
PCT-ADW SERIES

AUTOMATIC CYLINDER INVERTER/DRIER

INSTRUCTION MANUAL



MANUAL NUMBER 21-11-1007

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!!!DANGER!!!

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

AND

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

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1.0 INTRODUCTION

Galiso PCT-ADW series Automated Cylinder Inverter/Driers are designed to provide a safe, economical method for draining and drying heavy, water filled cylinders after the hydrostatic test. The PCT also features a wash phase, which allows the operator to flush the cylinder interior with detergent solution and hot water.

PCT-ADW series Inverter/Dryers are available in several different configurations for simultaneously servicing one or more cylinders. This instruction manual discusses the PCT-15-ADW, PCT-122-ADW, and the PCT-24-ADW Automated Inverter/Driers. The PCT-15-ADW will accept one cylinder up to 15 inches in diameter, the PCT-122-ADW will accept two cylinders with diameters up to 12 inches, and the PCT-24-ADW will accept two cylinders with a diameter of up to 12 inches and a single cylinder up to 24 inches in diameter. Other configurations allow servicing three or four cylinders simultaneously, and servicing of cylinders with unusual dimensions. Specifications for the PCT-15-ADW, the PCT-122-ADW and the PCT-24-ADW, are listed on the following pages along with an illustration of each model.

A powerful pneumatic clamping assembly firmly grasps the cylinder and inverts it a full 180 degrees. A stream of air is injected into the inverted cylinder to rapidly purge water left over from the hydrostatic test. Hot water is then sprayed into the cylinder interior to heat the cylinder to 180 degrees Fahrenheit. Air is once again injected into the cylinder to quickly evaporate any residual water from the cylinder interior. The entire operation takes only three minutes or less, depending upon the size of the cylinder being serviced.

The PCT-ADW allows very efficient use of workspace by eliminating the need for a cylinder vise, dump rack, and hot air drying manifold. In addition to draining and drying the cylinder, the PCT-ADW may also function as a heavy-duty cylinder vise for stamping cylinders or removing valves. If you clean cylinders by tumbling with abrasive media, the PCT-ADW is an ideal tool for rinsing and drying the freshly cleaned cylinders. The PCT-ADW can flush out residual tumbling media and then dry the cylinder interior before flash rusting can occur.

2.0 PCT-15 ADW Specifications

The PCT-15-ADW model Automated Cylinder Inverter/Drier is designed to invert, drain, wash and dry one standard sized cylinder per operation cycle. The inner clamp arm of the PCT-15-ADW is adjustable allowing the unit to accept cylinders as small as 4 inches in diameter. The PCT-15-ADW is also available with an instrument quality air filter and a special hot water source.

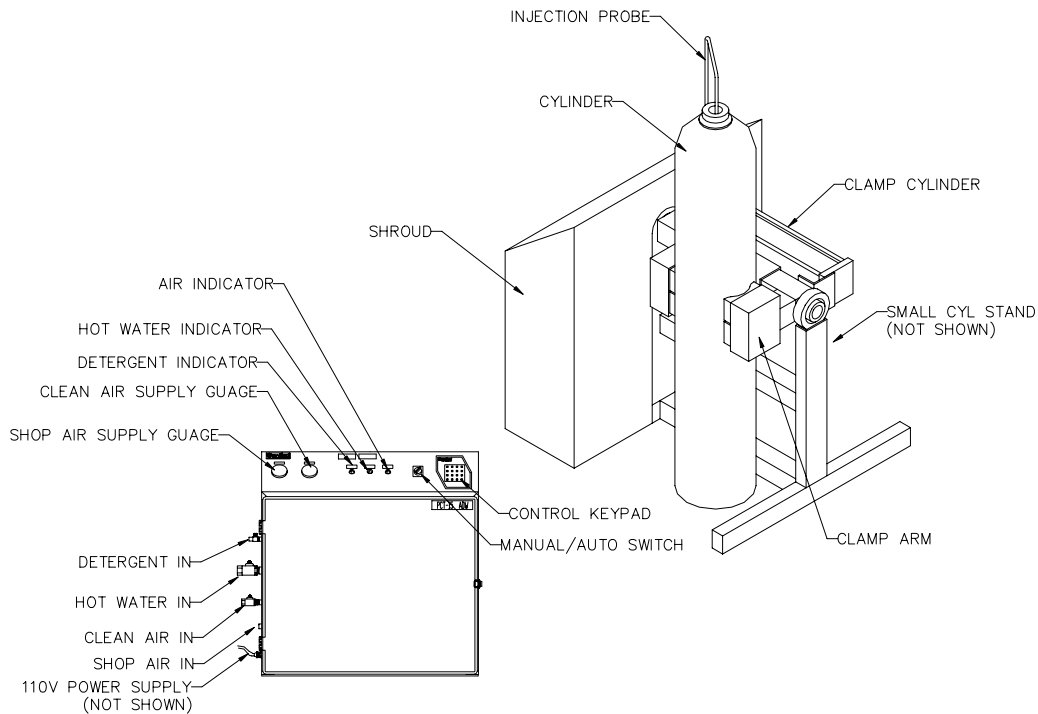


Figure 2 - 1 PCT-15 ADW

SPECIFICATIONS:

Dimensions: 42" long x 36" wide x 40" high.

Cylinder Capacity: One cylinder; 400 lbs max., 4" to 15" in diameter; up to 58" tall.

Operating Air Requirements: Do Not exceed 115 psig @ 1.0 cfm @ 120 psig Shop Air Supply.

Drying Air Requirements: 4.0 cfm @ 120 psig with < 0.03 parts per million contaminant.

Electrical Requirements: 120 Volt, 60 Hertz, or 220 Volt, 50-60 Hertz.

Hot water Required: 5.0 gpm @ 60 psig, 180°F max.

2.1 PCT-122-ADW SPECIFICATIONS

The PCT-122-ADW model Automatic Cylinder Inverter/Drier is designed to invert, drain, wash, and dry two standard sized cylinders per operation cycle. The PCT-122-ADW will accept two standard sized cylinders up to 12" diameter. With an optional pair of Clamp Arms, and the Center Clamp Arm removed, the PCT-122-ADW will accept one cylinder up to 15 inches in diameter. The PCT-122-ADW is available with an instrument quality Air Filter and a special hot water source.

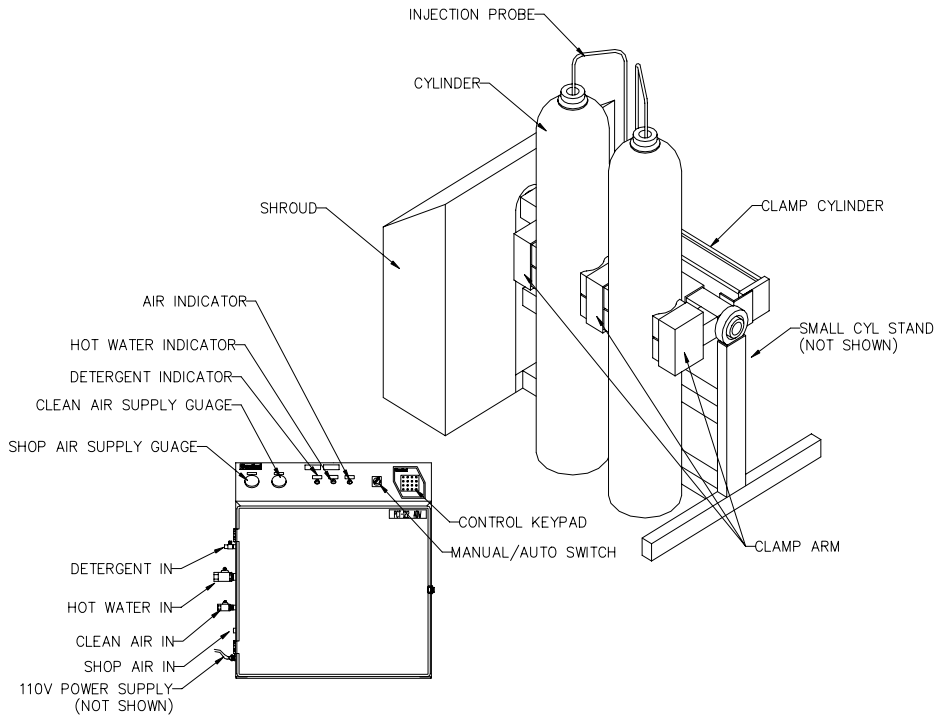


Figure 2 - 2 PCT-122 ADW

SPECIFICATIONS:

Dimensions: 60" long x 36" wide x 40" high.

Cylinder Capacity: Two cylinders, 400 lbs ea., 5" to 12" in dia., up to 58" tall, or one cylinder up to 15" in diameter with an optional set of Clamp Arms.

Operating Air Requirements: 1.0 cfm @ 120 psig Shop Air Supply.

Drying Air Requirements: 7.5 cfm @ 120 psig with < 0.03 parts per million contaminant.

Electrical Requirements: 120 Volt, 60 Hertz, or 220 Volts, 50 Hertz.

Hot Water Required: 10.0 gpm @ 60 psig, 180°F max.

2.2 PCT-24-ADW SPECIFICATIONS

The PCT-24-ADW model Automatic Cylinder Inverter/Drier is designed to invert, drain, wash, and dry not only cylinders performed by the PCT-122-ADW, but also large steel and composite fiber wrapped cylinders. The PCT-24-ADW can handle one cylinder up to 750 lbs. (340Kg), at lengths of up to 96" (2400mm). This is accomplished with the incorporation of a second drive at the opposite end, thus the drive train consists of two 8" air driven cylinders, driving dual sprocket chains. The inclusion of heavy-duty large cylinder clamp arms, creates a single cylinder clamping range of 12" (305mm) diameter to 24" (612mm) diameter. Two small cylinder stands are included.

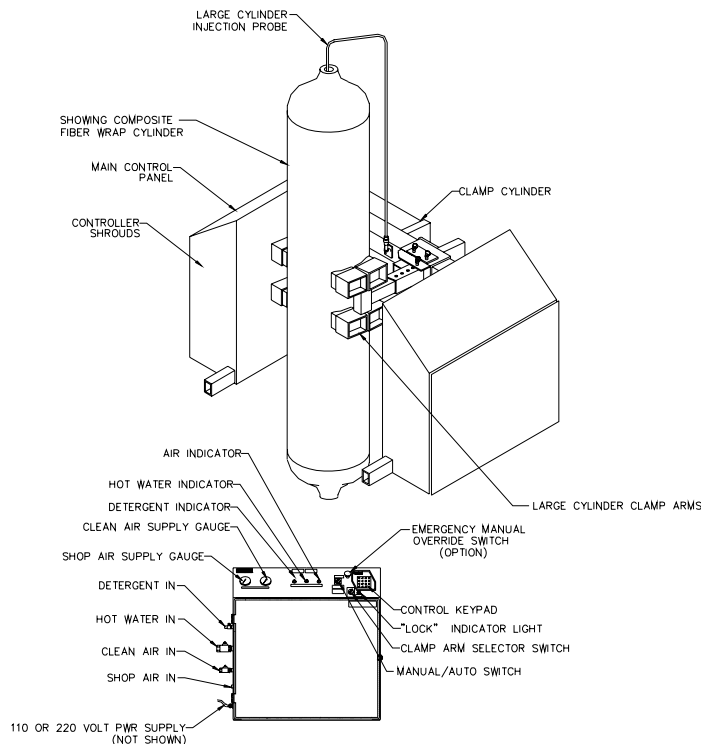


Figure 2 - 3 PCT-24 ADW

SPECIFICATIONS:

Dimensions: 72" long x 50" wide x 41" high.

Cylinder Capacity: Two cylinders, 400 lbs ea., 5" dia. to 12" dia., up to 58" tall with normal installation, or one cylinder, 750 lbs, 12" dia. to 24" dia up to 96" long using Large Cylinder Clamp Arms.

Operating Air Requirements: 1.0 cfm @ 120 psig Shop Air Supply.

Drying Air Requirements: 7.5 cfm @ 120 psig with < 0.03 parts per million contaminant.

Electrical Requirements: 120 Volt, 60 Hertz or 220 Volts, 50 Hertz.

Hot Water Required: 10.0 gpm @ 60 psig, 180°F max.

3.0 SAFETY

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

3.1 General

- A. The PCT-ADW is capable of producing considerable clamping force to rapidly clamp and rotate the cylinder. Stay safely behind control panels during machine operation.
- B. Provide sufficient water drainage on the discharge side of the machine to prevent water from splashing onto the operator's working area and the possibility of subsequent accident.
- C. Although the PCT-ADW is free standing, Galiso, Inc. recommends securing the machine to the shop floor. PCT-24-ADW machines must be secured to the floor.
- D. The PCT-ADW features a safety circuit that prevents the machine from inverting if the clamp is not engaged. The safety circuit also prevents the machine from unclamping once the cylinder has been lifted off of the ground.
- E. In the event of a power loss, the inverter will return the cylinder to the ground and stay clamped until power is restored to the unit.
- F. If air pressure to the PCT-ADW is cut off, the inverter will remain in the position that it was in at the time that the air pressure was lost.
- G. Galiso recommends marking off the area surrounding the PCT-ADW with yellow and black safety tape. The safety area should extend at least 36" on the loading side and 36" on the discharge side of the machine, to indicate the area occupied by the swing of the cylinder as it is inverted. All personnel should stay clear of the safety area while the machine is operating. Safety area may need to be extended to accommodate longer cylinders.
- H. Never operate the PCT-ADW without first loading a cylinder into the clamp grips and installing the injection probe(s). If the hot water injection phase of the operation cycle is performed without a cylinder in the clamp grips or the probes installed, hot water will be sprayed into the air, endangering the operator. If the hot water injection cycle is started without a cylinder in the clamp grips, immediately press the abort/reset key.

3.1 General Safety, continued

- I. To immediately stop the PCT-ADW operation cycle, press the ABORT/RESET key. The PCT-ADW will automatically return the cylinder to the upright position and release the cylinder clamp. To resume operation: follow the procedures described in Section 6.0, Operations.
- J. To refill the Detergent Supply Reservoir: Make certain that all pressure has been released from the Detergent Supply Reservoir before attempting to remove the SRC-1 Detergent Supply Reservoir Control Valve from the cylinder.
- K. Wear gloves, eye protection and foot protection while operating the PCT-ADW.

3.2 Safety, Unusual Dimension Cylinders

- A. Testing round bottom cylinders, such as Compressed Natural gas, requires the use of a suitable base that will hold the cylinder in an upright position. Due to the additional weight of these cylinders, a Drain Probe (Part Number 25-41-9352) must be used to partially empty any natural gas cylinder over 42" in height. Read Section 6 for complete operating instructions.
- B. Testing large diameter (over 15") L.P. or natural gas cylinders require clamping the cylinder at its vertical center. The use of a base or platform of the appropriate height may be necessary to accomplish this. Cylinder bases and L.P. cylinder stands are available from Galiso Incorporated.
- C. The air pressure regulator must be set at 110 psi to insure proper operation of the equipment.

!! WARNING !!

Failure to follow the requirements of Section 3.2 could result in a cylinder being dropped, causing extreme personal injury and/or damage to the equipment.

4.0 INSTALLATION

Read all instructions and familiarize yourself with the installation and operation procedures and drawings before attempting to install or operate the PCT-ADW.

4.1 Receiving and Placement

- A. Carefully un-crate the PCT-ADW and remove all banding and packing materials.
- B. Select a space for the installation of the PCT-ADW. The location of the machine should allow adequate clearance for the cylinder to swing on both the cylinder loading side and the discharge side of the machine. The location should allow adequate water drainage on the discharge side of the machine. Special consideration must be made for PCT-24-ADW when servicing large cylinders: see PCT-24-ADW specifications in section 2.
- C. A 36" wide safety zone should be marked off with yellow and black safety tape on the loading and the discharge side of the machine.

4.2 Utility Connections

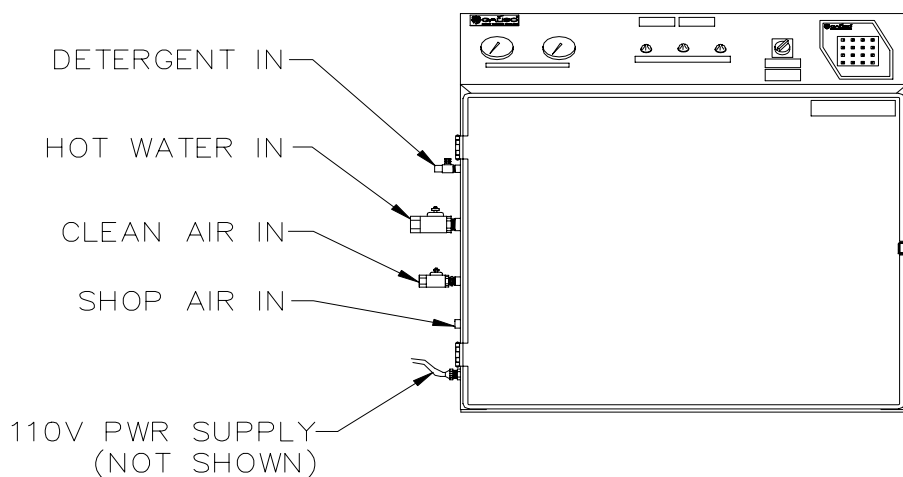


Figure 4 - 1

- A. Connect your Shop Air Supply Line (1/2' minimum) to the port labeled "Shop Air In" (1/2" FPT, see figure 4-1). Shop Air should be supplied at 120 psi.

4.2 Utility Connections, continued

- B. Connect the Clean Air Supply Line to the port labeled "Clean Air In" (1/2" FPT, see figure 4-1). The "Clean Air" supply must be clean gas (e.g. air or Nitrogen) to prevent contamination of cylinders. If compressed air is used, a filter system that will provide breathing air quality output with a contaminant level of no more than 0.03 parts per million must be installed in the Clean Air Supply Line. A filter system that will clean the air to a contaminant level of 0.01 parts per million is available from Galiso, Incorporated. See Section 4.3 for use of gasses other than compressed air.
- C. Connect your hot water source to the port labeled "Hot Water In" (3/4" FPT, see figure 4-1). An 80 gallon industrial water heater with a recovery rate of 125 gallons per hour at 140⁰ F minimum rise is recommended to achieve the maximum rate of approximately 40 large steel cylinders per hour. The temperature control on the water heater should be set at 180⁰ F. In applications where cylinder output requirements are not as high, a water heater with a lower recovery rate may be used. Galiso can provide you with a water heating system that has been tested and proven to work well in this application. Alternate hot water sources may be used provided they meet the supply specifications.
- D. Plug in the PCT power supply, appropriate for your electrical requirements. Power supplies are either 120Volt, 60 Hz, or 230Volt, 50 Hz. The power supply comes with an extra long cord to allow for remote placement of the power supply in order to reduce the risk of injury due to higher voltage electrical shock.
- E. If desired, connect a suitable detergent supply reservoir to the port labeled Detergent In (1/4" FPT). See Section 5.0, Detergent Supply, for additional details regarding installation and operation of the detergent supply reservoir.

4.3 Use Of Gases Other Than Compressed Air

If gasses other than compressed air are to be used, adequate ventilation must be provided, or the exhaust from the PCT-ADW must be piped to the outdoors to prevent accumulation of dangerous concentrations of gas in the work area. Note that if an extremely long exhaust line is used to pipe exhaust to the outdoors, the PCT-ADW may not be able to provide maximum clamping force due to the increased back pressure. Accumulation of exhaust gas can deplete the supply of breathing air, resulting in the danger of suffocation.

4.3 Use Of Gases Other Than Compressed Air, continued

If Carbon Dioxide or Nitrogen is used to power the unit, the following additional precautions must be taken:

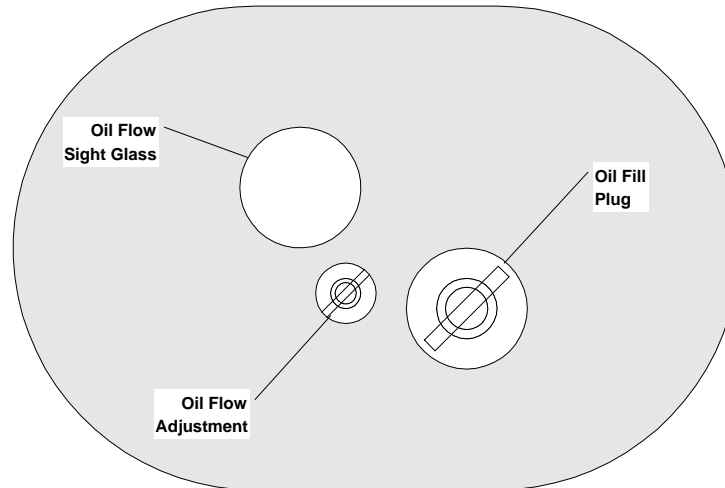
- A. A high volume Carbon Dioxide regulator must be installed at the storage unit to reduce the line pressure to between 100 and 120 PSI.
- B. Approximately 20 to 30 feet of 1/2" to 3/4" pipe or tubing must be run between the regulator and the connection to the PCT-ADW. The purpose of the line is to allow the Carbon Dioxide gas to warm up to ambient temperatures to prevent the drive motor from freezing or sticking.
- C. In the event that the ambient temperature is too low to provide adequate warm up of the gas prior to entering the unit, auxiliary heat of some type should be used to warm the gas to at least 100 degrees Fahrenheit before it enters the machine.

4.4 Air Lubricator Fill

Fill the air lubricator in accordance with the following instructions.

- A. Disconnect the air supply to the inverter cabinet, open the access panel and bleed all entrapped air by turning the air regulator all the way off. Verify the air pressure reads 0 psig on the inverter top panel air pressure gauge.
- B. Locate the oil reservoir, remove and fill with 10 weight non-detergent oil.
- C. Replace the oil reservoir. The oil feed should already be factory adjusted to approximately one drop per minute at full speed air flow. See figure 4-2 if oil flow adjustment is required.
- D. Re-adjust the air pressure regulator to the proper air pressure. Close the inverter access panel and re-connect the air supply.

4.4 Air Lubricator Fill, continued

**Figure 4 - 2 Top View - Air Lubricator**

4.5 Changing Cylinder Load Direction

PCT-ADW units are normally configured at the factory to load cylinders from the right hand side of the unit (when facing the control console). The side from which cylinders are loaded may be reversed on PCT-ADW units. In other words, cylinders may be loaded either from the right side or the left side of the machine. The following steps describe the procedure for changing the side from which cylinders are loaded into the PCT-ADW. Refer to figures 4-3 and 4-4 as necessary for clarification.

- A. Turn off and/or disconnect the Clean Air supply, Hot Water supply and Detergent supply and remove cylinder(s) and the injection probe(s), if installed.
- B. Turn the Manual/Auto switch (ref. Section 6.1.3) to the Hand (Manual) position. Press the E key (ref. Section 6.1.4) to Clamp the clamp arm grips. Press the F key to Invert the clamp assembly, then press the B, C and D keys to eject any residual hot water, detergent and/or air pressure from the machine.
- C. Turn the Manual/Auto switch (ref. Section 6.1.3) to the Off position. This will revert the clamp arm assembly, but will not unclamp the cylinder grips.

4.5 Changing Cylinder Load Direction, continued

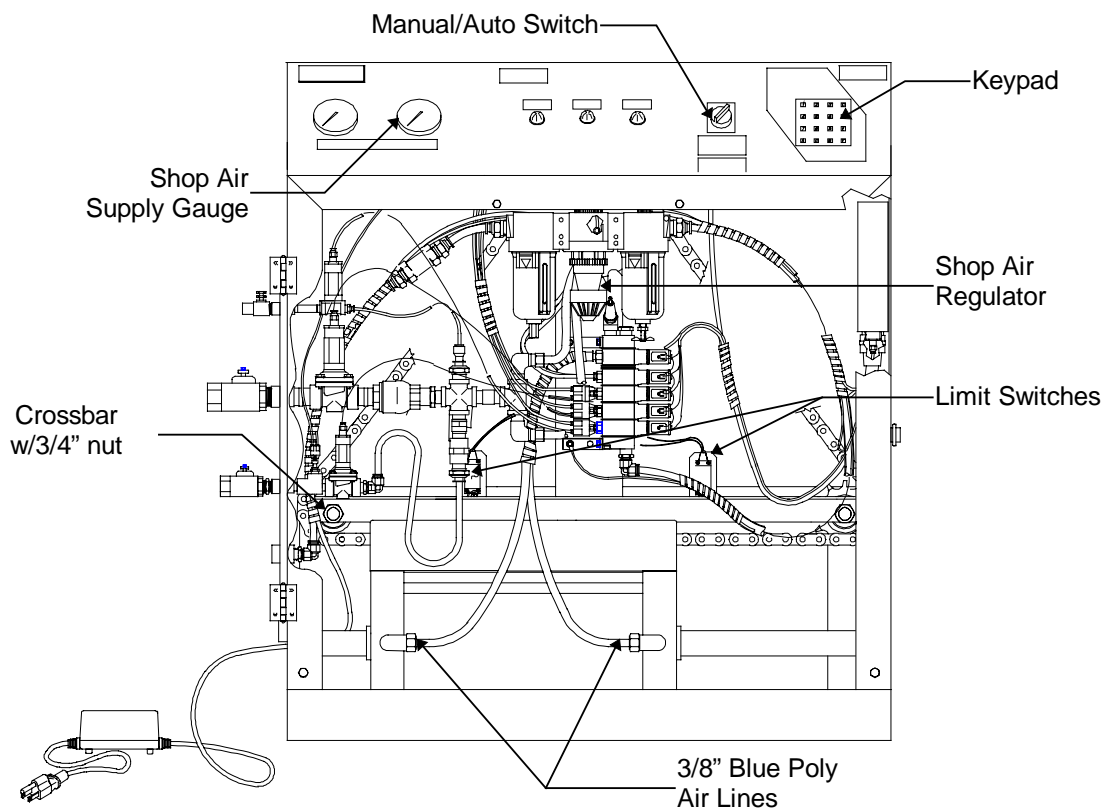


Figure 4 - 3

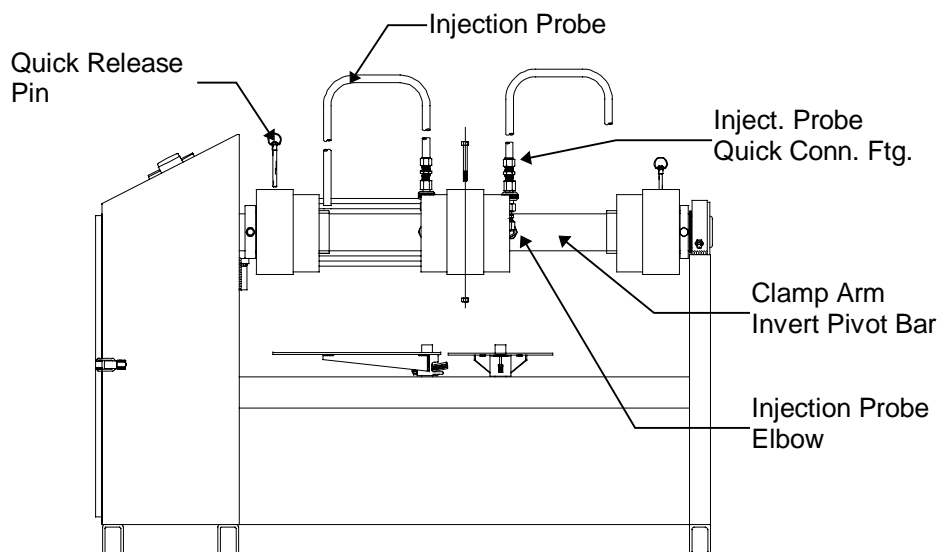
- D. Turn off/disconnect the Shop Air supply to the machine. Open the Shroud door panel and locate the Shop Air Regulator. Turn the regulator knob counter-clockwise until the Shop Air pressure gauge reads zero psig.
- E. Turn the Manual/Auto switch (ref. Section 6.1.3) to the Hand (Manual) position. Press the E key (ref. Section 6.1.4) to Unclamp the cylinder clamp grips. Since the air pressure has been released from the system (step D.), the clamp mechanism should not move. This step verifies that all the air pressure has been released from the system.
- F. Turn the Manual/Auto switch (ref. Section 6.1.3) to the Off position, and disconnect the power supply plug from the utility outlet.
- G. Open the Shroud door panel and locate the two limit switches, then locate the cross bar in front of the switches, see figure 4-3. Remove the $\frac{3}{4}$ " nuts holding the cross bar, and then remove the crossbar. Retain all items for re-assembly.

4.5 Changing Cylinder Load Direction, continued

- H. Remove the Limit Switches (2 ea.-1/4" bolts) and interchange (swap) them, re-tightening the bolts. Cut and remove ties and wire wraps as necessary to reposition the Limit Switches. Make sure that the wires are properly routed and supported after repositioning the switches.
- I. Replace the crossbar using the 3/4" nuts.
- J. Locate the blue poly invert cylinder air lines connected to the invert cylinder. Mark the lines and cylinder fittings so as to be able to identify the "as found" condition. Disconnect the lines by pushing the Quick Connect retainer into the fitting, holding the retainer in and then removing the tubing.
- K. Interchange (swap) and reconnect the blue poly air lines to the invert cylinder.
- L. Place the Manual/Auto switch in the OFF position and connect/open the Shop Air supply to the machine. This will automatically cause the clamp arm assembly to rotate to the other side of the clamp arm invert pivot bar.

! CAUTION !

Stay clear of the clamp arm assembly when supplying Shop air to the machine. The clamp arm rotates with considerable force and could cause personnel injury.

**Figure 4 - 4**

4.5 Changing Cylinder Load Direction, continued

- M. Remove and re-install the quick release pins from underneath the cylinder grips to the top side of the grips.
- N. Locate the Injection Probe fittings on the main cylinder invert pivot bar. Using a wrench, turn the elbow(s) clockwise $\frac{1}{2}$ turn (180°) until the fitting(s) points vertically upwards. Note that the Quick Connect fittings may have to be removed in order to turn elbows.
- O. Re-connect the power supply plug.
- P. Select the Manual (Hand) mode, and verify that the Clamp and Unclamp functions are properly operating by pressing the E key.
- Q. Verify that the invert mechanism is properly operating by pressing the F key while the cylinder arm is in the Clamp position.

! CAUTION !

In the event of any unusual noise, vibration and/or motion, press A, the Abort/Reset key immediately to Revert and Unclamp the machine, or press the Emergency Stop Switch (if so equipped) to completely shut down. Disconnect the air and power supplies and contact your Galiso, Inc. customer service representative for further instructions.

- R. Reconnect the Hot Water Detergent and Clean air supplies and proceed to cylinder handling operations as described in Section 6.0.

5.0 DETERGENT SUPPLY

The detergent supply system consists of a reservoir, a compressed air supply line and valve, and a detergent supply line and control valve. The following sections describe the installation and use of the detergent supply system.

5.1 Detergent Supply Reservoir Assembly

The Detergent Supply Reservoir consists of a customer supplied cylinder equipped with an SRC-1 Detergent Supply Reservoir Control Valve. Any clean, low pressure cylinder with a 3/4" NPT neck opening may be used with the SRC-1 to form the Detergent Supply Reservoir. Certain types of detergents and cylinder cleaning solutions are not compatible with aluminum cylinders. Therefore, Galiso recommends using a steel cylinder as the Detergent Reservoir. Suitable Detergent Supply Reservoir Cylinders are also available from Galiso. Refer to drawing number 25-82-9887 and the following instructions for preparation of the Detergent Supply Reservoir.

- A. Trim the bottom of the SRC-1 Dip Tube to fit the cylinder that is being used as the Detergent Reservoir. The length of the Dip Tube should allow approximately 3" between the base of the Dip Tube and the bottom of the cylinder when the SRC-1 is installed in the cylinder neck. See figure 5-1.

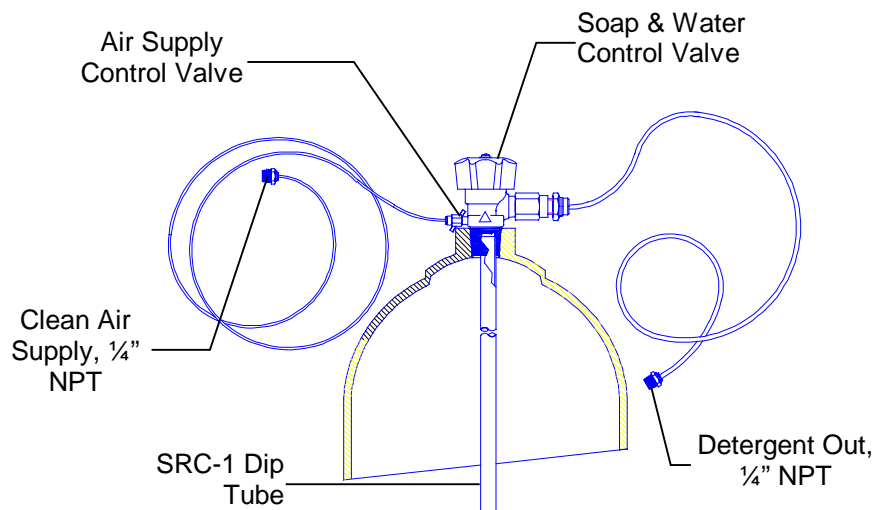


Figure 5 - 1

5.1 Detergent Supply Reservoir Assembly, continued

- B. Fill the cylinder with a suitable, oxygen compatible detergent or cleaning solution. The level of the detergent should be 6" below the bottom of the threads in the cylinder neck. Use an oxygen compatible, liquid degreaser, water-soluble soap such as Expray 80, which is available from Novamax Industries at 1615 Johnson Road, N.W., Atlanta GA 30318, or call toll free (800) 366-6682.
- C. Teflon tape the threads on the base of the SRC-1 and screw the SRC into the neck of the Detergent Reservoir cylinder. Close the Soap and Water Control Valve and the Air In Control Valve.
- D. Connect a supply line from the "Detergent Out" port on the SRC-1 to the "Detergent In" port on the PCT-ADW.
- E. Connect a supply line from the Clean Air port on the SRC to a source of clean, filtered air. Air used to operate the Detergent Supply Reservoir should have a contaminant level no more than 0.03 parts per million. The Detergent Reservoir Clean Air Supply Line can originate from the clean air source that is used supply clean air to the PCT-ADW. A filter system is available from Galiso which will clean the air to a contaminant level of 0.01 parts per million. The Detergent Reservoir clean air supply line should be equipped with a regulator, set at 80 psi.
- F. Open the Air In Control Valve and allow the Detergent Reservoir to build pressure. Open the Soap and Water Control Valve.

It may be necessary to adjust the Soap and Water Control Valve to achieve the appropriate detergent flow for the size of cylinders that you are servicing. If the cylinders are consistently dirty after cleaning, open the Soap and Water Control Valve slightly. If a detergent residue remains after rinsing, close the Soap and Water Control Valve slightly. See Section 6.5 to adjust the concentration of detergent injected into each cylinder.

6.0 PCT-ADW OPERATIONS

This section describes the automatic and manual modes of operation and discusses various controller and/or equipment adjustments, which may be necessary for proper system operation.

6.1 Invert/Wash/Dry Control Panel Components

The invert/wash/dry controls and indicators for the PCT-ADW are shown in figure 6-1.

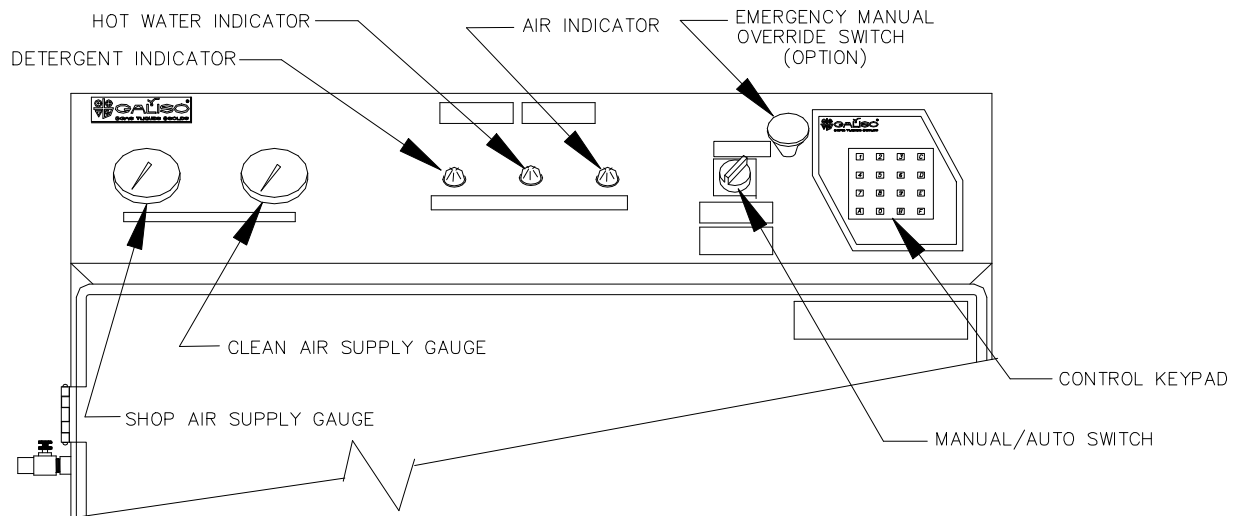


Figure 6 - 1 PCT-ADW Inverter Control Panel

6.1.1 Shop and Clean (Injection) Air Supply Gauges

The Shop Air pressure determines the amount of force applied to the cylinder clamp and the Cylinder Inverter. A shop air regulator is located inside the control enclosure for adjustment of the Shop Air supply pressure. Generally, a 80 to 90 psig air pressure setting is adequate for most steel cylinder(s), higher for larger volume cylinders.

The Clean or Injection Air supply gauge monitors the cylinder probe injection pressure. This air is also used to cool the controller and therefore must be clean and dry. Use of 5 micron, Grade D, Oil Free, Dry, filtered air is recommended.

6.1.2 Injection Indicator Lights

These indicator lights provide the operator with the status of the Wash/Dry cycle. The lights indicate when detergent, hot water or clean dry air is being injected.

6.1.3 Manual/Auto Control Switch

The position of the Manual/Auto control switch (see figures 6-1 and 6-2) determines whether the automated invert/wash/dry cycle will run, or the controller will accept manual operator inputs. Note also that the cylinder clamp mechanism will automatically unclamp when the switch position is changed.

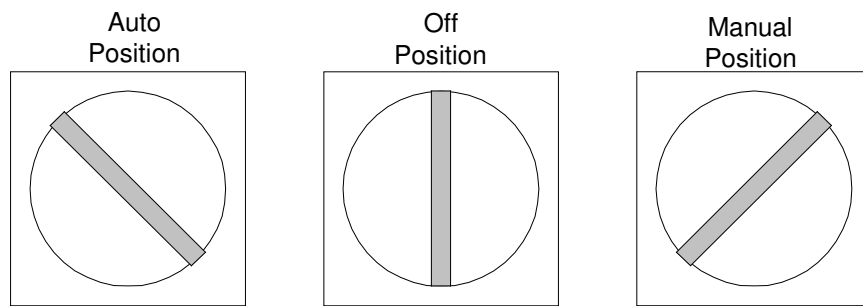


Figure 6 - 2 Manual/Auto Control Switch Positions

6.1.4 Clamp/Invert/Wash/Dry Control Keypad

The control keypad is shown in figures 6-1 and 6-3. This keypad provides operator control of the cylinder clamp and invert/wash/dry functions.

KEYPAD				KEY FUNCTIONS		
KEY	AUTO		MANUAL			
1	2	3	C		ABORT/RESET	
4	5	6	D		HOT WATER INJECT	
7	8	9	E		DETERGENT INJECT	
A	0	B	F		AIR INJECT	
					CLAMP/UNCLAMP CYL.	
					START AUTO CYCLE	
					INVERT/REVERT CYL.	

For F Auto Start Cycle See 6.2.C

Figure 6 - 3 PCT-ADW Controller Keypad

6.1.4 Clamp/Invert/Wash/Dry Control Keypad, continued

A. Inputting and Changing the Cycle Time Values:

Time values for any phase of the automatic operating cycle can be changed at any time between cycles to suit a particular cylinder size or application. To change a cycle time, set the Auto/Manual switch to AUTO, and proceed as follows:

- 1) Drain Air Injection Time: Enter the 3 digits representing the time value in seconds. For example, for a 10 second air injection time, enter 010. Enter the letter 'D', for Drain Air. Pressing the A key (Abort) will leave the last entered time.
- 2) Detergent Injection Time: Enter the 3 digits representing the desired time value in seconds. For example, for a 10 second detergent injection time, enter 010. Enter the letter 'C' for detergent injection. Pressing the A (Abort) key leaves the last entered time. To eliminate the detergent injection cycle, enter 0 time and press the 'C' key. Refer to Section 6.6 for additional information regarding detergent injection.
- 3) Hot Water Injection Time: Enter the 3 digits representing the desired time value in seconds. For example, for a 50 second water injection time, enter 050. Enter the letter 'B' for hot water injection. Pressing the 'A' (Abort) key leaves the last entered time.
- 4) Drying Air Injection Time: Enter the 3 digits representing the desired time value in seconds. For example, for a 60 second Air injection time, enter 060. Enter the letter 'E' for drying air. Pressing the 'A' (Abort) key leaves the last entered time.

B. Recommended Automatic Cycle Times:

The automatic process steps and recommended cycle times for standard steel cylinders are as follows:

- 1) Clamp and invert cylinder(s).
- 2) Drain/drying air on for 15-20 seconds.
- 3) Air off, and hot water on for 50-60 seconds (This includes detergent injection for the first 5-10 seconds, if used).

B. Recommended Automatic Cycle Times, continued

- 4) Water off and drying air on for 50-60 seconds.
- 5) Re-invert and unclamp cylinder(s).

For welded cylinders, a cylinder invert with a 10 second air injection cycle may be repeated three or six times at the end of the automatic invert/wash/dry cycle to insure complete drying of cylinder(s). Press D and then F to add three invert/air drying cycles, or press B and then F to add six invert/air drying cycles.

6.2 Automatic Operation

- A. Load the cylinder(s) into the clamp grips and insert the Injection Probe(s) into the neck of the cylinder(s). Connect the base of the Injection Probe to the Injection Outlet located on the Cylinder Clamp Arm.
- B. Turn the Mode Selector Switch to the AUTO (Automatic Operation) position.
- C. With the incorporation of a "Cycle Start" switch on the PCT control panel, the operator may elect to use it when testing in the Auto Mode. By doing this, it will extend the life of the keypad; specifically the "F" key.

NOTE:

On the PCT-15 and PCT-122, if the Selector Switch is accidentally turned to any position, (during operation), the machine will revert the cylinder to the upright position, and unclamp the cylinder.

The PCT-24-ADW is equipped with a 2 position, clamp arm switch that will override the cylinder unclamp step as previously stated. When servicing cylinders, operator must turn "CLAMP ARM" switch to "LOCK" position. This will prevent clamp arms from opening, which could possibly cause personal injury, equipment or cylinder damage, caused by power interruption or inadvertent "Selector Switch reposition (during operation). When cylinder service is complete and returned to "home" position, turn "Clamp Arm" selector switch to "Unlock" to open clamp arms. "A green indicator light, adjacent to Clamp Arm switch, when lit, tells operator to run "clamp arm" switch to "LOCK". This applies whenever the "Selector Switch" is in either HAND or AUTO mode.

6.3 Manual Operation

- A. Load the cylinder(s) into the clamp grips and insert the Air Injection Tube(s) into the neck of the cylinder(s). Connect the base of the Air Injection Tube to the Injection Outlet located on the Cylinder Clamp Arm.
- B. Turn the Mode Selector Switch to the HAND (manual operation) position.
- C. Press the E (Clamp Control) key to clamp the cylinder.
- D. Press the F (Invert Control) key to invert the cylinder.
- E. Press the D (Air Injection Control) key, air pressure will flush any debris from the cylinder. When the cylinder is empty, press the D key again to shut off the air injection.
- F. If the cylinder requires washing, press the C (Detergent Injection Control) key. When the cylinder is clean, press the C key again to stop detergent injection. See Section 6, Detergent Supply Reservoir for instructions for adjusting the detergent injection concentration.
- G. Press the B (Hot Water Injection Control) key to inject hot water into the cylinder. Allow the hot water injection to remain on long enough to rinse the detergent from the cylinder, and then press the B (Hot Water Injection Control) key to stop the hot water injection.
- H. If the cylinder does not require washing, allow the hot water injection to heat the cylinder for approximately one (1) minute, then press the B key again to stop hot water injection time. The time required to sufficiently heat a cylinder will vary with the cylinder size. If the cylinder is not dry at the end of the operation cycle, then the hot water injection time needs to be increased. Smaller cylinders will require a shorter hot water injection time and larger cylinders will require a longer hot water injection time.
- I. Press the D (Air Injection Control) key again to drain and dry the cylinder. Allow the air to dry the cylinder for approximately one (1) minute and then press the D key again to stop the air injection.
- J. Press the F (Invert Control) key to return the cylinder to the upright position.
- K. Press the E (Clamp Control) key to release the cylinder from the cylinder clamp, then disconnect the Air Injection Tube and remove the cylinder from the machine.

6.4 Cylinder Clamp Arm Adjustment

The PCT-15-ADW, PCT-122-ADW and the PCT-24-ADW, feature an adjustable cylinder clamp to allow the machine to accept a wide variety of cylinder sizes. The PCT-15ADW has an adjustable inner clamp arm, which allows the clamp to be repositioned for servicing cylinders from 4 inches to 15 inches in diameter.

The PCT-122-ADW features a slightly different clamp arm configuration. The center clamp is removable to allow the PCT-122-ADW to service larger cylinders. Normally, the PCT-122-ADW will accept two cylinders from 5 inches to 12 inches in diameter. When the center clamp arm is removed, the PCT-122-ADW, (with an optional set of clamp arms), will accept one cylinder, up to 15 inches in diameter.

The clamp arm adjustment procedures for both the PCT-15-ADW, and the PCT-122-ADW, are described below.

6.4.1 PCT-15-ADW Clamp Arm Adjustment:

The inner Cylinder Clamp Arm of the PCT-15-ADW may be set in three different positions to allow the PCT to accept cylinder from 4 inches to 15 inches in diameter. To adjust the Cylinder Clamp Arm, proceed as follows:

- A. Position a cylinder between the Cylinder Clamp Grips.
- B. Remove the pin that secures the inner Cylinder Clamp Arm to the Cylinder Clamp Shaft. Move the inner Cylinder Clamp Arm to the appropriate position and replace the retaining pin. Remove the cylinder from the Clamp Grips.

6.4.2 PCT-122-ADW Clamp Arm Adjustment:

The center Cylinder Clamp Arm of the PCT-122-ADW is removable to allow the PCT-122-ADW to service a single 12 inch to 15 inch diameter cylinder instead of two standard size cylinders. To remove or replace the center Cylinder Clamp Arm, proceed as follows:

- A. Position a cylinder next to the Cylinder Clamp Grips.
- B. Remove the bolts which secure the center Cylinder Clamp Arm to the Cylinder Clamp Shaft. Safely store the center Cylinder Clamp Arm and retaining bolts until they are needed again.

6.4.2 PCT-122-ADW Clamp Arm Adjustment, continued

- C. To replace the center Cylinder Clamp Arm, first remove the cylinder from the Cylinder Clamp. Reinstall the center Cylinder Clamp Arm and replace the retaining bolts. Tighten the bolts to securely fasten the center Cylinder Clamp Arm to the Cylinder Clamp Shaft.

6.5 Loading of Unusual Dimension Cylinders

6.5.1 Large Diameter Cylinders:

Large diameter (over 12") L.P. or compressed natural gas cylinders require special handling. Cylinders must be clamped at its vertical center to assure proper balance. A suitable base or platform may be needed to accomplish this.

Round bottom compressed natural gas cylinders require using a base that will support the cylinder in a vertical position.

L.P. or natural gas cylinders over 42" high require partial draining prior to inverting. This is accomplished by the use of a Drain Probe Assembly (Part Number 25-41-9352).

The operating air pressure regulator should be set at 110 psig to assure proper operation of the equipment.

6.5.2 Loading of cylinders under 42" high:

- A. Position cylinder between the cylinder grips on top of the appropriate base or platform
- B. Insert the injection probe into the neck of the cylinder and connect the base of the probe to the injection outlet located on the cylinder clamp arm.
- C. Proceed with manual or automatic operations as desired.

6.5.3 Loading of Cylinders 42" and Over in Height:

- A. Position the cylinder between cylinder grips on top of the appropriate base or platform.
- B. Turn the selector switch to the HAND position and press the E key to clamp the cylinder.

6.5.3 Loading of Cylinders 42" and Over in Height, continued

- C. Insert and tighten Injection Probe Assembly, (part number 25-41-9352) to the cylinder and attach the air supply line to the male quick connect fitting at the top of the assembly (air pressure should be 80 to 90 psi). When empty, disconnect the air supply and remove the Drain Probe Assembly.

NOTE:

Drain Probe can be cut to a length, which will allow the cylinder to remain partially full. The amount of water left in the cylinder will be determined by the ability of the cylinder grips to support the cylinder without slipping.

- D. Insert injection probe into the neck of the cylinder and connect the base of the probe to the injection outlet, located on the cylinder clamp arm.
- E. Proceed to either the automatic or manual operations as desired.

!! WARNING !!

Failure to follow the above procedures could result in a cylinder being dropped, resulting in extreme personal injury and/or damage to the equipment.

6.6 Detergent Supply Adjustment

The following sections provide instructions for adjusting the detergent injection, shutting down the detergent supply and re-filling the detergent supply reservoir.

6.6.1 Detergent Injection Adjustment

- A. Turn the Mode Selector Switch to the HAND position (Manual Operation).
- B. Load an empty cylinder into the Clamp Jaws, insert the Injection Probe into the neck of the cylinder and connect the base of the probe to the Injection Outlet, located on the Cylinder Clamp Arm. Press the "E" key (Clamp Control) to clamp the cylinder.
- C. Press the "F" key (Invert Control) to invert the cylinder.
- D. Press the "B" key (Hot Water Injection Control) to start hot water injection into the cylinder.

6.6.1 Detergent Injection Adjustment, continued

- E. Press the "C" key (Soap Injection Control) to start detergent injection into the cylinder. Turn the Detergent In Valve and the Hot Water In Valve to adjust the concentration of detergent injected into each cylinder. The detergent injection rate should be high enough to remove any contaminants, but not so high that an inordinately long hot water injection time is required to rinse the detergent from the cylinder after washing.
- F. After allowing the hot water injection to rinse all detergent from the cylinder, press the "B" (Hot Water Injection Control) key to stop hot water injection.
- G. Press the "D" (Air Injection Control) key to drain and dry the cylinder. Press the "F" (Invert Control) key to return the cylinder to the upright position. Press the "E" (Clamp Control) key to release the cylinder from the clamp.
- H. Disconnect the Injection Probe and remove it from the cylinder.
- I. Turn the Mode Selector Switch to the AUTO (Automatic Operation) position to continue computer-controlled operation, or leave the Mode Selector Switch in the HAND position (Manual Operation) position for manual operation.

6.6.2 Detergent Reservoir Fill

To refill the Detergent Supply Reservoir, proceed as follows:

- A. Close the Detergent Reservoir Clean Air In Control Valve and the Detergent Reservoir Clean Air Supply Line Regulator located on the SRC-1.
- B. Next, remove the Clean Air Supply Line and the Detergent Supply Line from the SRC-1.
- C. Open the Clean Air In Control Valve on the SRC-1 and allow all air pressure to escape from the Detergent Supply Reservoir. Close the Clean Air In Control Valve.

! CAUTION !

Make certain that all pressure has been released before removing the SRC-1 Detergent Reservoir Control Valve from the cylinder.

- D. Remove the SRC-1 from the cylinder neck and refill the Detergent Supply Reservoir as described in Section 4.5.

6.6.3 Detergent Supply Shutdown

To shut down the Detergent Reservoir at the end of a period of operation, proceed as follows:

- A. Close the Soap and Water Control Valve and the Clean Air In Control Valve.
- B. Close the Detergent Reservoir Clean Air supply line regulator.
- C. Remove the Detergent Reservoir clean air supply line from the SRC-1 and open the Clean Air In Control Valve and allow all pressure to bleed from the reservoir. Replace the Detergent Reservoir clean air supply line after all pressure has escaped from the Detergent Reservoir.
- D. Close the Clean Air In Control Valve.

7.0 MAINTENANCE

7.1 General

- A. Lubricate the Clamp Arm, Clamp Arm Bearings, Chain and Sprocket once per month with moly grease.
- B. Check the air supply line filter and lubricator twice per week for proper operation.
- C. If compressed air is used for injection, check filters daily for proper operation.
- D. Galiso recommends that the Air Filter element be replaced every six (6) months. The Air filter element may be purchased from Galiso under part number 80-11-0068.

7.2 Electronic Controller Replacement

A Galiso Manual (No. 21-11-1148) is provided with the shipment of all controllers, should it become necessary to replace the electronic controller.

7.3 Troubleshooting

In the event that the unit fails to respond to keypad input, there are two primary causes. First, electrical power surges may cause the electronic controller to shut down, disabling both automatic and manual control. Second, the keypad itself may have developed a malfunction.

A. Controller Reset

If the keypad controls are not responding, press the Reset button on the electronic controller. The controller is located inside the main enclosure on the right hand side. The Reset button is located on the back side of the controller enclosure, beneath the ribbon cable from the keypad. Press the red Reset button to reset the controller. The keypad commands should now be active. If they are not, procede to troubleshoot the keypad as described in 7.3.B, below.

B. Keypad

The keypad is connected to the PCT-ADW microprocessor with a ribbon cable and an eight pin Berg connector. To determine if the keypad is malfunctioning, perform the following steps:

- Disconnect the ribbon cable connector from the microprocessor.

7.3 Troubleshooting, continued

B. Keypad, continued

- Attach the leads of an ohm meter to the keypad cable connector pin(s) suspected of malfunction, see figure 7-1 for pin/key assignments. For example, if the 'A' key is desired, connect the ohm meter leads to pins 1 and 8 on the connector. The ohm meter is used to check continuity between the two pins.
- Press the key that is suspected of malfunctioning. If the key is functioning properly, the ohm meter needle will 'jump' when the key is pressed. If the key is malfunctioning, the ohm meter needle will not move when the key is pressed. Replacement keypads are available from Galiso, reference part number 87-11-0036.

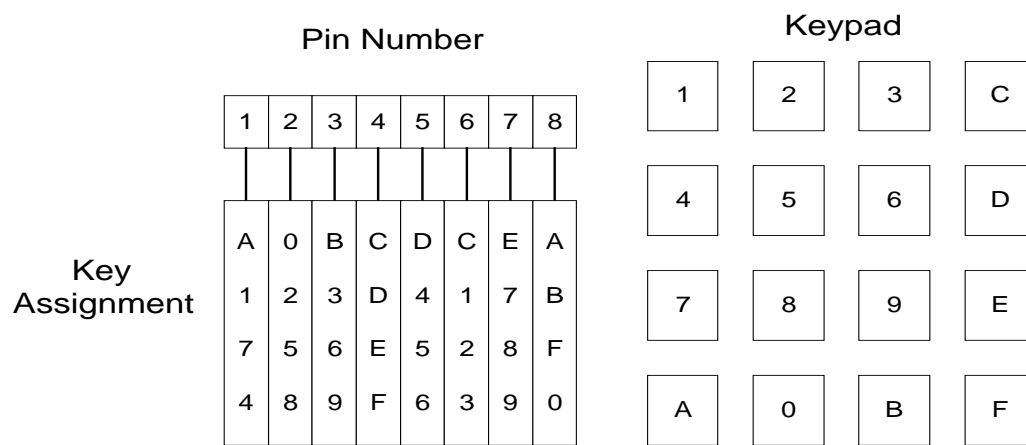


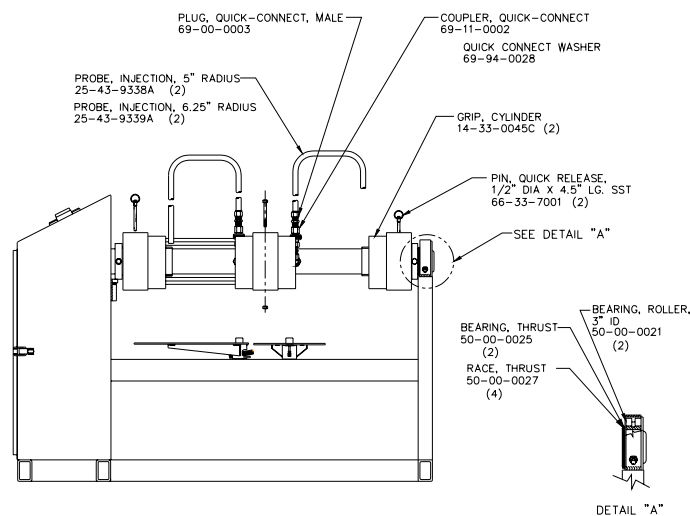
Figure 7 - 1 Keypad Pin Assignments

7.4 PCT Cylinder Inverter Spare Parts:

A spare parts list for the PCT cylinder inverter is provided in Table 7-1. Figures 7-2 and 7-3 depict the primary component spare parts locations for the PCT.

Table 7 - 1 PCT Cylinder Inverter Spare Parts

ITEM NUMBER	DESCRIPTION	QUANTITY
25-41-4056B	PCT CONTROLLER	1
25-41-4055A	HARNESS CONTROLLER	1
14-33-0045B	GRIP CYLINDER	1
25-31-9241A	COUPLING INJECTION PCT	1
25-43-9338A	PROBE INJECTION 5" RADIUS PCT-122	2
25-43-9339A	PROBE INJECTION 6.25 RAD PCT-122	2
50-00-0021	BEARING ROLLER	1
50-00-0025	BEARING THRUST	1
50-00-0027	RACE THRUST	1
69-94-0028	QUICK CONNECT WASHER	2
66-33-7001	PIN QUICK RELEASE 1/2 DIA X 4.5 L SST	1
69-00-0003	PLUG QC MALE 3/8 FPT	1
69-11-0002	COUPLER QC	1
81-11-0088	VALVE DISC 2 WAY 3/8 11439-010	1
81-11-0172	VALVE DISC 3/4	1
81-11-0224	VALVE CONTROL STACKABLE 12 VOLT	1
83-11-0038	VALVE CHECK 3/4	1
83-11-0047	SAFTEY VALVE 1/4	1
87-11-0025	SWITCH HEX KEY PAD MICROSWITCH	1
	POWER SUPPLY ASSY, 110VAC OR 220VAC	1 ONLY

**Figure 7 - 2**

7.4 PCT Cylinder Inverter Spare Parts, continued

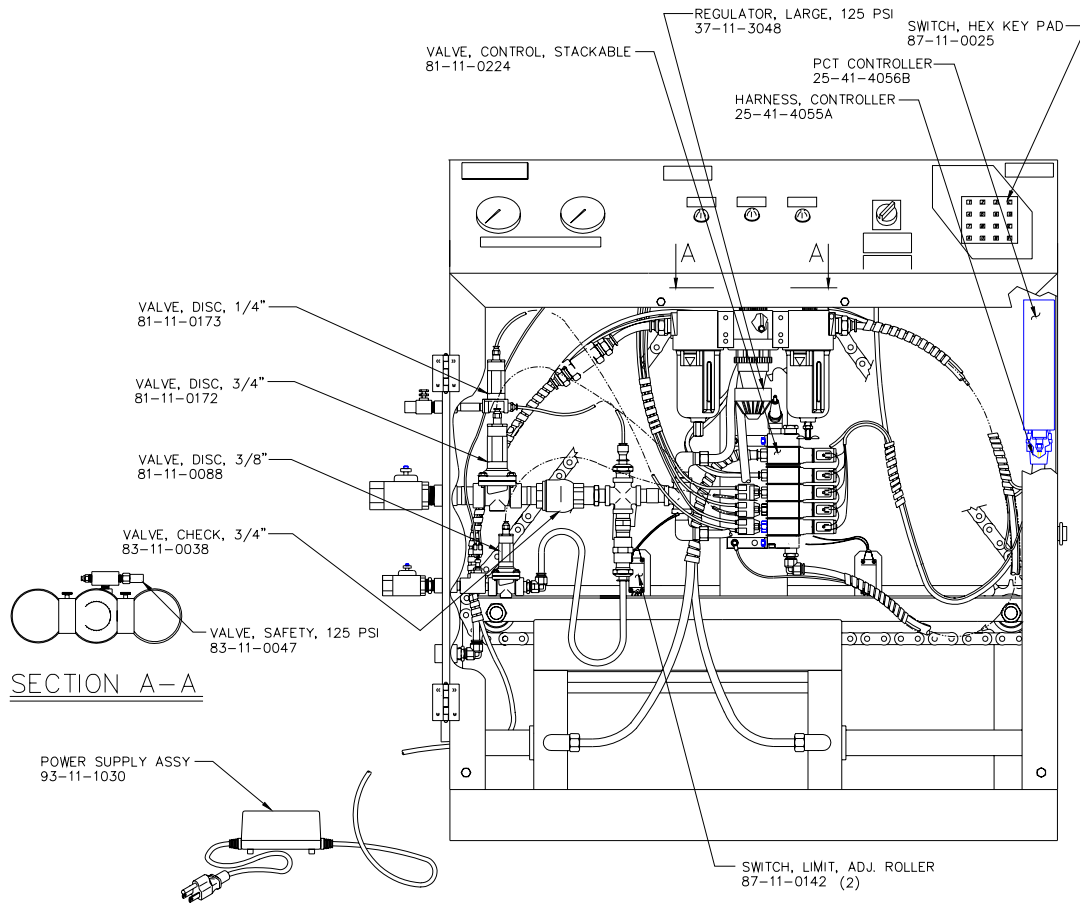


Figure 7 - 3



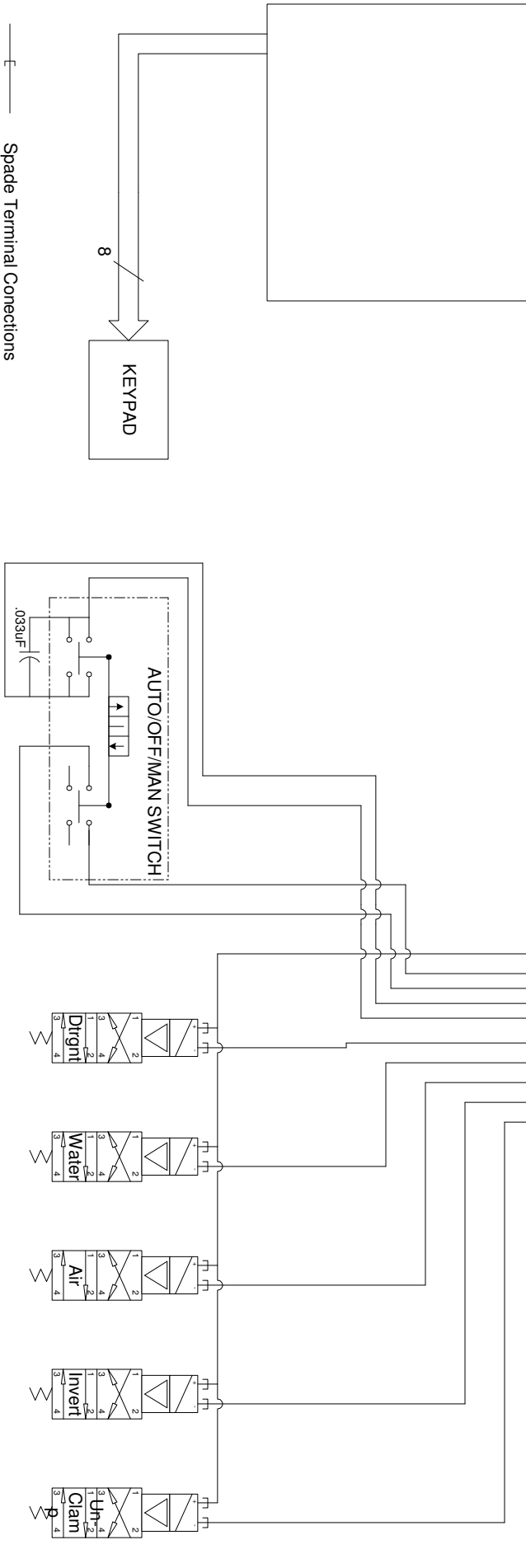
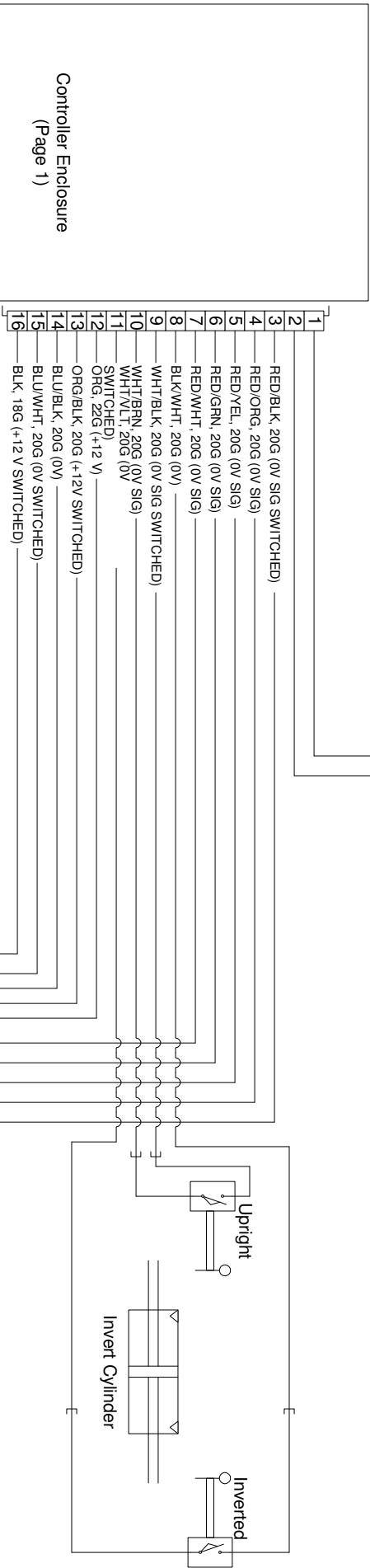
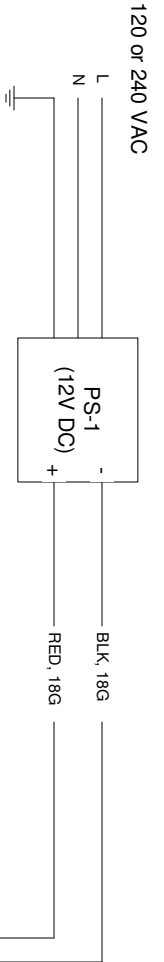
PRODUCT WARRANTY

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.

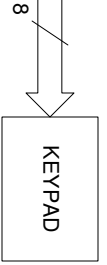
If the warranty determination indicates that the item is not covered by warranty, a repair/replacement cost estimate will be submitted to the purchaser for approval prior to initiating any repair work.
4. **CLAIMS:** In the case of equipment malfunction, notify Galiso (1-800-854-3789) and provide the 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.

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REV.	DESC.	DATE	BY:	APP.			
B	ECN #178	8/28/1997	DRS	CH			
C	ECN #193	5/15/1998	CH				



Spade Terminal Connections



MATERIAL

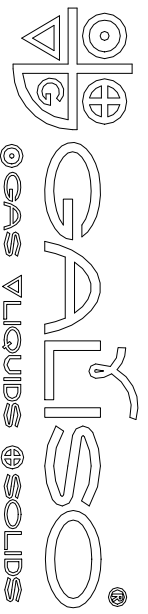
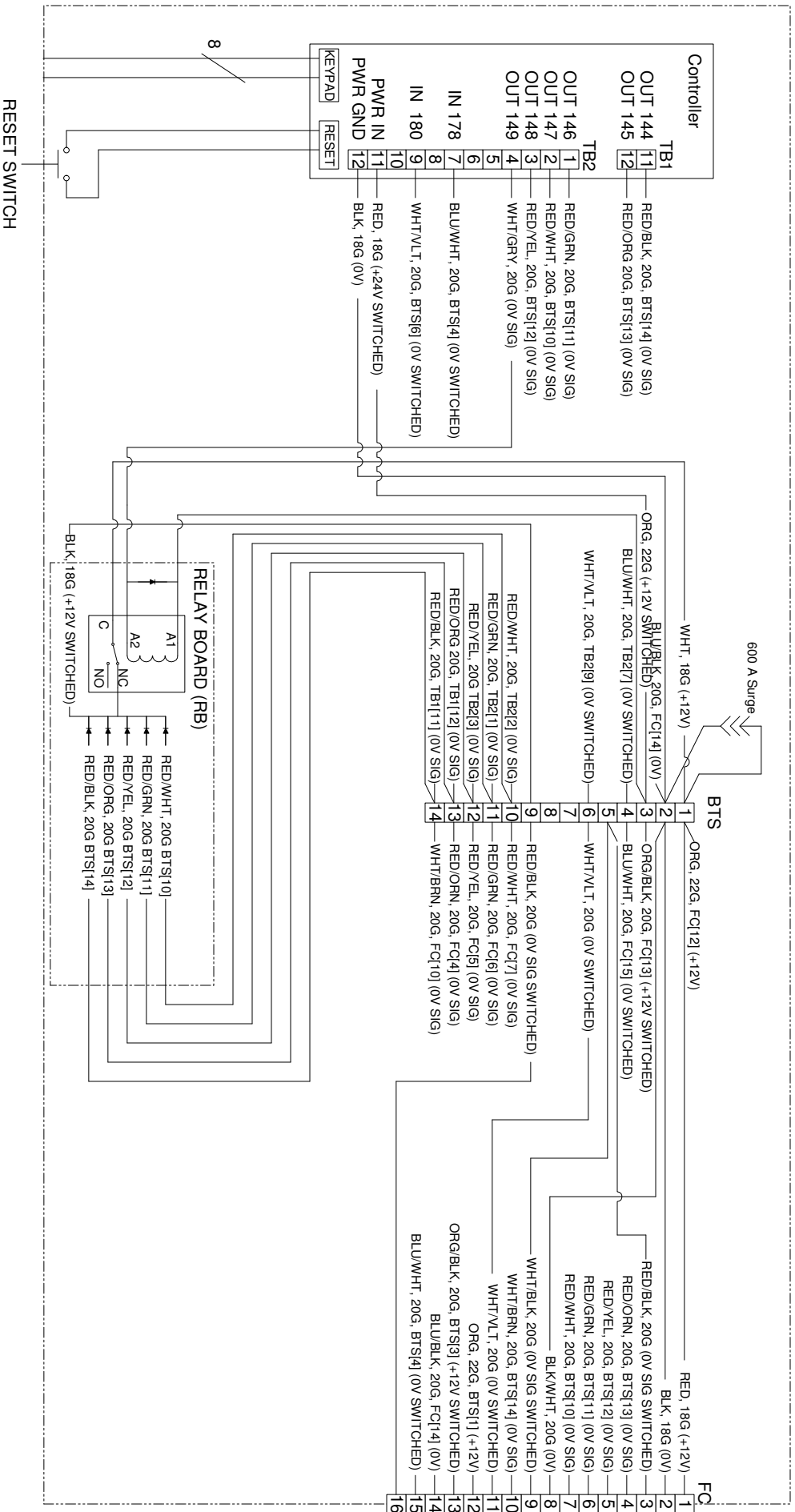
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PCT ADW SERIES ELECTRICAL				DRAWN		DATE	
MODELS 122, 24, & 15				C. HOOPER		5/15/1998	
DRAWING NUMBER	NEXT ASSEMBLY	SHEET	REVISION	ENG.	DATE		
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.X = ±				N/A	NONE	21911007C.VSD	

DRAWING NUMBER		SHEET	
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B	ECN #178	8/28/1997	DRS
C	ECN #193	5/15/1998	CH

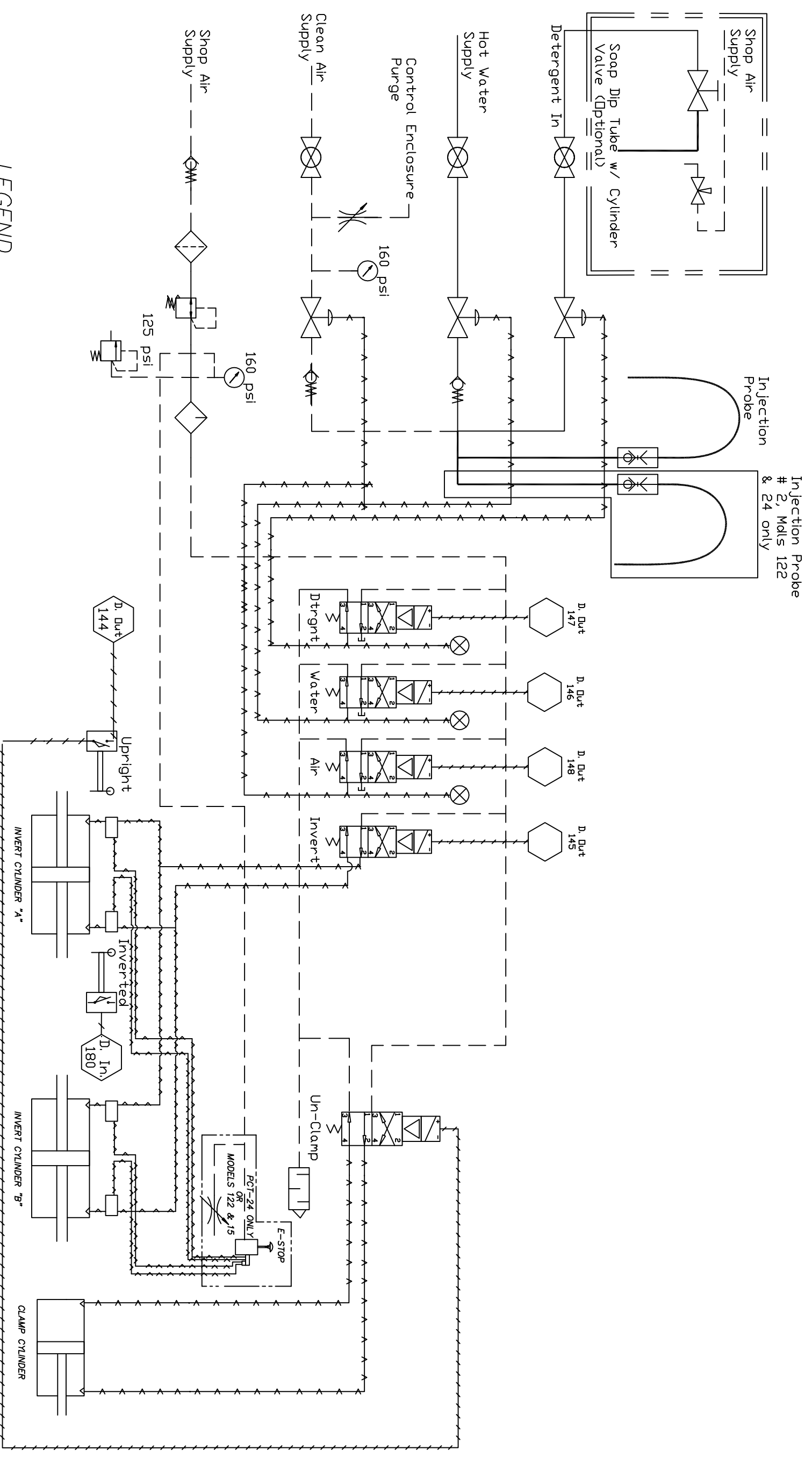
Controller Enclosure



MATERIAL	QTY
X	X
X	X

PCT ADW SERIES ELECTRICAL				DRAWN	
MODELS 122, 24, & 15				C. HOOVER	
DRAWING NUMBER 21-91-1007				ENG. DATE 5/15/998	
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Injection Probe
2, Mals 122
& 24 only

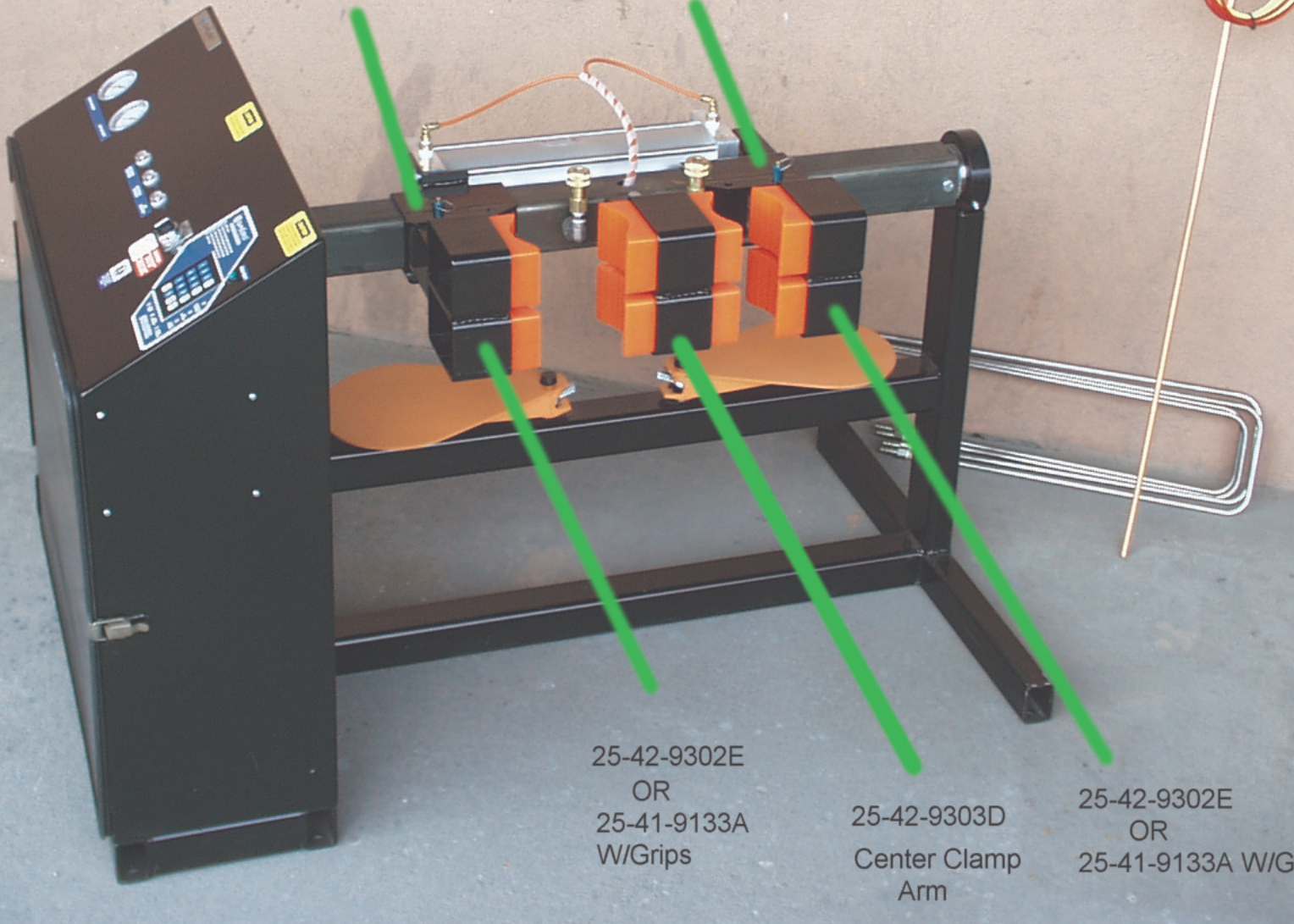
LEGEND

- — — — — Air Lines
- — — — — Pneumatic Control Lines
- — — — — Water Lines
- — — — — Process Lines
- — — — — Electric Signal

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SIGNATURE	DATE	<p>TITLE:</p> <p style="font-size: large; font-weight: bold;">PCT ADW SERIES P&ID</p> <p>MODELS 122, 24 & 15</p>	
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ENGINEERING			
QUAL. ASSURANCE		DRAWING NUMBER	REVISION
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			1 OF 1

25-41-9347C
Front Slider

25-31-9348C
Rear Slider



25-42-9302E
OR
25-41-9133A
W/Grips

25-42-9303D
Center Clamp
Arm

25-42-9302E
OR
25-41-9133A W/G