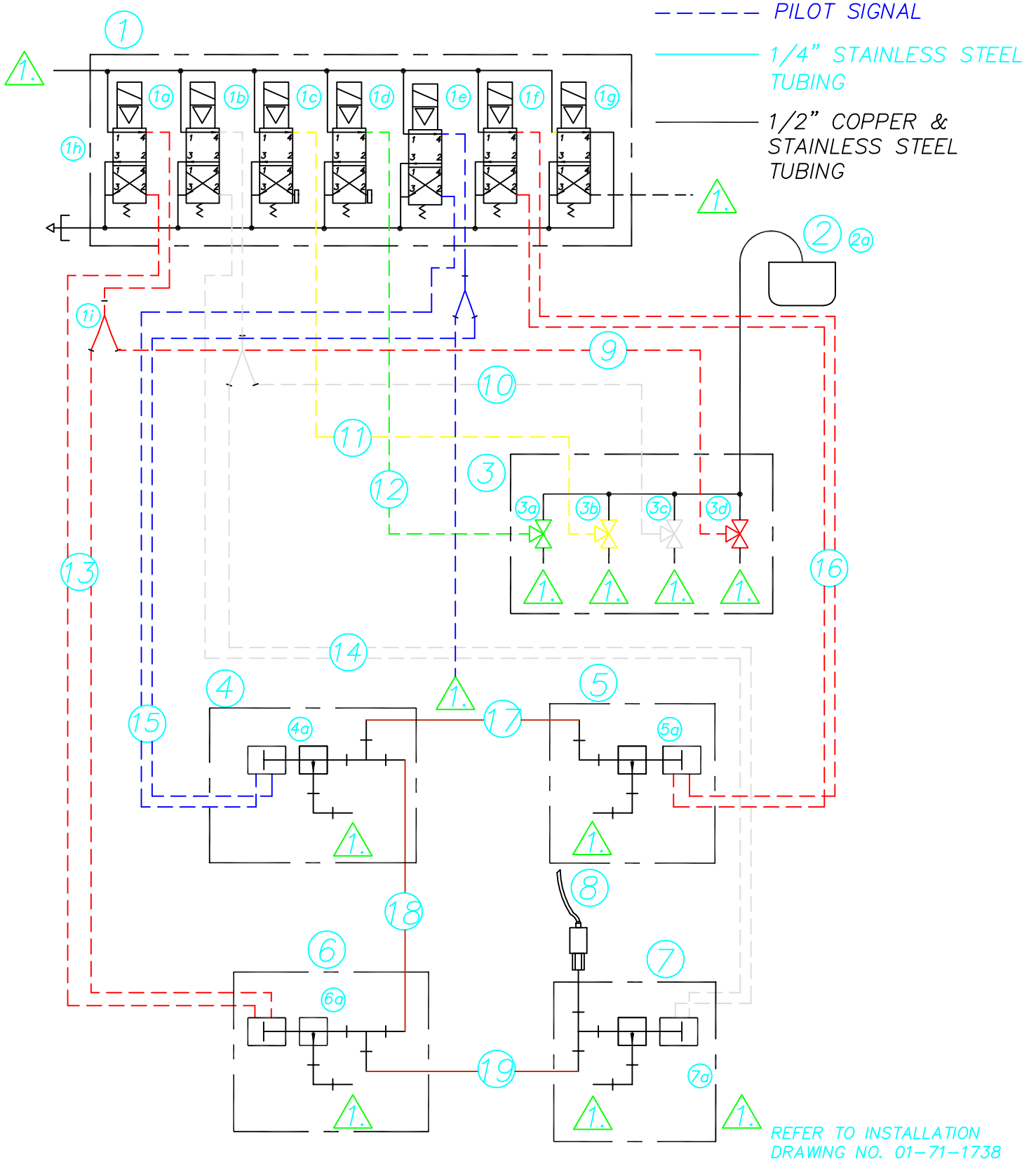
TUBING ASSY INSTRUCTIONS:

1. CHECK ALL ITEMS AGAINST THE REC. III INSTALLATION CHECKLIST.
2. SLIDE NUT THEN SLEEVE (LONG END INTO NUT) ONTO TUBING. (TYP. BOTH ENDS)
3. INSERT TUBING WITH SLEEVE INTO FITTING AND TIGHTEN ONE-AND-ONE-QUARTER TURNS.
4. CERTAIN "LINES" WILL NOT REQUIRE NUTS AND SLEEVES. THESE "LINES" WILL SLIP INTO FITTINGS.



MATERIAL		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.	
RECORTEST III PLUMBING INSTALLATION			
DRAWING NUMBER	NEXT ASSEMBLY	SHEET	REVISION
01-71-1738		3 OF 3	B
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:		ECN	SCALE
.X = ±		#93	NONE
		ISSUED	FILE NAME
			01711738
DRAWN	DATE	CHECKED	DATE
T. REY	1-11-90		

REV.	DESC.	DATE	BY:	APP.
A	N.P.R. #38			

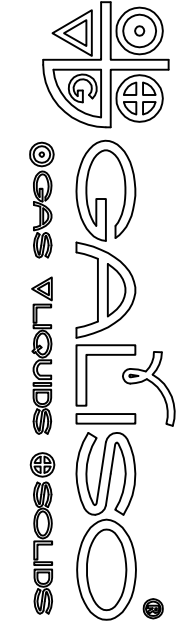


MATERIAL THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.	RECORTEST III PLUMBING P&ID			DRAWN	L. VIGIL	DATE	4-12-90
	DRAWING NUMBER	NEXT ASSEMBLY	SHEET	REVISION	CHECKED	DATE	
	01-91-1741		10F2	A	ISSUED	DATE	
	UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:			N.P.R.	SCALE	FILE NAME	
.X = ±	.XX = ±	.XXX = ±	38	NONE			01911741

REV.	DESC.	DATE	BY:	APP.
A	NPR #38			

19	1	EA.	01-31-1798 A	JKT #1 VALVE TO JKT #2 VALVE LINE	SST
18	1	EA.	01-31-1797 A	PRESSURIZATION VALVE TO JKT #1 VALVE LINE	SST
17	1	EA.	01-31-1796 A	PRESSURIZATION VALVE TO H.P. BLEED VALVE	SST
16	2	EA.	34-71-8524	PLASTIC TUBING, 5/32"O.D. x .062"W x 32"L	RED
15	2	EA.	34-71-8507	PLASTIC TUBING, 5/32"O.D. x .065"W x 32"L	BLUE
14	2	EA.	34-71-8509	PLASTIC TUBING, 5/32"O.D. x .062"W x 36"L	ORANGE
13	2	EA.	34-71-8524	PLASTIC TUBING, 5/32"O.D. x .062"W x 36"L	RED
12	1	EA.	34-71-8508	PLASTIC TUBING, 5/32"O.D. x .062"W x 11"L	GREEN
11	1	EA.	34-71-8523	PLASTIC TUBING, 5/32"O.D. x .062"W x 11"L	YELLOW
10	1	EA.	34-71-8509	PLASTIC TUBING, 5/32"O.D. x .062"W x 12"L	ORANGE
9	1	EA.	43-71-8524	PLASTIC TUBING, 5/32"O.D. x .062"W x 14"L	RED
8	1	EA.	01-42-1402A	TRANSUCER ASSY. (REF. DWG. 01-91-1743)	
7d	1	EA.	81-11-0130	VALVE, AIR OPERATED	
7	1	EA.	01-42-1400C	JACKET #2 VALVE ASSEMBLY	
6d	1	EA.	81-11-0130	VALVE, AIR OPERATED	
6	1	EA.	01-42-1363B	JACKET #1 VALVE ASSEMBLY	
5d	1	EA.	81-11-0130	VALVE, AIR OPERATED	
5	1	EA.	01-42-1399B	H.P. BLEED VALVE ASSEMBLY	
4d	1	EA.	81-11-0130	VALVE, AIR OPERATED	
4	1	EA.	01-42-1398B	VALVE ASSEMBLY, PRESSURIZATION	
3d	1	EA.	81-11-0166	VALVE, AIR OPERATED, 2-WAY, BRASS	
3c	1	EA.	81-11-0166	VALVE, AIR OPERATED, 2-WAY, BRASS	
3b	1	EA.	81-11-0166	VALVE, AIR OPERATED, 2-WAY, BRASS	
3a	1	EA.	81-11-0167	VALVE, AIR OPERATED, 2-WAY, BRASS	
3	1	EA.	01-42-1397B	EXPANSION VALVE ASSEMBLY	
2d	1	EA.	68-11-0207	CLEAR PLASTIC BOWL, 4 CUP (940 ml)	
2	1	EA.	01-42-1324A	EXPANSION BOWL ASSEMBLY	
1i	3	EA.	69-11-0525	PLUG-IN-Y, 5/32"	
1h	1	EA.	81-11-0192	END PLATE ASSEMBLY	
1g	1	EA.	81-11-0224	VALVE, PUMP SLOW, 12 VOLT, 1/4" NPT	
1f	1	EA.	81-11-0224	VALVE, TEST PRESSURE BLEED, 12 VOLT, 1/4" NPT	
1e	1	EA.	81-11-0224	VALVE, PUMP VENT, 12 VOLT, 1/4" NPT	
1d	1	EA.	81-11-0224	VALVE, EXPANSION BOWL FILL, 12 VOLT, 1/4" NPT	
1c	1	EA.	81-11-0224	VALVE, EXPANSION BOWL DRAIN, 12 VOLT, 1/4" NPT	
1b	1	EA.	81-11-0224	VALVE, JACKET 2, 12 VOLT, 1/4" NPT	
1a	1	EA.	81-11-0224	VALVE, JACKET 1, 12 VOLT, 1/4" NPT	
1	1	EA.	01-43-1396A	CONTROL VALVE ASSEMBLY	

ITEM	QTY	UNIT	PART NO.	DESCRIPTION	MATERIAL
------	-----	------	----------	-------------	----------



MATERIAL

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.

RECORTEST III PLUMBING P&ID

DRAWING NUMBER: 10F2 91-1741

SHEET: 20F2

REVISION: A

SCALE: NONE

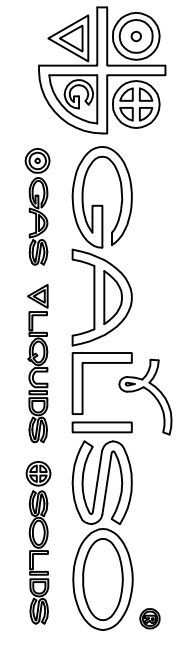
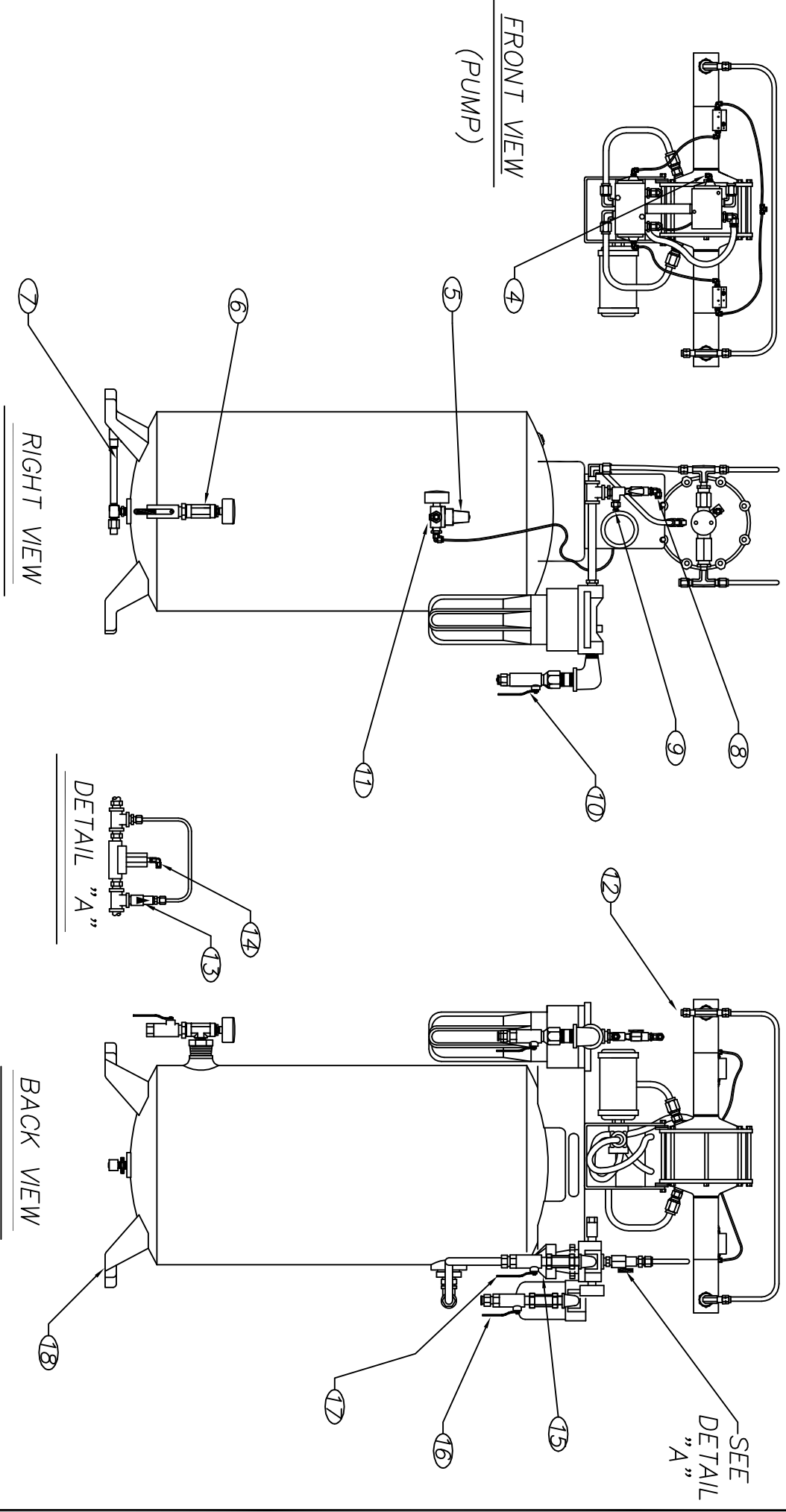
FILE NAME: 01911741

DATE: 4-12-90

DATE: 01911741

UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE: .X = ± .XX = ± .XXX = ±

REV.	DESCRIPTION	DATE	BY:	APP.
A	ECN #92			
Δ	ECN #53	1-3-91		
Δ	ECN #97	1-3-91		



MATERIAL		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.	
RECORTEST SUPPORT PACKAGE-10D INSTALLATION			
DRAWING NUMBER		RSP-10D	
01-73-1465		NEXT ASSEMBLY	
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:		.X = ±	
.XX = ±		.XXX = ±	
DRAWN	S. BROWN	DATE	4/13/90
CHECKED		DATE	
SHEET	1 OF 2	REVISION	C
ISSUED		SCALE	NONE
FILE NAME	01731465	DATE	
E.C.N.	#97		

REV.	DESCRIPTION	DATE	BY:	APP.
A	ECN #92			
Δ	ECN #53	1-3-91		
Δ	ECN #97	1-3-91		

1. READ ALL INSTRUCTIONS AND FAMILIARIZE YOURSELF WITH THE INSTALLATION DRAWINGS BEFORE ATTEMPTING TO INSTALL OR OPERATE THE RSP SYSTEM
2. CAREFULLY UNCRATE THE RSP AND REMOVE ALL BANDING AND PACKING MATERIALS.
3. SELECT AN AREA NEAR THE TEST PIT TO INSTALL THE RSP SYSTEM. THE INSTALLATION LOCATION SHOULD ALLOW SUFFICIENT DRAINAGE TO PREVENT WATER FROM ACCUMULATING AROUND THE SYSTEM AND SHOULD BE FLAT AND LEVEL.
4. PUMP VENT/CONNECTION, 5/32" PLASTIC TUBING.
5. RECORTTEST AIR SUPPLY REGULATOR
6. AUXILIARY AIR SUPPLY SHUT OFF VALVE/CONNECTION, 1/2" NPT
7. AIR RESERVOIR BLEED VALVE/CONNECTION, 1/4" NPT
8. JACKET FILL SHUT OFF VALVE/CONNECTION, 1/4" PLASTIC TUBING.
9. EXPANSION FILL LINE/CONNECTION, 1/4" PLASTIC TUBING
10. WATER IN SHUT OFF VALVE/CONNECTION, 1/2" PLASTIC TUBING
11. RECORTTEST CONTROL VALVES AND HEAD SEAL PRESSURE AIR SUPPLY LINE, 1/4" PLASTIC TBG.
12. HIGH PRESSURE WATER TO TEST CONSOLE/CONNECTION, 1/4" SST TUBING
13. PUMP SLOW SPEED CONTROL VALVE, 1/4"
14. PUMP SLOW/CONNECTION, 5/32" PLASTIC TUBING.
15. AIR SUPPLY REGULATOR
16. AIR IN SHUT OFF VALVE/CONNECTION, 1/2" PLASTIC TUBING
17. PUMP FAST SPEED CONTROL VALVE
18. USE 3/8" OR 1/2" LAG BOLTS TO MOUNT THE RSP TO THE FLOOR.



MATERIAL		RECORTTEST SUPPORT PACKAGE-10D INSTALLATION		DRAWN		S. BROWN		DATE	
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION WITH ALL RIGHTS AND TITLES RESERVED AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF GALISO INC.		RSP-10D		CHECKED				4/13/90	
DRAWING NUMBER		NEXT ASSEMBLY		SHEET		REVISION		ISSUED	
01-73-1465				2 OF 2		C		SCALE	
UNLESS OTHERWISE SPECIFIED - TOLERANCES ARE:				.X = ±		.XX = ±		NONE	
				.XXX = ±		#97		FILE NAME	
								01731465	