SEMITOOL SPIN RINSER / DRYER W/PSC-101 CONTROLLER

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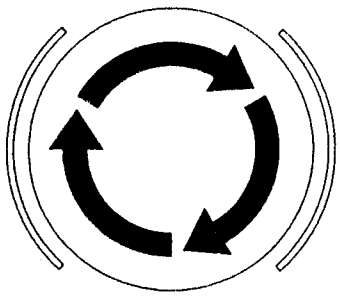
1.1 Emergency Machine Off (EMO) Procedure

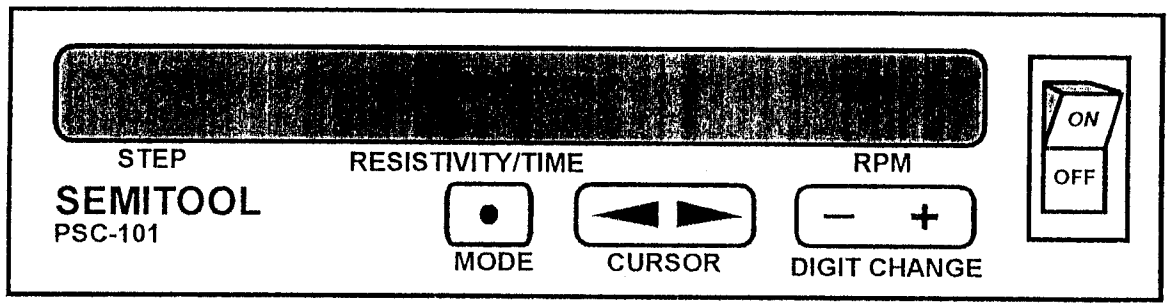
1. Locate the nearest Emergency Machine Off (EMO) Button (some tools may not be equipped with an EMO button, see step 3).

2. Press the EMO Button to immediately interrupt system power.



EMERGENCY MACHINE OFF (EMO) BUTTON (RED)

3. For tools not equipped with an EMO Button, turn the power switch to the **OFF** position. The power on/off switch is located on the right hand side of the controller panel.



4. To restart after an Emergency Machine Off:

   - Rotate the **EMO** button clockwise to reset the system.
   - Press the **ON** button.
   - See Section 4.5 for power up procedures.

1.2 Lockout/Tagout Procedure

1. When the POWER OFF button has been pressed, further action may be necessary to ensure safety of personnel during maintenance procedures.

2. **SEMITOOL** provides a plastic casing to secure around the end of the power cord (part number 61539-03, or 61539-05 for 220V plugs.). Pull the plug and enclose with the plastic casing. Insert your locking device to secure.

3. Secure a warning tag which alerts personnel that the tool has been locked out for maintenance purposes and should not be unlocked without proper authorization.

4. Personnel should be instructed in the proper company procedure and the following items should be posted in a highly visible location in order to maintain a safe Lockout/Tagout procedure:

   - Location of tags and locks;
   - List of personnel authorized to remove a tag or lock;
   - Approved record keeping procedure to prevent accidental tag/lock removal.

1.3 Warning Message Conventions

In keeping with current industry practice and in the interest of safe operation, the following conventions for Notice, Caution, Warning, and Danger messages, defined by example, have been incorporated into this manual:

In addition, the following three-tiered system will be observed for warning labels in this manual:

First -- Level of Hazard:	Notice, Caution, Warning or Danger.
Second -- Identification of Hazard:	Pictorial hazard alert symbols will be used to identify hazard types (see Section 1.3 for Pictorial Hazard Alert Descriptions).
Third -- How to Avoid the Hazard:	Replace fuse; Do not touch; Allow to cool; etc.

NOTICE

Notices are informative messages not critical to operator safety or tool integrity. They apply to the text immediately preceding them.

CAUTION

Caution Messages warn against potential hazards or caution against unsafe practices. They indicate a possible hazard against which proper precautions should be taken, and apply to the text immediately following them.

WARNING

Warning Messages indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury. Warning Messages apply to the text immediately following them.

DANGER

Danger Messages indicate that an immediate hazard exists and that special precautions are necessary. Loss of life or limb will occur if Danger Messages are not heeded! Danger messages apply to the text immediately following them.

1.4 Electrical Work Guidelines

Electrical work on **SEMITOOL** equipment is classified by type as defined by the SEMI S2-93 Product Safety Guidelines. The Type designation will be indicated in a shadow box wherever applicable. A brief description follows:

TYPE 1 Equipment is fully de-energized (electrically "cold").

TYPE 2 Equipment is energized. Live circuits are covered or insulated. Work is performed at a remote location to preclude accidental shock.

TYPE 3 Equipment is energized. Live circuits are exposed and accidental contact is possible. Potential exposures are less than 30 volts, 42.2 volts peak, 240 volt-amps, and 20 Joules.

TYPE 4 Equipment is energized. Live circuits are exposed and accidental contact is possible. Voltage potentials are greater than 30 volts RMS, 42.2 volts peak, 240 volt-amps, and 20 Joules, or radio frequency (rf) is present.

TYPE 5 Equipment is energized and measurements and adjustment require physical entry into the equipment, or equipment configuration will not allow the use of clamp-on probes.

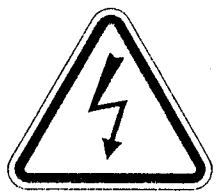
1.5 Pictorial Hazard Alerts

The following pictorial hazard alerts will be employed throughout the body of this manual. Wherever applicable, these symbols will appear in order to alert users to the potential risks of the procedures being explained. An example and brief description of each alert follows:

This symbol indicates a toxic material hazard.

This symbol indicates a general danger hazard.

This symbol indicates an oxidant material hazard.



This symbol indicates an electrical hazard.

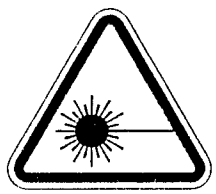
This symbol indicates an irritant material hazard.

This symbol indicates a heavy object hazard.

This symbol indicates a pinch point hazard.

This symbol indicates a flammable material or high temperature hazard.

This symbol indicates a hot surface hazard.



This symbol indicates a laser hazard.

This symbol indicates an explosive material hazard.

1.6 General Warning Notices

1.6.1 Alternate Parts Warning

WARNING

Use of alternate parts can lead to failures resulting in a fire, electrical shock, or physical injury. All replacement components should be provided and installed by **SEMITOOL**.

1.6.2 Service Mode Warning

WARNING

Operation of the Spin Rinser Dryer in the Service mode can cause conditions that endanger both property and personnel. Use extreme caution. When the system is started in the Service mode, safety interlocks are disabled.

1.6.3 Installation & Facilities Warning

CAUTION

Failure to install this **SEMITOOL** product according to the specifications set forth in this document may result in damage to equipment or product, and may cause injury to personnel. **SEMITOOL** is not responsible for damages that occur because of improper installation or facility supplies.

1.6.4 MSDS Information

The user should request a manufacturers Material Safety Data Sheet (MSDS) from the manufacturer of each chemical that is used in this machine. A copy of the MSDS should be placed in the SAFETY section of each manual.

1.6.5 Label Requirements

An OSHA approved Hazard Communication Label should be placed on all chemical tanks that:

- Describes the chemical and physical hazards present;
- Identifies the chemical;
- Lists recommended first aid measures in the event of exposure.

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SEMITOOL

STANDARD WARRANTY

Warranty and Warranty Period. Seller warrants that all products provided hereunder (exclusive of software and consumable products as defined below) will be free from defects in material and workmanship under normal use and service. This warranty does not extend to any equipment which has been misused, abused, improperly or inadequately maintained, or altered or modified without Seller's express consent.

This warranty does not extend to any defect which arises as a result of causes external to the product (such as power or air conditioning failure) which are not covered by warranty or which arise out of the installation or use of parts not authorized by Seller. Except as otherwise agreed by Seller in writing, this warranty does not extend to any custom products which have been produced to Buyer's specifications. The foregoing warranty shall extend for the following period:

a) Spin Rinser Dryers, Solvent Tools, Spray Acid Tools, Single Wafer Processors, Cassette Box Washers, Magnum, and Thermal Products - One (1) year from date of installation not to exceed Fifteen (15) months from date of shipment.
b) Spare Parts/Repairs - Ninety (90) days from date of shipment.

Consumable Products not warranted by Seller: pumps, filter elements, door seals, bowl seals and O-Rings.

DISCLAIMER. EXCEPT AS PROVIDED ABOVE, SELLER MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS SOLD HEREUNDER AND SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE.

Remedy. In the event any product fails to comply with the warranty set forth above Seller's sole obligation, and Buyer's sole remedy, shall be for Seller, at its option, to repair or replace the defective product, exclusive of all shipping costs. Any such repair or replacement shall be at no charge to Buyer.

EXCLUSION OF CONSEQUENTIAL DAMAGES; LIMITATION OF LIABILITY

EXCLUSION OF CONSEQUENTIAL DAMAGES. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED HEREIN, SELLER SHALL NOT, UNDER ANY CIRCUMSTANCES, BE LIABLE TO BUYER FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL OR INDIRECT DAMAGES ARISING OUT OF OR RELATED TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREUNDER, EVEN IF SELLER HAS BEEN APPRISED OF THE LIKELIHOOD OF SUCH DAMAGES.

LIMITATION OF LIABILITY. IN NO EVENT SHALL SELLER'S LIABILITY, WHETHER BASED ON AN ACTION OR CLAIM IN CONTRACT TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE AND, TO THE EXTENT PERMITTED BY LAW, STRICT LIABILITY) OR OTHERWISE, TO BUYER ARISING OUT OF OR RELATED TO THIS AGREEMENT EXCEED THE AGGREGATE PRICE OF THE PRODUCTS PURCHASED BY BUYER HEREUNDER AS OF THE DATE SUCH ACTION OR CLAIM WAS FILED.

OSHA - Occupational Safety and Health Act

The Occupational Safety and Health Act clearly places the burden of compliance on the user of the equipment and the Act is generalized to the extent that determination of compliance is a judgment decision on the part of the local inspector. Hence, SEMITOOL will not be responsible for meeting the full requirements of OSHA in respect to the equipment supplied or for any penalty assessed for failure to meet the requirements in respect to the equipment supplied of the Occupational Safety and Health Act, as interpreted by an authorized inspector.
SEMITOOL will use its best efforts to remedy such violation at reasonable cost to the Buyer.

2.1 Warranty

Standard warranty cards are included immediately preceding this page.

2.2 Introduction

This manual presents installation, operation and maintenance information for the **SEMITOOL** Spin Rinser/Dryer (SRD). Should the need arise for information not contained in this manual, please contact the **RHETECH** Service Department or your local representative for assistance.

2.3 Inspection

Upon receipt of **SEMITOOL** equipment, check for any damage which may have occurred during shipment. Notify the carrier and **RHETECH** immediately of any damage to the tool.

2.4 Spin Rinser/Dryer Operation

1. The **SEMITOOL** Spin Rinser Dryer features spin rinse and drying capability in one chamber. The SRD may be configured with one to three units in a single cabinet. Each SRD is operated by a programmable controller which accepts user recipe inputs. These inputs are retained in recipe memory utilizing a 2K battery backed-up RAM.

2. Machine activity is displayed on the controller LED. Recipe creation and editing is accomplished via soft keys and inputs are displayed on the controller LED. Built-in interlocks prevent accidental opening of the chamber door during a process. Fluid components and connections are located for visibility and accessibility, as well as safety.

3. The SRD sprays Deionized Water (DI) through a dedicated rinse manifold. DI water is constantly replenished on the water surfaces. DI water is purged from the process chamber using N2. During the dry portion of the process, heated N2 is applied through a separate dry manifold in the process chamber.

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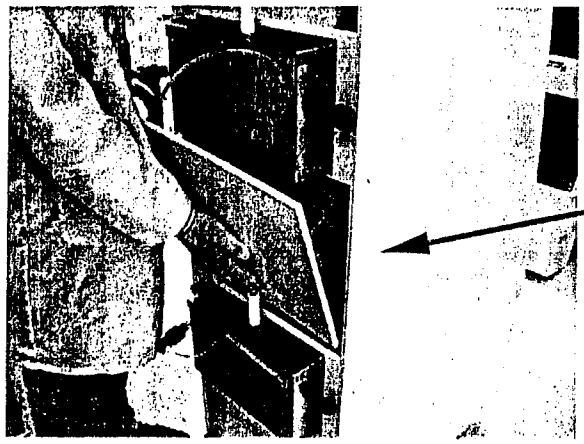
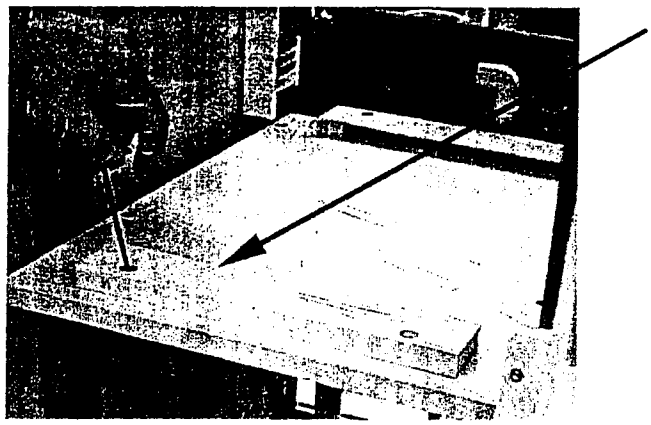


CABINET PREP.

** 870/880 Models **

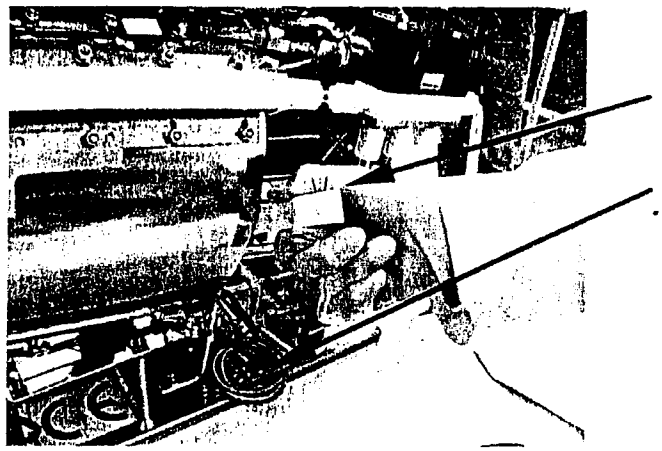
1. Remove Front and Rear Panels.
2. Remove Screw Caps and Screws from left side panel (facing front).



3. Remove Front Horseshoe (polymer block).

** 270/280/470/480 Models **

1. Remove Front Shroud by removing all necessary screws.



SRD PREP.

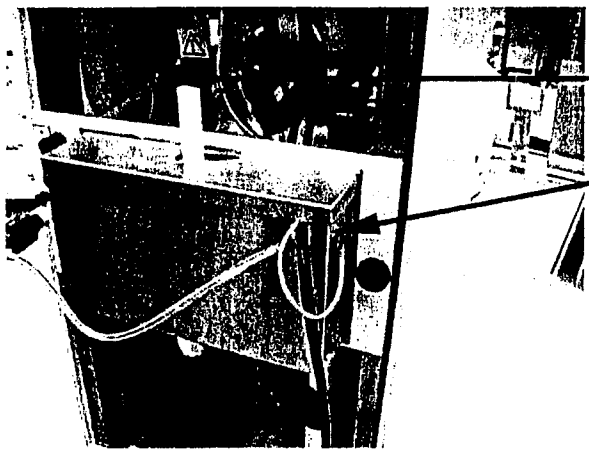
1. Remove wire tie and shipping block.
2. Remove wire tie on green/yellow ground wire.
3. Remove all red plugs from plastic tubing.

* Note: Do not cut tie wraps on automation wires until SRD is installed into cabinet.

INSTALL SRD(s) AND CONTROLLER(s)

(870/880 Models)

1. Note Model number. (-01, Top; -02, Bottom)
2. Install Bowl assembly and Controllers from front.
3. Connect facility lines.
4. Re-install polymer horseshoe blocks.



WIRING

1. Connect ground wires.
   * 1 ground from frame to each SRD.
   * 3 grounds from metal drain box to each SRD (CE specs only).
2. Open wire duct along left side.
3. Route and connect automation wires from SRD to controller.
4. Route and connect Resmon probe wire to controller.
5. Route and connect power cord through drain box hole.
6. Close wire duct.

FINAL PROCEDURE

1. Re-install front and rear panels.
2. Re-install screws and screw caps.
3. Connect tool to Fab facilities.
4. Install N2 filter between Fab and SRD.

3.3 Facility Requirement Specifications

3.3.1 Processing Fluid Requirements

The following table gives the fluid requirements for one machine. It should be noted that a Stacker model is two machines and the flow values need to be doubled. Do not exceed the maximum values listed.

Machine Size	Nitrogen			DI Water			Second Process Solution (3 stage option)		
	Tubing Size	Flow		Tubing Size	Flow		Tubing Size	Flow	
	O.D.	CFM	PSIG	O.D.	GPM	PSIG	O.D.	GPM	PSIG
240/60/70	3/8"	4-6	30-35	3/8"	1.5-2.0	25-30	3/8"	1.5-2.0	25-30
280	3/8"	4-6	30-35	3/8"	2.5-3.0	25-30	3/8"	2.5-3.0	25-30
2300	1/2"	8-10	30-35	3/4"	3.5-4.5	30-40	1/2"	3.5-4.5	30-40
2400	3/4"	8-10	30-35	3/4"	3.5-4.5	30-40	1/2"	3.0-4.0	25-30
2600	3/4"	8-10	30-35	3/4"	3.5-4.5	30-40	-	-	-

The following table lists Metric sizes where applicable.

*Fitting connections from US Standard to metric sizes are the responsibility of the end user.

Machine Size	Nitrogen			DI Water			Second Process Solution (3 stage option)		
	Tubing Size	Flow		Tubing Size	Flow		Tubing Size	Flow	
	O.D.	l/min.	BAR	O.D.	l/min.	BAR	O.D.	l/min.	BAR
240/60/70	3/8"	11.3-17.0	2.1-2.5	3/8"	5.7-7.6	1.8-2.1	3/8"	5.7-7.6	1.8-2.1
280	3/8"	11.3-17.0	2.1-2.5	3/8"	5.7-7.6	1.8-2.1	3/8"	9.5-11.4	1.8-2.1
2300	1/2"	22.7-28.3	2.1-2.5	3/4"	13.3-17.1	2.1-2.8	1/2"	13.3-17.1	2.1-2.8
2400	3/4"	22.7-28.3	2.1-2.5	3/4"	13.3-17.1	2.1-2.8	1/2"	11.4-15.2	1.8-2.1
2600	3/4"	22.7-28.3	2.1-2.5	3/4"	13.3-17.1	2.1-2.8	-	-	-

3.3.1 Processing Fluid Requirements (continued)

1. Regulators and pressure gauges for 3/8 inch supply lines must have an inside diameter of at least 1/4 inch.

2. Regulators and pressure gauges of 1/2 inch supply lines must have an inside diameter of at least 5/16 inch.

3. DI water facility pressures must be maintained during the rinse cycle.

4. Nitrogen facility pressures must be maintained during the dry cycle.

5. Water recirculation options:

   - WR20 (Teflon) - 3/8" tube outlet, plumb to facility reclaim.

   - WR20A (Gray PVC) - connect 1/8" ID tube to barb on drain box.

3.3.2 Drain Requirements

For easy installation, all bench and console models are provided with 1 inch Schedule 40 PVC drain box fittings. Stacker models use 1-1/4 inch Schedule 40 PVC drain pipe (Exception: 2300 - 2600 models use 1-1/2 inch PVC). Console and stacker models are plumbed with drain traps and atmospheric vents. All draining should be done in compliance with all local code requirements.

SEMITOOL recommends that every bench model Rinser/Dryer be installed with a drain trap to prevent contaminants from migrating back into the bowl. See the recommended drain configuration for more details.

3.3.3 Cabinet Exhaust Requirements

All **SEMITOOL** Rinser/Dryers are provided with a 1-1/2 inch Schedule 40 PVC exhaust fitting. **SEMITOOL** recommends that an equivalent mass flow rate of 7 CFM be maintained during all processing. Proper filtering of exhaust should be done in compliance with all local code requirements.

3.3.4 Power Requirements

PSC-101		BRUSHED MOTOR		BRUSHLESS MOTOR	
Bowl Size	Country	Volts	Breaker	Volts	Breaker
240 - 280	USA	120, 1 phase	15 Amp	120, 1 phase	15 Amp
	Europe	220, 1 phase	13 Amp	220, 1 phase	13 Amp
	Japan	120, 1 phase	15 Amp	100, 1 phase	15 Amp
2300	USA	N.A.	N.A.	208, 3 phase 208, 1 phase	15 Amp 15 Amp
	Europe	220, 1 phase	16 Amp	220, 1 phase	16 Amp
	Japan	N.A.	N.A.	N.A.	N.A.

- Short circuit interrupt capacity for all breakers equals 3,500 amps.

3.4 Facility And Handling Recommendations For Best Performance

3.4.1 DI Water Quality

a. Resistivity: 17 megohms or better.

b. Bacteria: ≤ 2 colonies/100 ml sample.

c. Particles: <1000/L sample.

d. Point of use filtration: 0.2 µm or better, made of approved material (PVDF, Teflon, Polysulfone, etc.).

NOTICE

The high flow cone nozzles used by **SEMITOOL** are designed to operate at relatively low pressures to minimize particulate generation. Refer to facility requirements for specific flow recommendations.

3.4.2 N_2 Quality

Nitrogen should be filtered to 0.05µm or better.

3.4.3 Recognized Process Recipe for Bowl Sizes 240 to 2300

1.	Rinse	60 -120 seconds	300-600 rpm
2.	Purge	10 seconds	1000 - 1800 rpm
3.	Dry 1	30 - 90 seconds	1000 - 1800 rpm
4.	Dry 2	180 - 480 seconds	300 - 600 rpm

3.4.4 Test Wafer Cleanliness

≤ 10 particles (0.3µm and larger)

3.4.5 Process Carrier (Boat)

The process carrier must be clean and uncontaminated (pure plastic - no pigment, preferably PFA Teflon).

3.4.6 Wafer Handling and Transportation

Recognized methods in Class 100 or better clean room environments (clean room garments, gloves, boat handles, etc.).

3.5 Facility Caution

CAUTION

Removing Pilot Valve Control Air (CDA or N2) without turning off the DI water may allow DI leakage past pneumatically controlled valves. This would result in excessive DI usage, N2 line/filter back filling, and possible chemical tank overflows. Remove DI pressure prior to Control Air shutoff.

3.6 General Wiring Practices

These guidelines should be followed in the installation of **SEMITOOL** equipment in industrial locations. Each installation will differ and more care should be taken as installations become longer. Special attention should be given to wires that transmit data. For all installations, the following practices should be observed:

1. Locate electrical equipment, controls and components away from water, humidity, heat and dust or provide a suitable enclosure to protect equipment from these elements.

2. Locate equipment, controls and components away from SCRs, Triacs, buzzers, heavy motors, contactors, heavy current relays or other electrical noise generating equipment.

3. Use a metal enclosure to protect the electronic components from radiated electrical noise or other electrostatic or magnetic noise.

4. Low level signal and control wiring should be separate from wiring for switching and power. Cabinet and panel wiring should be planned with the power and relay wiring dressed to one side and low level signals dressed to the other side. Wiring to barrier strips, connectors and relay contacts should be planned for maximum separation.

5. Signal and control wiring should be at minimum run (shortest length) in twisted pairs. Lines from tachometers and other pulse or frequency devices should be run in separate 2-wire shielded cables.

6. Shield connections for shielded cables should be connected so that no current flows in the shield. Care should be taken not to ground the shield at any point except where it is connected to the equipment or instrument ground. The case of the equipment or instrument should be connected to earth ground.

7. Provide power that is noise-free and free of power interruption. In some cases this may require constant voltage sources, isolation transformers and/or noise filters.

8. DC power busses should operate within the limits provided in the equipment specifications. Special care should be taken to isolate DC relay contact wiring from signal and control wiring.

9. Electrical noise may be most easily reduced at its source. The installation of snubber networks or noise suppressers across relay contacts, relays, and switches may be helpful.

3.7 Rotor Balancing And Operating Requirements

1. Each rotor **RHETECH** builds is spin balanced with a load (cassette and wafers) to ensure smooth, vibration free operation over the specified (RPM) operating range. Any excess vibration of the **RHETECH** is related to an unbalanced operating condition of the rotor. Several factors are important in maintaining balance and should be carefully observed by the operator.

2. Each rotor is balanced and operated for a specific cassette. Do not spin the rotor without a properly loaded cassette inserted. The rotor and/or bowl may be damaged. The cassette type is etched on the front plate of the rotor. Be aware of the cassette fit. It is possible that carriers of the same type (number) have different dimensions due to variations in their manufacturers' molds. Contact **RHETECH** if you should encounter problems.

3. All rotors are balanced and operated with a full cassette of wafers unless specifically requested by the customer. Some rotors will have a minimum load specification etched on the front plate of the rotor. This offers a minimum/maximum loading window to the operator. Any rotors balanced for less than a full cassette will have the specific balance criteria etched on the front plate of the rotor.

4. All rotors are balanced with the cassette "H" bar, or in the case of symmetrical cassettes, wafer slot one, to the inside of the rotor unless otherwise stated on the front of the rotor.

5. Rotors are balanced to operate across the full RPM range unless otherwise stated. Rotors with RPM limitations will have specific RPM criteria etched on the front plate of the rotor.

6. Prolonged operation of an unbalanced rotor, a rotor with an incorrect cassette, or an improperly loaded cassette, will cause premature stress related failures of the rotor, rotor plate, shaft assembly and drive motor. Prolonged operation of an improperly loaded rotor will cause the rotor itself to become unbalanced.

7. **RHETECH** offers a rotor rebalancing service at the manufacturing facility in Coopersburg, Pennsylvania. Contact the Service Department at (610) 282-0105 for details.

CAUTION

Do not spin the rotor without a properly loaded cassette inserted.
The rotor and/or bowl may be damaged.

3.8 Rinser / Dryer Start-Up

1. Do not perform the initial start-up procedures until the Operations Section of this manual has been carefully read and understood.
2. Verify that the main power cord is disconnected.
3. Verify that all control cables are connected between the Rinser/Dryer and controller.
4. Level and secure the tool using all leveler legs.
5. Verify that N_2 and DI pressures are set to factory recommendations.
6. Visually check all tubing connections for leaks.

NOTICE

Tubing connections have been loosened and removed during pre-ship sanitation procedures. After reconnection, the unit has not been checked for leaks using fluids. When installing the Rinser/Dryer, always use clean DI water in all liquid processing functions to verify leak-free operation prior to chemical loading or usage.

7. Turn the controller Power switch to the Off position.
8. Connect the main power cord to an appropriately rated receptacle.
9. Push the Power switch, located on the controller front panel, to the On position. Check for rotor or N2 error indications on the controller.
10. Open the door to the Rinser / Dryer and install the rotor. To install the Standard 4-Bolt Rotor, start all four rotor bolts before tightening. Tighten the rotor bolts in a cross-type pattern, making sure caution is taken not to over-tighten or gall the bolts. To install the Quick Disconnect Rotor, refer to the Options Section of this manual for installation instructions.
11. Insert the cassette into the rotor.

CAUTION

Each rotor is balanced for partially or fully loaded cassettes per the customer's specifications. Always spin up the rotor with the proper load. Failure to do so will unbalance the rotor and may cause damage to the rotor and/or bowl.

12. Press the Start switch on the operator control panel.

3.9 SRD Clean Up Procedure

1. Inspect facilities for proper drains (trapped) adequate H20, N2, line sizes, etc.

2. Good clean installations on new machines.

   a. Level and secure the tool using all leveler legs.

   b. Verify all external attachments to bowl:

      - CY20
      - H20 Manifold
      - N2 manifold
      - Drain

   c. Verify "O" rings and gaskets. Check tightness of all fittings.

   d. Install and turn-on water recirculation.

   e. On earlier door designs, remove door seal and clean with DI water and a clean cloth. Clean seal channel with cloth and IPA or DI water and reinstall. Service new door and seals only if absolutely necessary.

   f. Verify the door is sealing properly.

   g. Verify the CY-20 is operational.

   h. Verify the blanket and cartridge heaters are working.

   i. Inject or pour 400 ml. of H2O2 into the POU DI water filter. If point of use (POU) filter is not available, then wet down chamber, rotor, and cassette with liberal amount of 30% H2O2. Let soak for several minutes, then begin a long rinse program.

   j. Place SRD (with rotor and cassette) into a 60 minute rinse at maximum allowable RPM.

   k. Preferred STI recommended recipe for clean-up:

Rinse	Max RPM	3600 sec
Purge	1200 RPM	10 sec
Dry 1	1200 RPM	60 sec
Dry 2	600 RPM	300 sec

3.9 SRD Clean-Up Procedure (cont.)

l. Let the unit cycle using production recipe (Rinse Dry Process) for at least two hours.

m. Caution: If you must place wafers in cassette for balancing reasons, use the cleanest available. Do not use dirty wafers, this will only prolong the clean-up procedure.

n. Begin particle testing by placing several clean wafers in the cassette. Front, center and rear (assuming rotor is balanced 0-25). If rotor is balanced for "full", dummy monitors must also be loaded. Use cleanest monitors available. Rinse/Dry wafers using recommended recipe.

o. If particle counts are high, then cycle machine through several more Rinse/Dry cycles. Then repeat step n.

*Hydrogen peroxide has been shown to be an effective cleaner and should be used in lieu of wipes, brushes, and other cleaning solutions.

WARNING

Use necessary eye protection and safety gear when handling hydrogen peroxide.

3.10 Recommended Procedure For Oxidizing An SRD Bowl Surface

NOTICE

Used on electropolished bowl surfaces for more uniform drying.

3.10.1 Cleaning Internal Lines

Charge the point-of-use filter with 400 ml. of H2O2 (30%). Run an "extended rinse recipe".

- Rinse 999 seconds @ 2000 (max) rpm.
- Purge 10 seconds @ 2000 rpm
- Dry 1 60 seconds @ 2000 rpm
- Dry 2 300 seconds @ 600 rpm

NOTICE

If the SRD is equipped with a water recirculation option (WR-20), turn the water supply back on when the machine is in the rinse cycle.

3.10.2 Bowl Oxidization

1. Run the following "dry only" recipe:
   - Dry 1 60 seconds @ 1200 rpm
   - Dry 2 300 seconds @ 600 rpm
2. Completely douse the bowl interior, rotor, and carrier with H2O2 (30%). A spray or squeeze bottle is recommended.

CAUTION

Do no spray H2O2 near the bowl seal. H2O2 may damage the Ferrofluidics.

3.10.2 Bowl Oxidation (cont.)

3. Run the following "dry only" recipe:

   - Dry 1 60 seconds @ 1200 rpm
   - Dry 2 300 seconds @ 600 rpm

4. Run a normal rinse and dry recipe, during the rinse step, STOP the process and inspect the bowl. The bowl surface should not be hydrophobic (beading on the surface), it should be hydrophilic (sheeting on the surface). Certain areas will not turn hydrophilic, the areas where heat is least effective, drain areas, and areas around the manifolds are most common. Heat and H2O2 is the key for producing the oxide layer.

5. Repeat steps 1-3 as many times as needed to achieve a hydrophilic state. If a hydrophilic surface is not attained, contact **RHETECH** for further instructions.

A hydrophilic surface will promote water beading, it is more difficult to dry a large bead of water rather than a thin layer of water. Producing a thin layer of water is the goal for oxidizing the bowl surface.

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4.1 General Description

The model PSC-101 allows the programming of one recipe that consists of the following steps: a rinse, quality rinse (if the RM-20 option is present), purge, and two dry cycles. The RPM and time must be programmed for the rinse, purge, and dry cycles. The desired resistivity and RPM are programmed in the quality rinse cycle.

16K E prom, 2K RAM and 2K battery backed-up RAM allows the system to retain its recipe memory with the power OFF.

16-character display allows for easy programming and status information.

The PSC-101 is intended for use in a class 10,000 cleanroom or better environment.

The SRD is designed to be operated from a standing position, in front of the tool, within arms reach of the controls.

4.2 Modules

1. Control Panel - Located on the front, contains four programming soft keys, a power switch, and a status display that indicates individual recipe steps, system errors, diagnostic tests, etc.

2. Master Power On/Off Switch - Illuminated when power is ON.

3. Main Logic Board - Contains microprocessor, serial communications chip, bit input/output and RAM/ROM memory.

4. Power Supervisor Chip - Supervises the power supply voltage and inhibits operation if it should drop below predetermined level. It also ensures that the microprocessor starts up in a known manner.

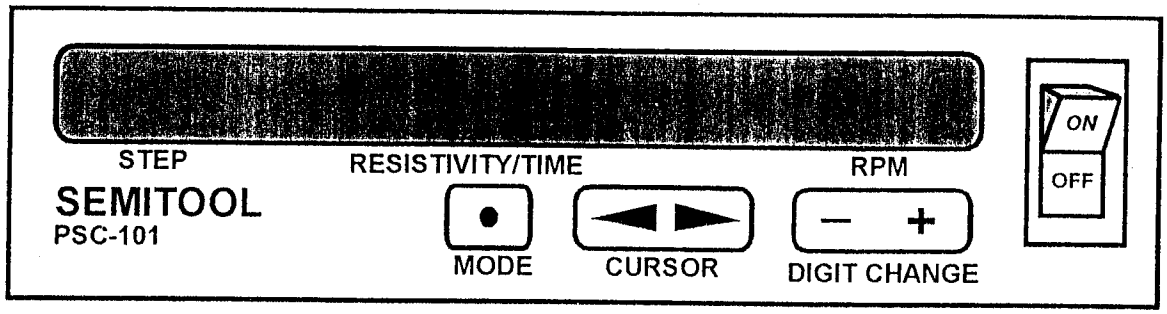
5. One set of Dip Switches - Sets SECS baud rate and program/service mode lockout. By setting this dip switch, entry to recipe programming and diagnostic testing will be denied.

6. Hardware reset switch - Located on the left hand side of the controller board. This button forces the machine to restart in the same manner as if the power was applied.

7. Power Supply - +5 at 1 Amp, +5 at 1 Amp and +24 at 1 Amp.

8. Motor Control Board - Regulates rotor speed. For Rinser/Dryers equipped with a brushless motor, see the AUTOMOTION Brushless Motor Control User's Guide in the Options Section of this manual.

4.3 PSC-101 Controller Panel



4.3.1 Step

A total of five steps per recipe is available. Each step has a programmable time and RPM, except the quality rinse, which has a programmable resistivity and RPM.

4.3.2 Resistivity/Time

When the RM-20 option is present, one of the five recipe steps is quality rinse. In this step, current resistivity is displayed and ranges from 0 to 18.2 megohms. A displayed value greater than this range indicates a dry or disconnected probe. During all other recipe steps, this field displays time, measured in seconds and ranges from 0 to 9999 (almost 3 hours).

4.3.3 RPM

This field displays the current RPM and has a programmable range that varies. The maximum RPM is engraved on the rotor.

4.3.4 Mode

Selecting **MODE** cycles the STEP display through all the operational modes on the Rinser/Dryer. Press **MODE**, while the tool is idle, to view the following displays:

- IDLE - Current status mode
- RINSE - Programmable recipe mode
- R.I.N.S.E. - Programmable Auto Cycle recipe mode (for tools equipped with the Auto Cycle option)
- PORT - Service/ Diagnostic Testing mode. This feature is accessible only in the Service mode. See Section 6.10.2 and the Port Map in the Schematics Section of this manual for instructions on this lockout feature.

4.3.5 Left and Right Cursors (← and →)

The Left and Right Cursors are used to position on different fields within a step. A blinking alphanumeric indicates that the cursor is positioned at this spot. If the entire field blinks, the field may be edited with a single keystroke, otherwise each digit must be changed individually.

4.3.6 Plus and Minus (+ and -)

The **PLUS AND MINUS** soft keys are used to increment or decrement the field where the cursor is positioned. On numeric fields, the cursor is positioned on each digit and then the **PLUS AND MINUS** keys are used to edit the current value. On non-numeric fields, such as the STEP field, selecting the **Plus or Minus** key results in cycling forward or backward through all the possible choices of that field. For example, when the current mode is programmable recipe, continuously selecting + in the STEP field results in the following states: RINSE, QRINSE (for tools equipped with the RM-20 option), PURGE, DRY1, and DRY2.

4.4 Rinser / Dryer Controls

The following buttons/switches perform dual functions and are located on the front of the Rinser/Dryer.

4.4.1 Start

a. Starts the process from Recipe Step 1.

b. If dip switch DSI-7 is ON and a recipe is running, selecting START performs a step advance. After the first step of the recipe has begun, START advances the process to the second step in the recipe. Subsequent pressing continues the step advance function.

4.4.2 Stop

a. Stops the process.

b. Clears error messages when error no longer exists.

4.4.3 Door Toggle or Kick Switch

a. Opens the door if the door is currently closed; closes the door if it is currently open.

b. If dip switch DSI-7 is ON and a recipe is running, activating the door toggle or switch causes the current step to hold indefinitely.

4.5 Power Up

Before powering up the SRD make sure there is adequate lighting. To power up the PSC-101 controller, select the **POWER** switch located on the right hand side of the controller. When this occurs the following messages should be seen:

1. The display check appears, with all segments of each digit appearing on the display panel.

2. The ROM resident program check occurs. This results in the display, **"EPROM XX #.# OK"**, where **XX #.#** is the software version used in the controller.

3. The RAM memory check takes place and displays **"RAM OK"**.

4. Parameters (recipe, timers, SECS, etc.) are verified and **"PARAMETERS OK"** is displayed.

5. When power up is complete, **"IDLE"** along with the autocycle default time and zero RPM will display. If there are any active errors in the system, then a blinking display of these errors will alternate with the IDLE display.

4.6 Recipe Programming

Unless the dip switch is set to lock out operator changes, recipe programming may be done whenever the Rinser/Dryer is idle. Recipe steps that are executing may be reviewed, but any attempt to change values will be ignored.

1. To enter the recipe program mode, press the **MODE** soft key on the controller until RINSE appears blinking on the status display. The preprogrammed rinse cycle appears on the display, with the time (in seconds) and RPM.

2. To change the time period and/or RPM of this step, press the **LEFT** or **RIGHT CURSOR** to the desired field. Since both are numeric fields, a single digit blinks as the cursor moves to that position. To change that digit, press the plus or minus key to increment or decrement the field, then move on to the next digit. For example, suppose the preprogrammed rinse cycle is 200 seconds long at a RPM of 500 and we want to change the step to 360 seconds and 600 RPM. To do this, press the **RIGHT CURSOR** twice, and the **"2"** of 200 seconds begins to blink. Now press the **"+"** key once and the **"2"** changes to a **"3"**. Press the **RIGHT CURSOR** key once and the **"0"** located in the tens place of the field begins to blink. To change this value to six, press the **"+"** key six times. As this is done, the digit increments each time until finally a **"6"** appears. The time now displays 360 seconds (with the digit six still blinking since the cursor is at that location. To change the RPM from 500 to 600, press the **RIGHT CURSOR** three times. The **"5"** is blinking now. Press the **"+"** key once, to change the value to 600. Programming for this recipe step is now complete.

3. To program the next step in the recipe, the cursor must be moved back to the STEP field. From the above example, where the cursor was positioned in the hundred's position of the RPM field, this requires pressing the **RIGHT CURSOR** three times. For tools equipped with the RM-20 option, the next step in the recipe cycle is the Quality Rinse (QRINSE). Otherwise, for non-RM-20 tools, the next step is PURGE. The QRINSE cycle displays programmable fields for resistivity (measured in megohms) and RPM. Values may be changed in the same manner as described in Step 2, using a combination of the **LEFT** and **RIGHT CURSOR**, and the **PLUS AND MINUS** soft keys.

NOTICE

If a resistivity setpoint is programmed, the Quality Rinse will hold in this cycle until the resistivity setpoint is reached. To avoid remaining in this step indefinitely, the Resistivity Alarm should be set from the Service/Diagnostics Testing mode. To program this alarm, see paragraph 4.9 of this section.

4. Continue programming the rest of the steps (PURGE, DRY1, and DRY2). These steps all contain time and RPM fields and are programmed exactly as the RINSE cycle (in Steps 1 and 2).

4.7 Running Recipes

After a recipe has been programmed, the Rinser/Dryer is ready to run. Open the door and insert a loaded cassette of wafers. If the cassette is not full, the wafers should be evenly spaced throughout the boat.

CAUTION

Engraved on the front of the rotor is the minimum wafer load required for a balanced run. Placing a smaller load than this minimum risks damage to the rotor. Refer to the Balancing and Operating Requirements for **SEMITOOL** Rotors in the Installation Section of this manual.

The recipe may be started in any controller mode, e.g., Recipe Programming, Service/Diagnostics, etc. However, to observe the recipe cycle through each step, the mode should be changed to the status display, i.e., IDLE should be displayed in the STEP field prior to starting the recipe. This may be done at any time. To begin wafer processing, close the door and press the **START** button on the front of the tool.

While the Rinser/Dryer is operating, the following conditions may be observed.

- From the status display, the current recipe step is displayed along with the time remaining in that step, and the actual RPM.
- Verify that the (manually operated) door is properly sealed. Applying firm pressure, pull on the door. It should not open.
- Observe that the rotor is spinning counter-clockwise.
- During rinse cycles, DI water should be flowing over the wafer.
- The water manifold is purged for approximately five seconds. After ten seconds have elapsed, the purge valve will close with a high N2 flow continuing in the dry cycle. Check that the SRD switched to the dry cycle.
- Make sure there is no excessive vibration.
- Verify that rapid rotor deceleration (spin-down) occurs after the Dry one cycle.
- Check that the Rotor Stop Positioner (RSP) has stopped the rotor in the correct upright position at the end of the cycle.
- When the door seal is de-energized, open the door. Using a gloved hand, feel inside the bowl to ensure the SRD was heating.

4.8 Auto Cycle Options (AC-10 and AC-20)

The Auto Cycle function instructs the Rinser/Dryer to clean the bowl if a recipe has not been run for some interval (usually an hour). Auto cycle does not close the door. The machine will not start an auto cycle if the door is open or the controller is interlocked. If the programmed time interval has expired, the tool will continue to attempt starting the auto cycle, so when the door is closed or interlocks are cleared, the auto cycle will begin.

The AC-10 option gives the PSC-101 controller a second programmable recipe. To access this option, select **MODE** until the displayed step is R.I.N.S.E. This is the auto cycle recipe and is programmed exactly as a normal recipe (see Section 4.6 for recipe programming instructions). When the recipe is programmed, it may be run as an auto cycle or regular recipe. To run in auto cycle, press the **MODE** soft key until **"PORT"** appears in the step area of the status display. This may only be done when the SRD is in the Service/Diagnostics mode. See Section 6.10.2 for instructions on accessing the Service/Diagnostics mode. To set the auto cycle timer, continue to press the **Plus or Minus** key until **"AUTCYC"** is displayed. Select the **RIGHT CURSOR** key once to move to the ON/OFF field. Set this field to ON, using the **Plus or Minus** key, to activate the auto cycle function. To the right of this field is the time interval (in minutes) that sets the frequency of the auto cycle occurrence. This field is displayed in the area normally devoted to RPM. IT IS NOT RPM. To run this as a second recipe, without using the auto cycle timer, press **MODE** until IDLE is displayed. Then press the **Plus or Minus** key once. I.D.L.E. should now be displayed. To start the recipe, select **START** from the front of the Rinser/Dryer and the recipe will begin immediately at programmed RPM.

NOTICE

When the auto cycle recipe is initiated using the auto cycle timer, the maximum RPM for the auto cycle will not exceed 300 RPM. Therefore, if any recipe step has a RPM greater than this, it will be overridden and will run at 300. If the recipe is initiated from the I.D.L.E. display, all recipe steps will execute at the programmed RPM.

4.8 Auto Cycle Options (continued)

The AC-20 option has the same capabilities as the AC-10, plus two additional features. Both of these features are accessed from the PORT display.

1. By using the **PLUS AND MINUS** soft keys, **"ACY RUNS"** allows the user to specify a certain number of runs to occur prior to starting the auto cycle. Enter the number of occurrences (0 - 99) and activate this function by selecting ON. When this option is selected, the auto cycle delay, described above, should be OFF. Likewise, when the auto cycle delay is selected, the auto cycle runs option should be deactivated, i.e., the user should choose one way of activating the auto cycle recipe.

2. By using the **PLUS AND MINUS** soft keys, **"ACY DOOR"** allows the user to specify an auto cycle delay time based on door closure. This feature requires a programmed delay time (from 0 to 99 seconds) to be entered. When this function is enabled, the program waits for all of the following to occur: a programmed regular recipe runs to completion; the door opens and closes; and the programmed door delay time elapses. The auto cycle door delay is meant to be used with the runs command. The auto cycle recipe starts.

NOTICE

The auto cycle function may be equipped (by customer request) to run at higher RPM's. However, **SEMITOOL** recommends running auto cycle recipes at a maximum of 300 RPM to avoid damage to the Rinser/Dryer.

4.9 Resistivity Alarm Setting (RM-20 Option)

When a resistivity is entered for a quality rinse cycle, the possibility exists that this value may never be reached and the recipe step will not advance. For this reason, it is recommended that the Resistivity Delay Alarm be activated. It instructs the machine to hold in Rinse for a certain number of seconds, waiting for the machine to reach the Resistivity Setpoint. If at the end of the programmed time the machine has not reached Setpoint, the Rinser/Dryer will advance to the next step. The "Resistivity Monitor Timeout" error will display to indicate that this product run did not reach Setpoint. This error is reset by pressing the Stop button after the end of recipe. To set this timeout period, perform the following steps.

1. With the cursor positioned at the STEP display, press the **MODE** soft key until PORT is displayed. This may only be done when the SRD is in the Service/Diagnostics mode. See Section 6.10.2 for instructions on accessing the Service/Diagnostics mode.

2. Press the **Plus or Minus** key until "RESALRM" appears.

3. Press the **RIGHT CURSOR** key once to position on the ON/OFF field. Selecting the + key activates the alarm, and the - key deactivates it.

4. Press the **RIGHT CURSOR** key once to position on the timeout field. Use the **Plus or Minus** key to select a timeout period (from 0 to 99 minutes).

4.10 Error Conditions

4.10.1 N2 Fail

When a N2 failure occurs, the process will abort and this error is displayed. Selecting stop will clear the message. If the N2 is still low, however, the error remains displayed.

4.10.2 DI Low Flow Error (Low Flow Option)

If the DI flow is not adequate within five seconds, the process is aborted and this message is displayed. Selecting **STOP** clears the message.

4.10.3 Bowl Temperature Errors

These errors show up as a High Bowl Temp error and a Low Bowl Temp error. These errors are not an indication of high or low temperatures, but reflect the status of the "At Temp" switch of the heater blanket.

Low Bowl Temp Error

This error is displayed when there is excessive on time of the "At Temp" switch.

High Bowl Temp Error

Shows in case of excessive off time of the "At Temp" switch. "At Temp" is 160º F., 71º C. Check current software for on time and off time of "At Temp" switch.

4.10.4 Rotor Upright

The Controller allows 13 seconds after Rotor Stop Positioner is fired to upright the rotor. RSP should fire at 75 RPM. In case of RSP failure, the rotor will not be upright, therefore giving Rotor Upright failure message. The error will clear when rotor is upright.

4.10.5 Motor/Tachometer Error

When the motor or tachometer is not operating correctly during the recipe , this error is displayed and the process is automatically shut down. RSP wil not be activated and no Rotor Upright error will be displayed. Selecting **STOP** clears the Motor/Tachometer failure message.

4.10.6 Motor Overtemp Error

When the motor overheats, this error is displayed and the motor is automatically shut down. Selecting **STOP** clears the message.

4.10.7 High Vibration Error

This problem may occur when the cassette load or rotor is unbalanced and the result is this error display and the process is automatically shut down. Selecting **STOP** clears the message.

4.10.8 Door

When one of the four door valves remains in the wrong position for ten seconds after opening/closing the door, this error is reported. Any active recipe is aborted. The door valves are all turned Off when a Door error is sensed and the door will assume whatever position gravity takes it. Selecting **STOP** clears this message.

4.10.9 Stop Error

When **STOP** is selected while a process is running, this message is displayed and the process is shut down. Selecting **STOP** again clears the message.

4.10.10 Hold Error

When a HOLD PROCESS is initiated (selecting the Door switch when Dip Switch 7 is ON) while a process is running, this message is displayed. Selecting **STOP** after the end of the recipe clears the message. (Also applicable for SECS II laptop use.)

4.10.11 Step Advance Error

When STEP ADVANCE is selected (selecting **START** when Dip Switch 7 is ON) while a process is running, this message is displayed. Selecting **STOP** after the end of the recipe clears the message. (Also applicable for SECS II laptop use.)

4.10.12 Resistivity Monitor Timeout Error (RM-20 Option)

When the Resistivity Timeout Alarm is set in the Service/Diagnostics mode (see section 6.10.2) and the Quality Rinse resistivity for the current recipe is not achieved, the step will automatically advance when time out is reached. The Resistivity Monitor Timeout Error will display. Selecting **STOP** after the end of the recipe clears the message.

4.10.13 Auto Cycle Pending Error (AC-10 and AC-20 options)

When the auto cycle function is ready to run (from the Service/Diagnostics mode, see Section 6.10.2), but for some reason cannot (such as the door is open), this message is displayed. Selecting **STOP** or allowing the auto cycle to function clears the message.

4.11 Signal Tower

The following table lists conditions that activate each of the signal tower lamps.

Lamp Color	Lamp State	Condition
RED	Steady	An Alarm has occurred.
YELLOW	Steady	Recipe is In Process.
GREEN	Steady	Tool is idle.
GREEN	Flashing	Process is finished but door has not yet been opened.

SECTION 5: OPTIONS

CY-20 ANTISTAT OPTION

The CY-20 Antistat is a self-contained pulsing, direct current static control system with the ionizing needles introduced directly into the process chamber. The CY-20 is a true point of use system, ionizing the actual production environment. The unit is only energized while the Rinser/Dryer is operating in the Dry II part of the recipe. The CY-20 requires no maintenance and is easily serviced.

Testing the CY-20 Antistat Unit

The CY-20 produces a high voltage, low current output. A high voltage probe, such as the Beckman HV-211 (22 megohm input impedance) is required to measure the CY-20 output. Output voltage should be checked by a qualified service technician at least every six months (in diagnostics port 42 bit 7).

Using safety ground as a reference, carefully touch the meter probe to each needle of the CY-20. A properly functioning unit will read 3.5 KV to 4.6 KV on each needle. One tip will indicate a positive reading and the other tip a negative reading.

If the inspection tag on the antistatic unit indicates a factory test value greater than 3.5 KV, replacement is indicated by a reading lower than 3.0 KV.

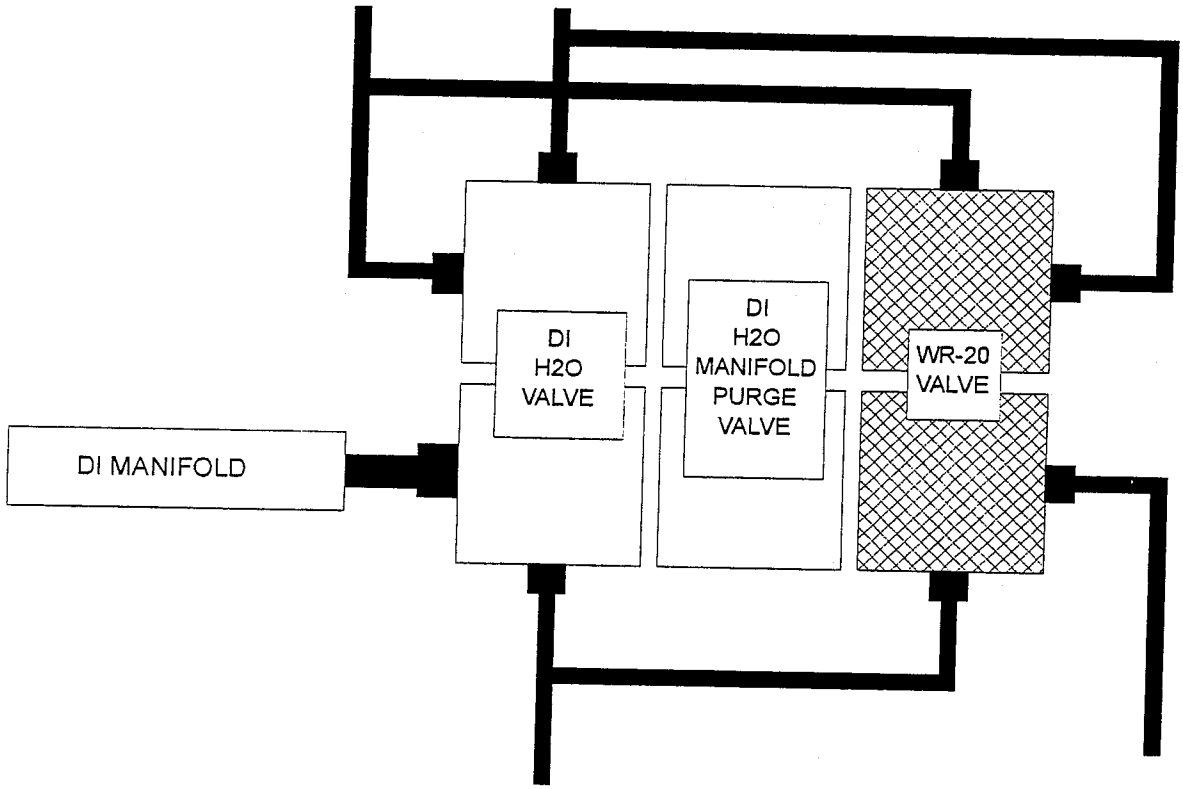
NOTE: Early CY-20 units had factory test readings of approximately 2.5 KV.

CY-20 Parts List

DESCRIPTION	PART NUMBER
CY-20 Antistat Assembly (110 V)	115R0004-01
CY-20 Antistat Assembly (220 V)	115R0004-501

WR-20 OPTION

The WR-20 option provides for recirculation of DI water. When the water spray manifold is not in use (closed), the DI water supply is diverted through the bypass water tubing and an additional **SEMITOOL** valve, then through the adjustable WR20. This circulation reduces bacterial build-up at the valve body.

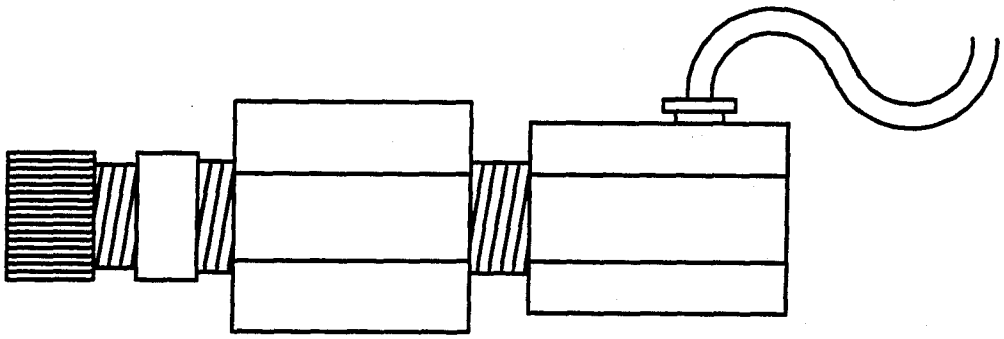


WR-20A FLOW ADJUSTMENT PROCEDURE

NOTICE

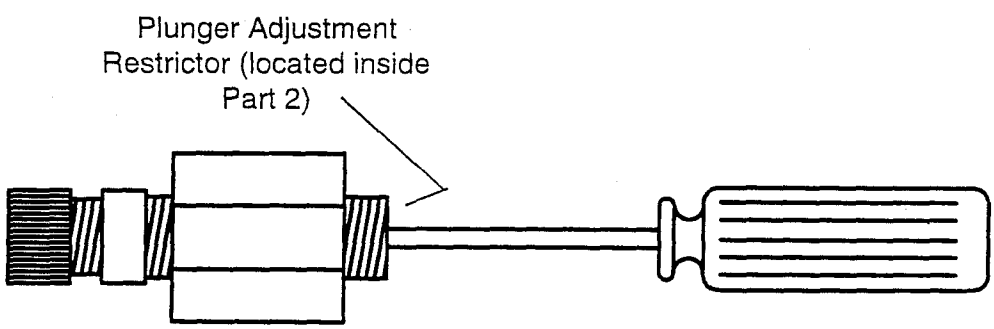
Shut off DI water before performing the following procedure.

Flow adjustment modifications may be made by first removing part III of the assembly.



1 2 3 (Remove Part III to Adjust)

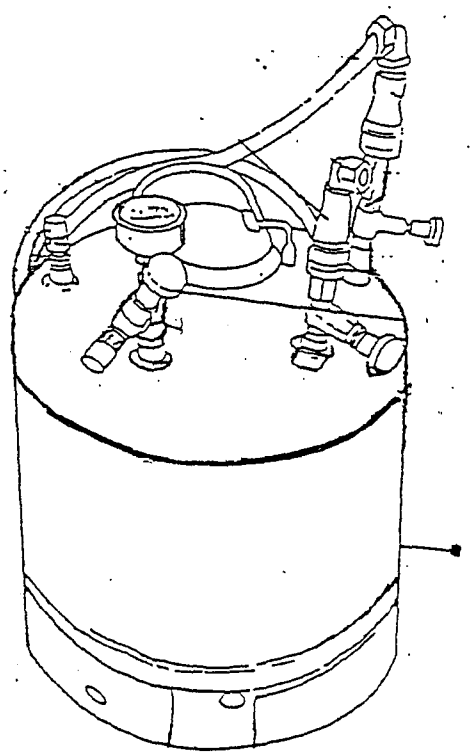
Insert a wide blade screwdriver, and turn the plunger adjustment restrictor counter-clockwise to increase the flow rate or clockwise to decrease the flow rate.



The DS-50 Dispensing System for soap type solutions is comprised of a five (5) gallon pressure vessel with appropriate fluid control elements capable of handling pressures up to 60 psi.

DS-50 PRESSURE VESSEL (DISPENSING SYSTEM) PARTS LIST

	DESCRIPTION	P/N	QTY/ASSY
1.	ADPT 1/4 x 1/8 NPTF	324B0006-01	1
2.	TUBING 3/8 x .060 TEF	70701	10'
3.	TANK 6 GALLON PRESSURE	70730	1
4.	TEE 1/4 NPTF	70782-02	1
5.	ADPT 3/8 TB x 1/4 NPTF	70866-50	2
6.	GAUGE PRESSURE 0-60 PSI	70904-02	1
7.	REGULATOR AIR BRASS	70905	1
8.	NUT REGULATOR	70906	1
9.	VALVE RELIEF 50 PSI	70907-02	1
10.	CAP DEFLECTOR	70908	2
11.	NEEDLE VALVE (BLEED)	SS-1RM4	3
12.	NIPPLE 1/4 NPT	SS-4-CN	2
13.	HEX COUPLING	SS-4-HCG	1



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6.1 General Notes On Maintenance

Good performance can only be achieved if the **SEMITOOL** Rinser/Dryer and surrounding areas are kept clean. Most regular machine cleaning procedures can be performed using DI water and peroxide. For components that are excessively dirty, the following sequence of baths or wipe-downs can be performed.

- DI water and peroxide for removal of residue build-up.
- 30% hydrogen peroxide for bacteriological decontamination.
- Deionized (DI) Water for a final rinse.
- Blow dry with a Nitrogen (N2) or Clean Dry Air (CDA) supply.

The use of ultrasonic or agitated bath cleaning methods is preferred over scrubbing. To eliminate the need for valve disassembly, purge and flush with cleaning fluids (30% hydrogen peroxide, DI Water). Some components are damaged by certain cleaning fluids. The table below lists these components and presents the cleaning fluids which may be used.

Component	Acceptable Cleaning Fluid
Manifold Gasket	DI Water Only
Optical Sensor Reflective Surface	DI Water Only
Resistivity Monitor Probe	DI Water or 2% Micro-soap with DI Water @ 55° C ultrasonic bath.
N2 Cartridge Heater	DI Water Only
Electrical Components	Blow Clean with N2 CDA
Door Seal	IPA/DI Water
Bowl	IPA/DI Water
Ferrofluidic Seal Assembly	DI Water Only

Note: Micro-soap is a product of International Products Corp., Trenton, New Jersey, 08601

Any personnel servicing **SEMITOOL** equipment should be skilled in maintenance practices. Use clean tools, wear adequate protective gear, and be conscious of maintaining a clean environment. Work should be performed in a clean, well ventilated area with adequate lighting, space, and facilities.

6.1.1 Facilities Inspection

1. Clean the machine shroud and all areas surrounding the SRD.
2. Run the SRD through four cycles to verify correct operation. Check all nozzles for correct spray pattern. If there is a poor spray pattern see section 6.4.3 for cleaning procedures.
3. Check for leaks at tool connections.
4. Verify that pressures and flows are in specification for this particular tool. (See installation section of manual for tool specifications.)

> ***NOTICE***
>
> After any cleaning or maintenance is performed, an extended rinse cycle should be run at a high RPM (1500-2000, **DO NOT EXCEED MAXIMUM RPM STAMPED ON ROTOR**). This should ensure that the machine is free of any possible contaminants before it is used for processing.

6.1.2 Tubing and Fittings Inspection

1. With shroud or access panels removed, inspect surfaces and plumbing connections. Check for abrasion of tubing that is in close proximity to metal edges.
2. Inspect pneumatic lines for tightness of connection and/or crimped hoses.
3. Reinstall shroud and wipe down surface with lint free cloth and peroxide/DI Water solution. (If you are performing a Semiannual or Annual PM, do not reinstall shroud at this time.)

6.1.3 N2 Filter Inspection

The filter life depends on several factors, such as the quality of N2 being supplied and machine usage. Until the user develops a time schedule for their replacement, the filter should be inspected regularly.

> ***NOTICE***
>
> After any cleaning or maintenance is performed, an extended rinse cycle should be run at a high RPM (1500-2000, **DO NOT EXCEED MAXIMUM RPM STAMPED ON ROTOR**). This should ensure that the machine is free of any possible contaminants before it is used for processing.

6.2 Monthly Preventative Maintenance

6.2.1 Window and Door Seal Inspection

1. Open the door and examine the seal area for foreign material.
2. Remove the seal if the area appears contaminated with broken wafer chips or residue from processing. Clean the seal with peroxide/DI Water solution and a lint free cloth.
3. With the seal removed, clean the seal channel with peroxide/DI Water solution and a lint free swab.
4. Reinstall the seal in the channel and wipe the exterior of the seal and window surfaces with the peroxide/DI Water solution.

6.2.2 Rotor Removal

1. **S-Style Rotor** (QD).
   a. Insert the rotor wrench into the socket head cap screw (the drawbolt).
   b. Hold the rotor firmly with one hand.
   c. Turn the wrench counterclockwise to loosen the drawbolt, until the drawbolt is completely free from the motor thru-bolt.
   d. Use both hands to pull the rotor from the bowl.
2. **F-Style Rotor** (four bolt).
   a. Remove the four retaining bolts and the rotor from the bowl). Take care when removing the rotor from the bowl to prevent scratching or scraping the coating of bowl.
   b. Remove the nut, spacer/washer, cam (and optical encoder if equipped), from the motor drive shaft.
   c. Carefully remove the drive plate from the bowl.

NOTICE

Stains can be an indication that a change in process might be necessary; i.e., increased retention time in "Dump Rinse" after acid process.

6.2.3 Rotor Drive Plate/Shaft Inspection

1. Clean the shaft and plate assembly with a solution of peroxide/DI Water.

2. Inspect surfaces for signs of wear or corrosion. If the drive shaft/plate assembly is severely pitted or stained, repolishing may be necessary. Contact **RHETECH** for instructions.

6.2.4 Bowl Inspection

1. Inspect Bowl for scratches, scrapes, dents and other signs of damage. Damage of this sort can contribute to increased particle counts. If damage is severe, repassivation may be necessary. Contact **RHETECH** for instructions.

2. Inspect the area around N2/DI water nozzles, and CY-20 port for signs of contamination. Clean with peroxide and/or DI water if necessary.

3. Inspect the surface of the drive plate, if F-style, or the QD drive. Inspect the exterior of the motor/bowl seal.

6.2.5 Drain Tube Inspection

1. With the rotor removed, visual inspection of the Drain Tube can be carried out using a flashlight. The tube should be clean and smooth with no signs of water breakage. If the tube is contaminated, remove it and clean with peroxide/DI Water solution.

2. To remove Drain Tube, unfasten screws from shroud and remove shroud. With shroud off, loosen hose clamp on drain tube. Twist tubing to remove. Clean tubing with peroxide/DI Water solution.

3. Reassembly of tube is the reverse of disassembly.

NOTICE

Older tools are equipped with Tygon drain tubes. **RHETECH** recommends replacing these tubes with PFA Teflon drain tubes. The **RHETECH** part number will vary according to tool size; please contact **RHETECH** Customer Service to obtain the proper replacement part for your unit.

6.2.6 Drain Box Inspection

1. Located at the rear of the tool, remove the drain box cover from the top of the drain box and remove the screen (trap) from inside the drain box.

2. Inspect the drain box for foreign material. Remove any material from the box. If the inside of the box is discolored or dirty, clean with a lint free cloth soaked with peroxide/DI Water solution.

3. If the drain box shows signs of recent wafer breakage, the Resistivity Monitor Probe (if present) may have become fouled. Remove the Probe by disconnecting the patch cord from the controller and unscrewing the probe from the drain box. Bits of broken wafer can become lodged in the probe. Use the N2 blow off gun to remove this type of contamination. If the probe requires more cleaning, proceed to the next step.

6.2.7 Cleaning Resistivity Monitor Probe (RM-20 Option)

1. Inspect the probe and drain box for sources of contamination, e.g.; broken wafers, scale and/or blocked DI Water path. Remove foreign material from the drain box. Any object in contact with the probe can affect the resistivity reading. Any obstruction of water flow to the probe can cause erratic resistivity readings.

2. Conditions can exist that can contaminate the resistivity monitor probe, e.g. organic contamination from fouled DI Water sources, mishandling of the probe during inspections, etc. If resistivity indications are erratic or unusually low, when compared to another probe, cleaning of the probe may be necessary. A tentative schedule for cleaning the electrodes should be established. The time interval between cleanings can be increased or decreased depending on the nature of the process liquid or the difference between resistivity readings before and after cleaning. To clean the probe, remove the probe from the drain box (See 6.2.6.3). The following procedure is from Foxboro and should be satisfactory to clean most contamination:

    a. Remove the sensor from the process chamber.

    b. Soak the sensor (immersed to the bushing) in 2% Micro-soap/DI Water for thirty minutes. Solution should be stirred with a magnetic stirrer. Solution temperature should be approximately 55º C.

    c. With fresh solution, immerse electrodes to the bushing in an ultrasonic bath, at approximately 55ºC, for four minutes.

    d. Repeat step three.

    e. Rinse electrodes in DI Water.

    f. With a fresh solution of DI Water, immerse electrodes to the bushing in the ultrasonic bath for four minutes minimum. Repeat this step.

NOTICE

Micro-soap is a product of International Products Corp., Trenton, New Jersey, 08601

NOTICE

If performing Semi-annual P.M., complete 6.3.1 before re-install of rotors.

6.2.8 Replacing the Rotor

1. **S-Style Rotor** (QD).

CAUTION

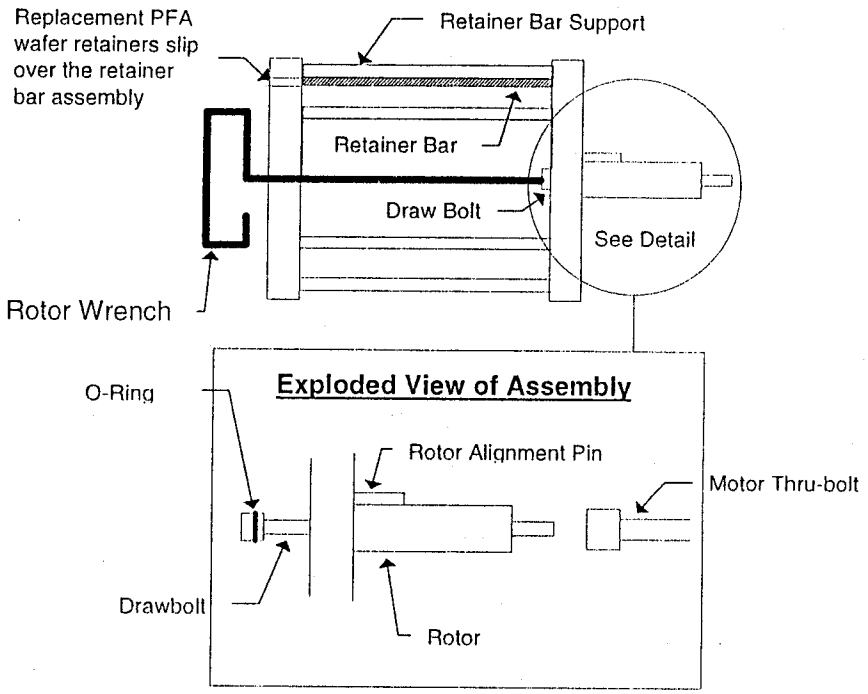
1. Put the rotor in straight to avoid damage to the shaft.
2. Do not damage the O-ring on the drawbolt when tightening.

a. Clean the rotor shaft and ID of motor shaft using IPA and a Scotch-Brite™ pad. Wipe dry with a cleanroom wipe. Check the rotor shaft and motor shaft for burrs or other damage each time the rotor is installed.

b. Use both hands while inserting the rotor shaft into the motor shaft.

c. Push the rotor in firmly. To be sure it is properly aligned, slowly turn the rotor until the alignment pin drops into the motor shaft alignment pin slot.

d. When the rotor is completely in place, tighten the drawbolt by turning the rotor wrench clockwise. Torque to 12-15 ft-lbs. (16.3-20.3 N•m). (See following page for diagram).



2. **F-Style Rotor** (four bolt).

   a. Reinstall the shaft/plate assembly by inserting the drive shaft into the motor shaft. Please note the alignment pin at the junction of the drive plate and the shaft. The pin goes in a slot cut in the motor drive shaft to align the rotor in an upright position in relation to the RSP.

   b. Reposition the spacer/washer, cam (and optical encoder if equipped) on the motor drive shaft.

   c. Tighten the nut on the rear of the motor drive to 30 in•lbs (3.4 N•m) torque. This assures proper compression of the motor drive shaft and the rotor drive shaft/drive assembly.

6.3 Semi-Annual Preventative Maintenance

The following steps should be performed in addition to the monthly maintenance procedures.

6.3.1 Rear Bowl Seal Inspection

1. Remove the Quick Disconnect Rotor, if present, following the instructions located in the Options Section of this manual. If the standard four bolt rotor is present see Section 6.2.2.2 for instructions.
2. Remove the motor/bowl seal spacer.
3. Visually inspect all surfaces on the rear bowl seal.
4. Clean the cap seal and shaft spacer thoroughly with peroxide/DI Water.
5. Reinstall the shaft spacer.
6. Check the inside of the bowl for scratches or staining. Clean as needed.
7. Remove the cover from the bowl drain.

6.3.2 Rotor Stop Positioner (RSP) Inspection

1. Inspect the rotor stop positioner for damage, especially the cam and follower.
2. Clean all pivot points, linkage and bearings.
3. Reinstall the RSP and align according to the cam.
4. Check the rotor stop positioner for correct operation.
5. Reinstall the shroud.

6.3.3 Door Alignment Inspection

1. Open and close the door to check for any dragging of the window or door seal on the bowl ring.
2. If a noticeable drag exists or the window appears to hit the edge of the bowl ring on closing, adjustment may be necessary.
3. The height of the door can be changed by unlocking the jam nut on the lower hinge pin. Then the hinge pin may be raised or lowered by turning it with an Allen wrench.
4. Be sure to lock the jam nut on the lower hinge pin when finished with this adjustment.

6.3.4 Inspect All Bowl Attachments

1. Verify proper tightness of all attachments to the bowl: CY-20, if present; H2O Manifold; N2 Manifold

2. Verify the integrity of O-rings and gaskets.

6.3.5 Check for Loose Electrical Connections

1. Check for any loose components inside the controller and tighten as required.

2. Visually inspect all wiring.

6.3.6 Power Supply Voltage Inspection

1. Check the five volt power supply inside the Rinser/Dryer controller unit. The power supply unit should provide 5.1v ± 0.5 volts. This voltage should be measured on the Main Logic board. Consult schematics in the back of this manual to locate test points on the Main Logic Board for your particular controller.

2. Check other voltages at the power supply wiring connections. Some controllers use 12 VDC relays, others use 24 VDC.

6.3.7 DI Water Recirculation Inspection (WR-20 Option)

1. Check the flow of DI water recirculation. The flow rate can be set by adjusting the restrictor in the external valve.

2. The flow rate through the recirculation loop should be sufficient to prevent the growth of algae in the manifolds.

6.4 Annual Preventative Maintenance

The following steps should be added to the monthly and semi-annual maintenance procedures.

NOTICE

After any cleaning or maintenance is performed, an extended rinse cycle should be run at a high RPM (1500-2000, **DO NOT EXCEED MAXIMUM RPM STAMPED ON ROTOR**). This should ensure that the machine is free of any possible contaminants before it is used for processing.

1. Valves can be cleaned by back-flushing to eliminate the need for disassemby.
2. Remove and clean the DI water manifolds.
3. Remove, disassemble and clean all nozzles. Before disassembling the nozzles, note the original spray angles. Try to achieve the same angle when the spray systems are reassembled. Examine the nozzles under bright light. Foreign material can be removed by use of CDA blown back through the nozzle. Foreign material that is particularly stuck can be removed with a small pointed object similar to a dentists probing tool. Nozzles can also be immersed in an ultrasonic bath for cleaning in a peroxide/DI Water solution.
4. Remove and clean all tubes and fittings. Empty DI Water from the DI Water filter housing. Fill the filter housing with DI water and 30% hydrogen peroxide (check chemical compatibility). Program the tool for a modified recipe. A long rinse step will be needed to allow proper rinsing of the filter, tubing and fittings. Complete the recipe with normal dry times and RPM. Place the tool into a sixty-minute rinse at the maximum allowable RPM. Verify the resistivity has returned to normal at the end of the hour. If not, repeat the rinse in smaller increments until resistivity meets specifications. Return the controller to normal process recipe configuration.
5. Remove, inspect and clean the N2 cartridge heater. Some tools may not be equipped with this option. To remove the heater, disconnect the power connector and unscrew the heater from the manifold. Examination of the heater should reveal a golden brown color with a slight tint of blue. If the heater is black or appears to be charred, this condition can contribute to high particle counts. Replace the heater if necessary. On reassembly look inside the nitrogen manifold for pieces of Teflon tape and other possible sources of foreign material.
6. Inspect the shock mounts for deterioration or damage and replace them if necessary.
7. Check the N2 pressure switches.
8. Verify tachometer readings.
9. Drive Motor/Process Chamber Seal. (See section 6.9.1)

6.5 Fundamentals Of Accurate Particle Counting

All particle count results should be verified using the following steps:

1. A known clean carrier must be used; either just cleaned (boiled off, outgassed) or just unpacked from a sealed bag.

2. Use known good wafers of relatively low counts (less than 20 @ ≤ 0.3 µm).

3. Check the wafers to see if they are hydrophilic or hydrophobic. This can be done by immersing the wafer in a reservoir. If water runs off the wafer, they are hydrophobic. If water is retained on the wafer, it is hydrophilic. Hydrophilic wafers are the desired wafer type.

4. Check the measuring machine (Surfscan, Euronka, etc.) for erratic counts by particle counting the same wafer several times. The counts should not vary by more than two or three.

5. Conduct an airborne particle test.

6. Place monitor wafers in front, center, and rear of cassette, this will provide data for particle performance down the carrier. Conduct a series of runs and figure the average.

7. Recognized Process Recipe

• Rinse	60-120	300-600 rpm
• Purge	10 sec	1000-1800 rpm
• Dry 1	30-90	1000-1800 rpm
• Dry 2	varies	300-600 rpm

NOTICE

Dry 2 time varies with wafer size. 4 min. for 100mm wafers, 5 min. for 125 and 150 mm wafers, and 6 min. for 200 mm wafers..

8. Use a control wafer in all experiments in order to verify that an increase in particles resulted from the process in question. Use the same number of slots and keep an accurate log of the results, noting which parameters changed.

9. If you follow the recorded steps for particle control, you will achieve counts of less than 10 for 1 microns. Please note that if the machines are in a bad state (counts greater than 200), an overnight rinse through manifolds may be required.

6.6 Wafer Loading For Particle Performance Testing

Proper loading and configuration of wafers during particle performance tests is crucial. When using one to three wafers for monitoring particle performance the following configuration is recommended:

- When using one wafer place in slot 12 or 13.
- When using two wafers place in slots 1 and 25.
- When using 3 wafers place in slots 1, 12, and 25.

The same monitor wafer can be used over and over again as long as it is kept relatively clean.

- Wafers must be facing toward the window of the Rinser Dryer.
- Use hydrophilic wafers only.
- Use **SEMITOOL**'s recommended recipe.
- A periodic maintenance schedule on the rinser-dryer must be active.

The more aware you are of how to check particle counts, the more likely you are to achieve good results with the Rinser/Dryer.

6.7 Particle Control

Preventive maintenance and proper cleaning is essential for particle control. Occasionally, a well maintained Rinser Dryer may still exceed particle performance specifications. The following information provides guidance in these areas.

The most important item for particle control is a planned preventive maintenance and cleaning schedule for the machine. If neglected, an increase in the number of particles generated during a cycle will be the result. See the recommended maintenance and cleaning schedules provided in this manual.

1. Correct drying times and rotor speeds are important for obtaining good results.

2. Check the facility pressures to ensure that the N2 and DI are set at the proper levels. If the N2 extends outside the parameters, it can effect the machine performance in two ways.

   a. If the N2 pressure and flow are too low, the wafer will not be dried within the recommended time and an increase in particles will be seen. A simple check for low flow is to increase the drying time. If the particle problem disappears, then the problem may be the N2 supply pressure or flow.

   b. Having N2 pressure and flow too high may create excess turbulence within the chamber. This can lead to poor drying and the possible displacement of particles being introduced into the chamber when loading and unloading the wafers.

3. Check the cartridge and bowl heaters to ensure they are working correctly. With a gloved hand feel the inside of the bowl. It should be warm after a dry cycle has been completed. If the surface does not feel warm, there may be a problem with the blanket heater. To check the cartridge heater, with a gloved hand feel the inside of the bowl under the N2 manifold. You should feel a warm low pressure purge coming from the manifold.

4. Verify regular maintenance or cleaning periods have not been missed.

5. Check for broken wafers or debris in the chamber or drain box. If a broken wafer is found, the machine must be stripped, i.e., rotor and drive plate removed. The bowl, door, door seal, rotor drive plate and drain should all be cleaned thoroughly. Check for wafer pieces in the water nozzles. Drain tube must be replaced. Replace process cassette if silicon pieces are embedded.

6. Check the wafer carrier for contamination.

7. Use known clean hydrophilic wafers.

6.7 Particle Control (cont.)

8. Check the DI water supply for contamination. Check the resistivity of the DI water source. If dirty, the lines are suspect. Purge them using a 30% peroxide solution. Check the DI water filtration to ensure that the filter is not out of date or contaminated. If doubt, change the filter and flush the lines to the machine. Clean the machine at the same time.

9. Remove the drain tube from the bowl and clean out or replace if discolored. A dirty drain tube can be a source of particles.

10. Check the operation of the DI manifold valves by watching the inside of the manifold for leaks. Make sure it is fully closed during the N2 dry cycle.

11. Excessive vibration has been found to cause particle generation. Using an incorrect carrier, incorrect load, or damaged rotor will cause vibration. The correct I.D. number for the carrier is stamped on the face of the rotor. The rotor may be balanced for a number of different loads. If no number is stamped on the face of the rotor (1/2 load, ¾ load 6 wafers, etc.), then the rotor must contain a full 25 wafers at all times. Any modification to the carrier could cause severe vibration.

12. If vibration could not be minimized, the rotor should be returned to **RHETECH** for re-balancing.

6.8 Particle Troubleshooting

1. Conduct an environmental particle check. Expose a clean wafer to all areas the monitor wafer will be in contact with except the Rinser Dryer.

2. Verify the recipe against the **SEMITOOL** recognized recipe.

3. Check the facility pressures to ensure that the N2 and DI are set at the proper levels. Check if any other equipment in the vicinity of the SRD is experiencing high particle counts. Look for indicators of N2 or DI problems in that section of the fab.

4. Check the tool for any obvious particle sources. Typical sources are broken wafers inside the chamber, drain tube, or drain box. If excessive amounts of silicon dust are present in any of these areas, perform the following steps.

    - Change the drain tube.
    - Check the DI manifold gasket for silicon dust.
    - Remove the rotor and drive plate (if drive is present). Check the rear bowl seal for silicon dust and/or tears in the seal.
    - Run a 1 hour high speed rinse (approximately 2400 RPM).

5. Perform the following steps to verify correct door operation.

    - Check for door leaks while running a rinse in the chamber.
    - Reduce the N2 pressure to approximately 15 psi. With the door open, use the port display to inflate the seal. Check for leaks in the seal or cracks in the window. Inspect for dirt or defects in the seal, remove and clean if necessary.
    - Clean the door seal and window with DI water. H2O2 will damage the seal.
    - If the Rinser Dryer has a Brushed Motor, check the ferrofluidic seal. If it appears dry, charge it, using sixty microliters of ferrofluid (one glass pipette full). Overcharging will result in even higher particle counts and extended cleanup time for the bowl. If ferrofluid is found in the back of the bowl, use either lighter fluid or heptane to clean the bowl. Pull the drain tube and clean ferrofluid residue from inside the tube. Reinstall the rotor.

6. Using a new or slightly used cassette, run a 60 minute rinse at maximum RPM, followed by a standard purge and dry. Run three standard recipes, then check particle counts.

7. If particles are reduced but not within specifications, repeat Step 6. Continue repeating this step as long as particle counts decrease.

6.8 Particle Troubleshooting (cont.)

8. If particle counts are still high proceed with Dry Only tests:
   a. Load a clean wafer in the rinser dryer and set idle for 5 minutes. If particles are added, the N2 heater, N2 filter, N2 pressure, Ferrofluidic seal flow or door seal should be investigated.
   b. Rinse a cassette with three clean wafers in an SRD with acceptable particle counts. Transfer the wet wafers to the tool with high counts and run a dry only recipe.

9. If particles remain high, check the N2 line for sources of contamination.
   a. Remove the cartridge heater and check for deep bluing or blackening of the heater. Either clean the heater with Scotch-Brite™, IPA and DI water or replace it with a new cartridge heater.
   b. Repeat the process in Step 8b. If counts are still high, replace the P.O.U. N2 filter.

10. After the tool qualifies for the dry only process, run a standard recipe. If the tool does not qualify, proceed to the next step. Otherwise, particle troubleshooting is complete.

11. Remove the rotor. Check the rear bowl seal for tears. Thoroughly spray the inside chamber with H2O2. Clean the rotor and drive plate, if the four bolt is present, with H2O2. Reinstall the rotor and run a one-hour high-speed rinse (approximately 2400 RPM). Check particle counts.

CAUTION

Do not spray H202 directly on the Ferrofluidic seal, H2O2 may damage the seal.

12. If the tool is still not in spec, the following are additional tips that could cause high particles.

    - Unplug the CY20, if present. If the probes are badly deteriorated, they may shed particles.
    - Check the tightness of the mounting bolts for the N2 and DI manifold and CY20.
    - If none of the above recommendations work, it is possible the bowl needs new electropolishing.

The above procedures should solve particle problems in the majority of circumstances. Should all steps be performed and the tool still does not qualify, consult your local representative or **RHETECH** Customer Service at 610-282-0105 in Coopersburg, Pennsylvania.

6.9 General Maintenance Procedures

6.9.1 Drive Motor/Process Chamber Seal

1. Ferrofluid Seal Cartridge Assembly – **(Brushless Motors)**

CAUTION

Attempts to service this assembly by other than qualified **RHETECH** personnel may cause seal failure. Machine damage and product contamination is possible. Never use IPA around the seal assembly area.

The Rinser/Dryer comes equipped with a pre-charged ferrofluid seal cartridge assembly. The unit has been assembled at the **RHETECH** facility by qualified technicians and has no user-serviceable parts. No maintenance is necessary and service life should exceed 5 years under normal operating conditions. Should service to this unit be necessary, contact your RHETECH service representative for assistance.

2. Seal Adapter Assembly – **(Brushed Motor Only)**

Charging of the Ferrofluidic is unnecessary on all Direct Drive units unless the Seal Adapter assembly is removed. The following parts are required to charge the Ferrofluidic Seal:

Ferrofluidic – Part # 70738-F (1 cc bottle, enough for 16 changes)

75ul Pipettes – Part # 70738-D (100pk, includes bulb)

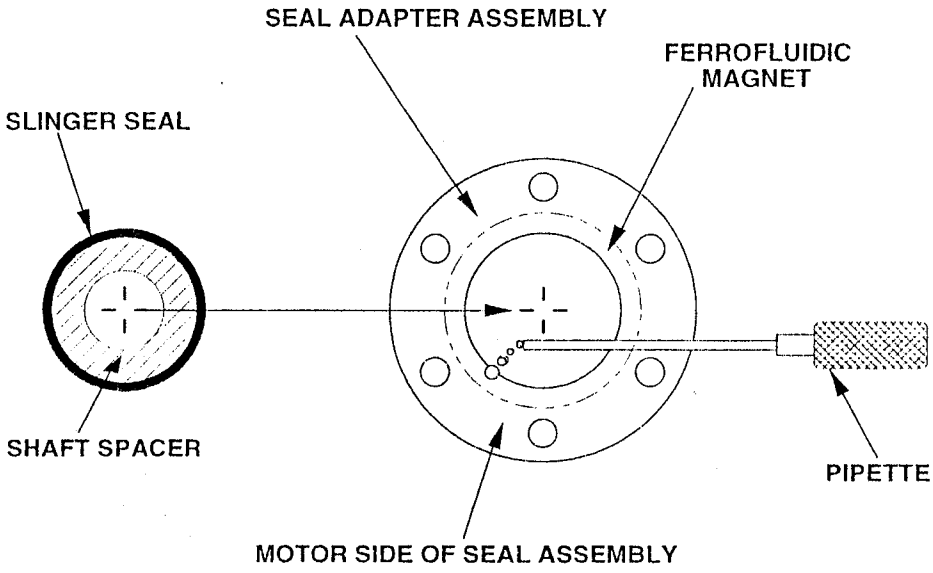
CAUTION

Do not exceed 75 ul of fluid in the Ferrofluidic Seal assembly. Excessive fluid will leak from the seal and cause contamination of the chamber and product.
Certain solvents will adversely affect the Ferrofluid. Do not use any solvents directly in contact with the Ferrofluid or near completed assemblies.

6.9.1.2 Seal Adapter Assembly -- (Brushed Motor Only -- continued)

The following procedure should be performed outside the Rinser/Dryer.

a. The seal adapter assembly should be wiped clean using only a dry cloth. All excess ferrofluid should be removed from the magnet area, as shown in the following display.



Ferrofluidic Seal Maintenance

b. To charge the pipette with Ferrofluid, carefully inset a glass pipe into the bulb. Covering the hole in the bulb, squeeze and draw fluid from the vial until the pipette is almost filled. The glass pipette capacity is 75 microliters (µl).

c. Apply fresh ferrofluid directly to the interior of the magnetic seal from the flat side of the seal adapter assembly (faces motor). An amount of 60 µl should be applied at four points (3, 6, 9, and 12 o'clock) on the seal. Touching the magnet will draw fluid from the pipette. Do not squeeze the pipette until the last touch point. At the last point, gently squeeze the pipette to dispense the remaining 60 µl. Spinning the rotor drive after reassembly will distribute the fluid evenly and create an airtight seal.

d. After applying ferrofluid to the seal, it is recommended that the seal be reassembled within fifteen minutes of charging. Increased exposure of the ferrofluid to an open environment could degrade the seal.

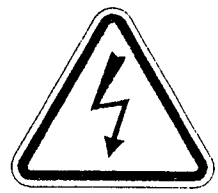
6.9.2 KBIC Motor Control Calibration Procedures (**Brushed Motors Only**)

TYPE 4

KBIC Motor Controllers are used to drive Rinser/Dryer motors. It is important that the horsepower resistor (R21) located on the KBIC be valued appropriately (refer to the table defining values). Prolonged operation of a KBIC motor combination with incorrect R21 values will result in premature failure of these components.

DANGER

The following procedures involve operations on electrically "live" equipment and should be performed only by authorized, trained maintenance personnel.



1. Tools Required :
   - Insulated alligator jumper leads
   - DC ammeter (0 - 10 amp)
   - Plastic hex adjustment tool
2. Ensure primary power is deactivated on the tool prior to making any preliminary adjustments/connections.
3. After locating the appropriate KBIC motor control within the electronics enclosure, set the four controls as follows (refer to the KBIC Motor Control Drawing):

   Max = fully CW IR = fully CCW, then 1/4 turn CW

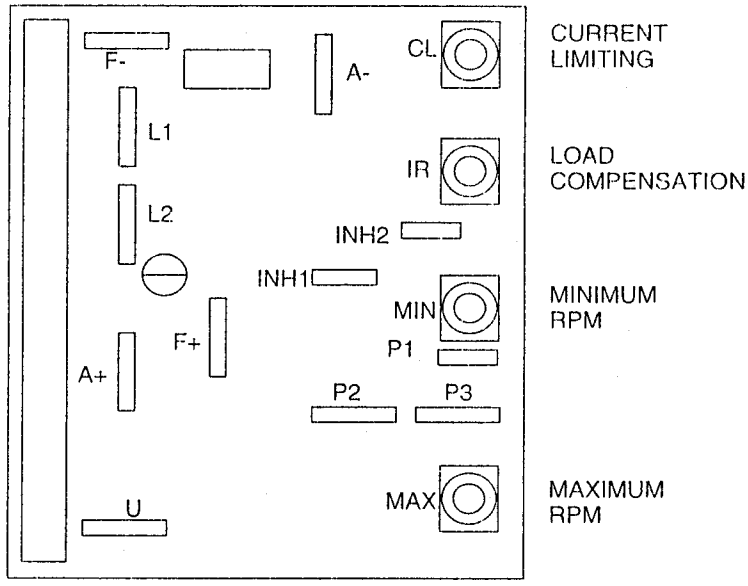
   Min = fully CCW CL = fully CCW, then 1/4 turn CW
4. Refer to the KBIC motor control drawing (see next page). Locate the terminal marked **A+**. Carefully remove the push-on wire connector attached to the **A+** terminal. Using the insulated alligator clip, connect the wire removed from the **A+** terminal to the negative ammeter lead.
5. Using the second alligator clip lead, connect the positive ammeter terminal to the **A-** terminal on the KBIC. Use caution to ensure no connections are contacting metal or shorting to other components.
6. The next step is to set the CL (Current Limiting) pot on the KBIC. Apply power to the tool. If an ammeter is not available, adjust the pot to the twelve o'clock position. If an ammeter is to be used, observe the ammeter and turn on the motor. Adjust the CL pot on the KBIC until the maximum startup current is limited to five amps. This process may take several starts and stops of the motor to accomplish.

6.9.2 KBIC Motor Control Calibration Procedures (continued)

7. The maximum RPM will need to be set once the Current Limiting is adjusted. Due to the variety of products, the following assumes knowledge of user RPM selection procedures. Caution should be taken to ensure that the rotor is removed for the Max RPM calibration. Operation of the empty rotor at full RPM can cause the rotor to be knocked out of balance.

8. Using the diagnostic tests, run the motor without feedback at maximum RPM (stamped on the rotor). Adjust RV1 of the duty cycle to the voltage converter (P/N 14861) until the requested and actual RPM displays are equal. Set the maximum RPM limitation by adjusting the **Max RPM** potentiometer on the KBIC motor controller as follows:

240-270	=	2800 RPM
Any 280/300mm	=	2100 RPM
2400/2600	=	1300 RPM



KBIC MOTOR CONTROL DRAWING

HORSEPOWER	RESISTOR VALUE	RESISTOR P/N
1/12 HP	.18 OHM	P/N 76001
1/3 HP	.035 OHM	P/N 60701-15
1/2 HP	.025 OHM	P/N 60701-20

6.9.3 Brushless Motor Failure Checkout Procedure

TYPE 2

To troubleshoot a Brushless Motor Failure, check all voltages at the Automotion Controller.

1. General Maintenance Notes:

   - Automotion does not recommend grounding the motor to safety ground. This induces noise in the motor controller.
   - When using an AC powered oscilloscope, you should NOT connect the scope probe ground clips to Automotion pin 5. Instead, use two channels of a dual trace scope to make a differential measurement.
   - Use 10x probes and set both channels to 10 VOLTS/DIV. A lower setting may overload the scope's pre-amps.
   - Select DC on both channels and set TIME/DIV control to 5 ms.
   - Set channel B to INVERT mode and vertical mode to ADD with channels A and B OFF.
   - Put both channel probes on Automotion pin 5 (motor ground). The probe grounds may be connected to safety ground or left floating.
   - If the two probes are matched you will see a flat line (channel A - channel B). If the signal is not a flat line you will need to adjust the variable gain of one of the channels to match the probes as closely as possible.
   - Leave the channel B probe on Automotion pin 5 as reference.
   - Use the channel A probe to measure the signals you need to see.

2. The voltage measured between pins 4 (+) and 5 (-) should be 12 VDC. This is supplied from the motor controller.

3. Check the three hall sensors. They should switch between +12 VDC and ground during one rotation of the motor. Measure this by using pin 5 as ground; pins 1, 2, and 3 are the hall sensors. Use a DVM or an oscilloscope. When you rotate the motor slowly you should see a square wave.

4. Check the motor drive voltage at pin 11 (pin 5 is reference ground). On drive systems configured for analog control (typical SRD), 1 VDC should be close to 3000 RPM.

6.9.3 Brushless Motor Failure Checkout Procedure (continued)

5. Check the control bits. These are +12 VDC signals that tell the controller what to do.

   - Pin 5 is ground.
   - Pin 6 is start/stop. It is at 0 VDC when stopped and 12 VDC when start is pressed.
   - Pin 7 is the reverse bit. It is 12 VDC for forward or counter clockwise rotation and 0 VDC for reverse or clockwise rotation.
   - Pin 8 is the brake. It is 0 VDC until the end of a cycle, then it momentarily switches to +12 VDC when the brake is applied.

NOTICE

On Rinser Dryers with limited RPM, the start/stop bits run through the motor speed limiter. If there is a problem getting the controller to start/stop, the motor speed limit may be bad. These signals originate at the Output Board, go through the Opto Isolator Board, then through the Motor Speed Limiter, to the Automotion Controller.

6. If the voltages on the controller check out, there is possibly a problem with the field windings in the motor. To check the windings:

   - Unplug the short connector from the Automotion Controller and measure the resistance of the windings.
   - Measure between pins 18 & 19, 18 & 20, and 19 & 20. There should be 3 ohms for a LC4 120 VAC, or 12 ohms for a LC5 220 VAC unit on each of the 3 windings.
   - Measure between pin 15 (ground) and pins 18, 19, and 20 for any continuity. This should be an open circuit.

6.9.4 Door Seal Replacement Procedure (**VAD-DOWN ONLY**)

The following steps are required to insure that the vertical auto door seal is replaced properly.

1. Door Position - The auto door should be in the closed position.

2. Shroud Removal - The shroud is fastened to the frame with six screws, three on each side of the tool. Once the screws have been removed, the shroud can be removed from the tool to expose the door mounting brackets. It is not necessary to remove the back panel from the tool.

3. Door Removal - The auto door is attached to the pneumatic cylinder assembly by two stainless steel brackets. Each bracket (see figure 1), attaches to the door with four screws. After removal of the eight screws, pull the door away from the tool. Extreme caution should be taken to ensure that the pneumatic cylinder bracket assemblies are not turned outward on the tool. When the door is closed, the door photo sensor interlocks are engaged, and if the assemblies are forced outward, the photo sensor may be damaged.

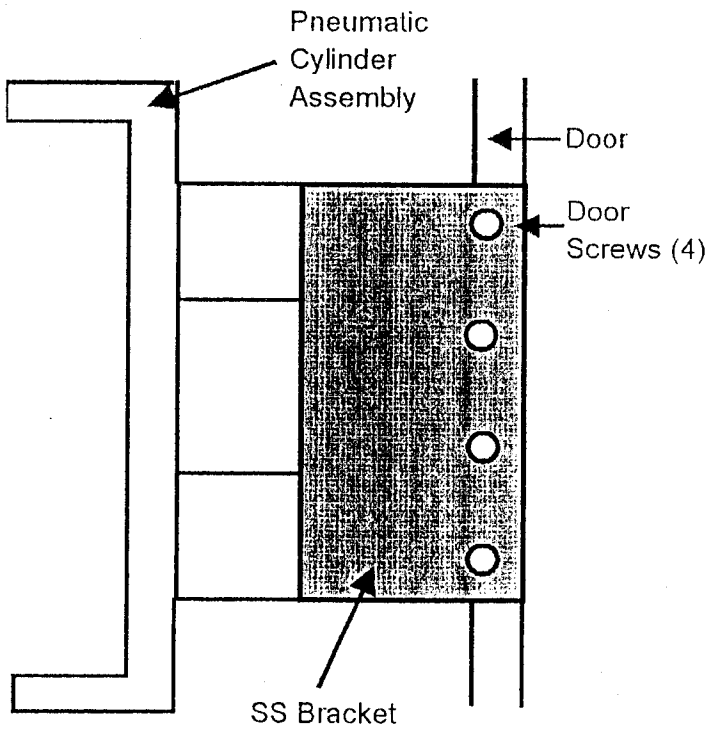


FIGURE 1

4. Door Seal - Remove the door seal from the channel in the window. Insert the new seal in the channel, making sure it is in the correct position (see figure 2 on the next page). When replacing the door, replace the rubber O-Ring (Grommet, see figure 3 on the next page), if it is damaged or worn. To replace the door, reverse the door removal procedure.

6.9.4 Door Seal Replacement Procedure (continued)

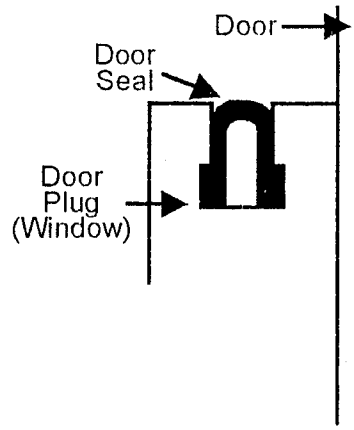


FIGURE 2

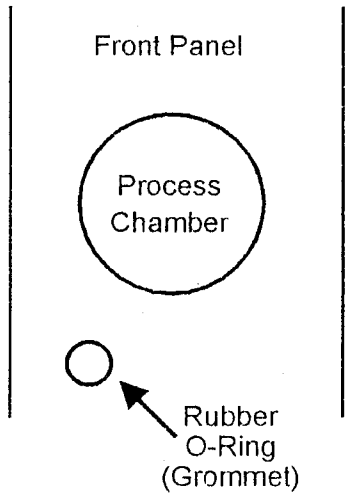


FIGURE 3

6.10 PSC-101 Diagnostic Testing Routine

The PSC-101 software contains diagnostic tests that can be accessed to aid in troubleshooting. These diagnostic tests are accessed through the Service/Diagnostics mode of the controller.

WARNING

The safety interlocks are disabled when the PSC-101 controller is in the Service/Diagnostics mode diagnostic routine.

6.10.1 Common Hazards to Avoid

1. The door can be opened when the rotor is turning, or when the rotor is not upright.
2. The motor can be started while the door is open.
3. The door-close time-out feature is not active. The door will continue to close, even if an obstruction is present, until the processor is told otherwise.
4. The water and microsoap spray features can be activated while the door is open.

6.10.2 Accessing the PSC-101 Diagnostic Routine

Rhetech ships all SRD's locked out of the diagnostic mode. Position 4 of DIP Switch 1 must be turned on to enter the service mode. To access the PSC-101 diagnostic routine, press the MODE soft key until PORT is displayed on the front panel. If the controller does not enter the diagnostics mode, then it may be locked. Both diagnostics and recipe programming may be made inaccessible by setting positions 4 and 5 of DIP Switch 1 to OFF (see the Main Logic Board Assembly Drawing in the Schematics Section for the switch location). By setting these two switches to the ON position, all controller functions will be accessible. Disable access to the Service mode when Diagnostic testing is complete.

6.10.3 Port Input/Output Setting

The intended purpose of this test is to provide a means to exercise the valves and relays. This test allows the user to read from or write to a selected port. The data sent and received is entered and displayed in binary. The port address selected is entered in hex. Refer to the Port Map located in the Schematics Section for port addresses and bit definitions.

1. The port location is entered in the field normally reserved for resistivity/time.

2. The bit string is entered in the field normally reserved for time and RPM and is entered digit by digit like all other fields.

3. Position the cursor in the STEP field and press the **MODE** key until PORT is displayed on the controller. Move the cursor to port location field, which is initially set to twenty. Use the **PLUS AND MINUS** soft keys to enter a port number.

4. To write to a port, move the cursor to the bit field. Use the + key to set a bit ("1" indicates ON) and the - key to reset the bit ("0" indicates OFF). The displayed bit pattern is numbered from the right to the left, starting at 0 and ending at 7. Use this to refer to the bit number in the Port Map. Verify that the setting of the bit results in the expected function output.

5. Select the next port address to be tested and repeat the above procedure.

6.10.4 Multiplexed Input Read

The user switches, program switches, and status inputs may be read with this test.. The switch settings are displayed in the order in which they are multiplexed (Bits 0 - 4 of Port 0). Refer to the Multiplexed Inputs page of the Port Map located in the Schematics Section for port addresses and bit definitions.

1. The port location is entered in the field normally reserved for resistivity/time.

2. The bit string is entered in the field normally reserved for time and RPM and is entered digit by digit like all other fields.

3. To read from a selected port, position the cursor in the STEP field and with PORT displayed, press the + key once. The controller now displays Multiplexed Inputs ("MPXIN"). Move the cursor to port location field, which is initially set to zero. Use the **PLUS AND MINUS** soft keys to enter an input port number. The bit pattern displayed is the current setting for the selected port and can not be modified.

4. Select the next port address to be tested and repeat the above procedure.

6.10.5 Motor Control Test

This procedure allows the motor RPM to be tested. There are two modes in this test: feedback mode, and non-feedback mode. In feedback mode, the controller will read the user inputted RPM and attempt to run at this speed. In non-feedback mode, the controller will output an appropriate constant voltage depending on the selected RPM. No adjustments in the voltage will be made by the controller to compensate for an incorrect actual value in the RPM.

1. While in PORT mode, select this test by positioning the cursor in the STEP field and selecting the + soft key until "MOTOR_" is displayed.

2. Move the cursor to the middle position, where the resistivity/time field normally resides, and enter the desired RPM. This is the RPM that the motor will attempt to run.

3. Move the cursor to the underscore just to the right of the word "MOTOR". The underscore indicates the motor is idle. To choose a feedback mode and initiate the test, select the + key. "N" initiates the non-feedback mode and "F" initiates the feedback mode test.

4. When the motor starts, the actual RPM is displayed on the right side of the controller.

5. To terminate the test, press and hold the - key.

6.10.6 Resistivity Monitor Test (RM-20 Option)

This test allows the user to test the values read by the resistivity monitor.

1. While in PORT mode, select this test by positioning the cursor in the STEP field and selecting the + soft key unitl "RES" is displayed.

2. The first field to the right of "RES" is the actual value read from the resistivity monitor probe (in megohms). The next field, to the right, is the temperature (in Celsius) of the probe. The field on the far right side of the controller, is the resistivity, adjusted to 25 degrees Celsius.

6.10.7 Serial Port Test

This test allows the user to test the serial I/O port and to determine the baud rate at which the port operates. The baud rate is displayed in the field to the right of the word "SIO". The next field displays the last character sent, and the rightmost field displays the last character received. The test automatically sends a series of characters, starting with hexadecimal 20 (space), and ending with hexadecimal 7E (tilde), resulting in a "barber pole" pattern if connected to an external terminal. If no external terminal or device is connected to the serial port then characters will be sent but none will be received. However, by connecting pins 2 and 3 of the DB-25 connector, the same characters sent will be received, alllowing a complete test of the port.

1. While in PORT mode, select this test by positioning the cursor in the STEP field and selecting the + soft key unitl "SIO" is displayed.

2. The baud rate may be changed by setting the proper switches on DIP switch 1 (see the Port Map for the baud rate switches and the Main Logic Board Assembly for the location of DIP switch 1). When the switches are reset according to any of the following settings, the new baud rate will take effect when the power is toggled.

BAUD RATE	SWITCH 1	SWITCH 2	SWITCH 3
150	Off	Off	Off
300	Off	Off	On
600	Off	On	Off
1200	Off	On	On
2400	On	Off	Off
4800	On	Off	On
9600	On	On	Off
19,200	On	On	On

6.10.8 Master Setting (SECS II Option)

When the SECS II Protocol option is present, this mode sets the Master/Slave flag. When the Master flag is set, the controller's messages will have higher priority than the secondary devices with which it communicates. Therefore, when the controller and a secondary device make a request concurrently, the controller's message will be processed first. Conversely, when the Slave flag is set, the secondary device message will be processed before the controller message.

1. To set the Master/Slave flag, while in PORT mode, position the cursor in the STEP field and select the + soft key unitl "MASTER" is displayed.

2. Move the cursor, to the right, to the Master/Slave flag field. To set the controller to Master, set this digit to "1". "0" indicates that the controller is slave to secondary devices with which it communicates.

6.10.9 Device Identification Setting (SECS II Option)

When the SECS II Protocol option is present, this mode allows the user to assign an identification number to the tool for communication purposes. This value may range from 0 to 32767.

1. To assign an identification number to the tool, while in PORT mode, position the cursor in the STEP field and select the + soft key unitl "DEVICE ID" is displayed.

2. Position the cursor in the numeric field to the right and use the **PLUS AND MINUS** keys to set the desired value.

6.10.10 Retry Setting (SECS II Option)

When the SECS II Protocol option is present, this mode allows the user to set the number of times a message may be transmitted. If an error in communication occurs between the controller and another device, this value is used to determine the maximun number of times the message may be retransmitted. This number may range from 0 to 31.

1. To set the maximum number of retries, while in PORT mode, position the cursor in the STEP field and select the + soft key unitl "RETRY" is displayed.

2. Position the cursor in the numeric field to the right and use the **PLUS AND MINUS** keys to set the desired value.

6.10.11 Timer Settings (SECS II Option)

When the SECS II Protocol option is present, this mode allows the user to set the timeout periods for the four timers used in SECS communications. Timer T1 is the timeout period between successive characters. T2 is the timeout between the end of one block of data and the acknowledgement from the host device. T3 is a timeout used in SECS II protocol that is not currently implemented. T4 is the timeout period between successive blocks of data for lengthy messages requiring more than one block transfer. The default settings for these timers are appropriate for most applications and should not be changed without a thorough understanding of the SECS protocol.

1. To set any of the timers, while in PORT mode, position the cursor in the STEP field and select the + soft key unitl "TIMER TX" is displayed (X represents the timer number, 1 through 4).

2. Position the cursor in the numeric field to the right and use the **PLUS AND MINUS** keys to set the desired time. The ranges of the timeout periods are as follows:

TIMER	SECONDS
T1	**0 - 10**
T2	**0 - 25**
T3	**0 - 120**
T4	**0 - 120**

6.11 Rinser / Dryer Trouble-Shooting Tips

6.11.1 Machine won't advance to dry cycle with the resistivity monitor activated.

1. Check the resistivity of the facility DI water. Provide cleaner DI water or reduce the setpoint of the resistivity monitor.
2. Check for contaminants being leached out of old carriers. Clean the Rinser/Dryer and carrier following the instructions described in this section.
3. Check and clean the monitor probe.
4. Check for lack of N_2 purge during the rinse cycle.
5. Clean the drain tube, box and trap and check for foreign matter or possible sources of contamination.

6.11.2 Door will not seal

1. Remove the door seal and clean. Reassemble seal and verify proper fit.
2. Check the door hinge and adjust if necessary.
3. Set the facilities N_2 supply for factory specifications. See the installation section.
4. Check and replace any damaged tubing and barbs.

6.11.3 Rotor Stop Positioner won't upright

1. Verify correct facility pressure. Set correct pressure if necessary.
2. Check the Humphrey valve labeled "RSP" for proper operation.
3. Check the tubing and barbs. See Flow Diagram (Schematic Section) for N_2 routing. Replace any punctured or damaged tubing or barbs.
4. Replace the RSP unit, if required.

6.11.4 Rotor positioner out of position

Check rotor orientation on shaft and rotate.

6.11.5 No heat

1. Test the continuity of blanket heater wires. Blanket heaters normally have approximately 50 ohms resistance. Replace heater if necessary.
2. Check the heater relay in the power module.

6.11.6 Machine stays in holding mode

Verify thermostat closure, and check the relay. Replace if necessary.

6.11.7 Rotor appears to be out of balance

Check the rotor at high RPM for excessive vibration with a properly loaded cassette of wafers. Return unbalanced rotor to factory for rebalancing.

6.11.8 Water overflows

Check for blocked drain or atmospheric vent. Clean drain or vent.

6.11.9 Water continues to spray when in dry cycle

1. Check the DI water valve for proper operation. Replace if necessary.
2. The DI water pressure may be too high. Set to factory specifications.
3. Check solenoid valve operation. Replace if necessary.

6.11.10 Machine won't start

1. Check for interlock failures, e.g. low N_2 pressure, open door, etc. Correct any failure condition.
2. Check start/stop switches. Replace if necessary.

6.11.11 Display on controller stops counting or shows erratic display

Check the CPU board and replace if necessary.

6.12 PSC-101 Controller Troubleshooting Guide

6.12.1 Display is blank/No Response to input.

1. Check the power supply voltage. Regulator CR1 should have + 5 volt output with only minor ripple.

2. Check the reset line to the CPU. The power supply supervisor chip (TL7705) will hold the reset line low when the power supply dips below about 4.75 volts. If always low, check the power supply, TL7705, and the reset switch.

3. The chip selects to RAM, ROM, and 8253 timer chips should pulse low. If they do not, check the 74LS138 address decoders and the various address lines for "stuck low or high" conditions. Visually inspect the chips in the ROM and RAM sockets for bent pins, etc. Try a known good ROM chip. Try a known good CPU chip. Check strapping options on the chips.

4. The interrupt line to the CPU (INT) should be low about 50% of the time with about a 2 msec repetition rate.

   - If the interrupt line is always low, check on the input side of the 74LS05 to see which input is high and causing the interrupt. An 8251 is required in the first position (not optional) for proper operation.

   - If the interrupt line is always high, check the 8253. It should generate an interrupt about every 2 msec. Experience has shown that the Mitsubishi brand 8253 chips don't initialize reliably. We have since specified Intel or NEC brands. Check the chip select of the 8253 and look for a 2 msec. short pulse at the "timer pulse" line. The 74LS123 is used like a flip-flop and is set and cleared by the timer pulse and timer clear lines.

5. The NMI line should not be low. In normal operation the CPU toggles the WD RETRIG line periodically. If the processor stops running, the 74LS123 will time out, pull the NMI line low, and actuate the error recovery software. A failure in the 74LS123 or the 8255, which controls the WD RETRIG output, could cause the processor to get stuck handling the NMI. If removing X8 allows the CPU to work correctly, check this circuitry.

6.12.2 CPU FAIL message is displayed on the controller.

This message indicates a recipe checksum error has occurred. The following procedure ERASES ALL RECIPES.

1. Turn off the power.

2. Open the drawer and depress the Memory Clear button (SW 9 on the Main Logic Board Assembly Drawing in the Schematics Section) located behind the Program key switch.

3. Turn on the power while holding the button. **"CLEARING RECIPES"** will be displayed, followed by: **"EPROM XX #.# OK"** (where **XX #.#** is the software version residing on the controller); **"RAM OK"**; and **"PARAMETERS OK"**.

6.13 Calling for Technical Service

When calling the factory or your local representative for help, it is suggested that a person with machine maintenance responsibilities be present with a copy of the manual to receive instructions.

If data is furnished by letter or telephone, it is essential that the data furnished be complete and accurate in order to avoid unnecessary delays.

Listed below is the information that should be provided with your request for help:

- Date, customer name, and address.
- Person to contact (name, title, telephone, and extension).
- Person writing/calling (name and title).
- Machine model and serial number.
- Description and part number of replacements parts.
- Urgency of request, e.g. machine is down.
- Nature of problem, e.g. broken part, won't respond, etc.
- Components inoperative (description and part number, if available).
- Additional information or comments that might be helpful.

6.13.1 Return of Goods Policy/Special Shipping Requirements:

1. Notify **RHETECH** Customer Service or local representative prior to return, and request a Return Material Authorization (RMA) number. Please give the machine model and serial number when requesting a RMA.

   RHETECH, Inc.
   Customer Service Department
   416 South 4th Street
   Coopersburg, PA 18036-2098
   (610) 282-0105

Note: Return shipments will not be accepted by the **RHETECH** Receiving Department without a RMA number.

2. Secure goods so that they cannot be damaged in transit. Package in original container if possible.

3. Include reason for returning the machine, along with original purchase order and RMA number.

SECTION 7: PARTS LIST

7.1 PSC-101 Controller Spare Parts List 7-1

7.2 Rinser / Dryer Spare Parts List 7-3

7.3 PSC-101 Consumable Parts List 7-6

7.1 PSC-101 Controller Spare Parts List

Contact your local **RHETECH** Representative for Spare Fuses.

TYPE	DESCRIPTION	PART NUMBER
General	Board, Display PSC-101 Assy.	16707-01
	Board, Converter Assy.	14861-501
	Fuse, 7 Amp Slow Blow 3AG	61640-10
	Fuse, 8 Amp Slow Blow 3AG	61640-11
	Board Assy. Power Supply +24 +5/120V	16710-505
Brushless Type Motor	Board, PSC-101 Logic Assy.	16709-501
	Board, Relay Assy. 101	14880-01
Brush Type Motor	Board, PSC-101 Logic	16709-01
	Board, Relay Assy. PSC-101 220V	14876-01
IC For Logic Board	8255 I.C.	60316
	I.C. Z80 CMOS 4Mhz	60320-01
	DS 1220 RAM	60324
	8253 I.C.	60325
Remote Autodoor Option Only	PSC-101 Controller Cable Assembly (DB50 Signal) 4 Ft.	14169-01
	Remote Operator Control Assy. 101	17135-01

TYPE	DESCRIPTION	PART NUMBER
Additional Parts	Bezel, Front PSC-101	12923-01
	Nut, 4-40 Nylon	95069
	Panel, Membrane PSC-101	12777-01
	Screw, 6-32 CPTV w/Knob	95046-19
	CNTR 2 Pin Recpt Ribbon Cable	73206
	Standoff, 0.25 x 0.2 Nylon	95061
	Switch, Rocker DPST W/16A BRKR	73170-01
	Switch, Key Lock DPDT	73083

7.2 Rinser / Dryer Spare Parts List

TYPE	DESCRIPTION	PART NUMBER
General - Electrical	Board, Optical Sensor Assembly Tach	16730-01
	Heater, Cartridge (375W /120V)	61501
	Heater, Cartridge (375W /220V)	61501-04
	Heater,Blanket (2 Thermodiscs 120V) 6 x 7-3/4	60270-04
	Heater, Blanket (2 Thermodiscs 220V) 290W 6 x 7-3/4	60270-220
	Heater,Blanket (No Thermodiscs 120V) 290W 6 x 7-3/4	60270
	Heater, Blanket (No Thermodiscs 220V) 290W 6 x 7-3/4	60270-221
	Switch, Pressure Non Adj.	61510
	Switch, Micro w/ 2-1/2 Arm	61567-01
	Switch, Reed 3W 120V	60709
	Switch, Magnetic Actuating Reed	60709-01
	Switch, 1 PL MOM Round Panel Mount	73029
	Valve, Solenoid (Humphrey 24V)	61591
General - Mechanical	Actuator Valve Assembly Slow Act 1/4 ULV	310C0028-01
	Actuator Valve Assembly, 1/4" VLV	310C0022-01
	Adapter, 1/4" Valve 3/8 Tube FLRTK	324C0006-01
	Filter, Cartridge (Disposable Plastic .2 Micron)	70003
	Filter, Cartridge (Stainless Steel .01 Micron Disposable)	70886-10 (Pall)
	Filter, Cartridge 0.05U Disposable SS	70886-02 (Millipore)

TYPE	DESCRIPTION	PART NUMBER
General - Mechanical	Gasket, H2O 8 POS 240-70 Silicon	10968-01
	Grommet Panel Front 1/4	61206
	Nozzle, 80 CONE (PVDF) Spray 8 ea. 2300-2600 Bowl Size	341R0010-01 341C0001-01 & 341C0002-01
	Nozzle, 80 CONE (PVDF) Spray 8 ea.	341R0010-01
	Rotor Stop Positioner (240,260,270) Slow Act	17143-01
	Rotor Stop Positioner (280,300) Slow Act	253R0022-01
	Seal, Viton Door 240	10771-01
	Seal, White Viton Locking Door 260, 270, 280, 2300	121R0001-01, 03, 05, 07
	Window, 240LH, 240RH w/o Flange	10892-511, 512
	Window, 260LH, 260RH, 270LH, 270RH	123R0013-501, 502, 503, 504
	Window, 280LH, 280RH	17446-505, 506
	Window, 300LH, 300RH	123R0013-507, -508

TYPE	DESCRIPTION	PART NUMBER
Brushless Type Motor	Cartridge, SRD Ferrofluid	240R0001-01
	Motor, Brushless 1/2 HP (120V)	17410-01
	Motor, Brushless 1/2 HP (230V)	17410-03
	Controller (110V) Motor 1/2 HP Brushless	60710-27
	Controller (230V) Motor 1/2 HP Brushless	60710-28
	Seal, Bowl Viton (240 - 300)	17448-01
Brush Type Motor	Motor, 1/2 HP Brushed 90 VDC	17359-01
	Motor, 1/2 HP Brushed 90 VDC, Thermal Protection	17359-03
	Motor Controller Rinser Dryer(120V)	60701-10
	Controller, 1/2 HP Brushed Motor (220V)	60701-05
	Resistor 0.025 Ohm SW	60701-20
	Seal Adapter 316SS (240, 260, 270)	13444-05
	Seal Adapter ST (280, 300)	12497-03
	Seal, Bowl Viton (240 - 300)	10777-01
	Seal, Ferrofluidic	70738

7.3 PSC-101 Consumable Parts List

The following list consists of parts which **SEMITOOL** considers to be consumable.

TYPE	DESCRIPTION	PART NUMBER
PSC-101 Controller, General	Fuse, 7 Amp Slow Blow 3AG	61640-10
	Fuse, 8 Amp Slow Blow 3AG	61640-11
Rinser/Dryer, General - Mechanical	Filter, Cartridge (Disposable Plastic .2 Micron)	70003
	Filter, Cartridge (Stainless Steel .01 Micron Disposable)	70886-10 (Pall)
	Filter, Cartridge 0.05U Disposable SS	70886-02 (Millipore)
	Gasket, H2O 8 POS 240-70 Silicon	10968-01
	Seal, Viton Door 240	10771-01
	Seal, White Viton Locking Door 260, 270, 280, 2300	17438-01, 03, 05, 07
Brushless Type Motor	Cartridge, SRD Ferrofluid	240R0001-01
	Seal, Bowl Viton (240 - 300)	17448-01
Brush Type Motor	Seal, Bowl Viton (240 - 280)	10777-01

SECTION 8: SCHEMATICS

Fluid Flow Symbol Legend

Rinser Dryer Fluid Flow

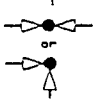
PSC-101 Port Map

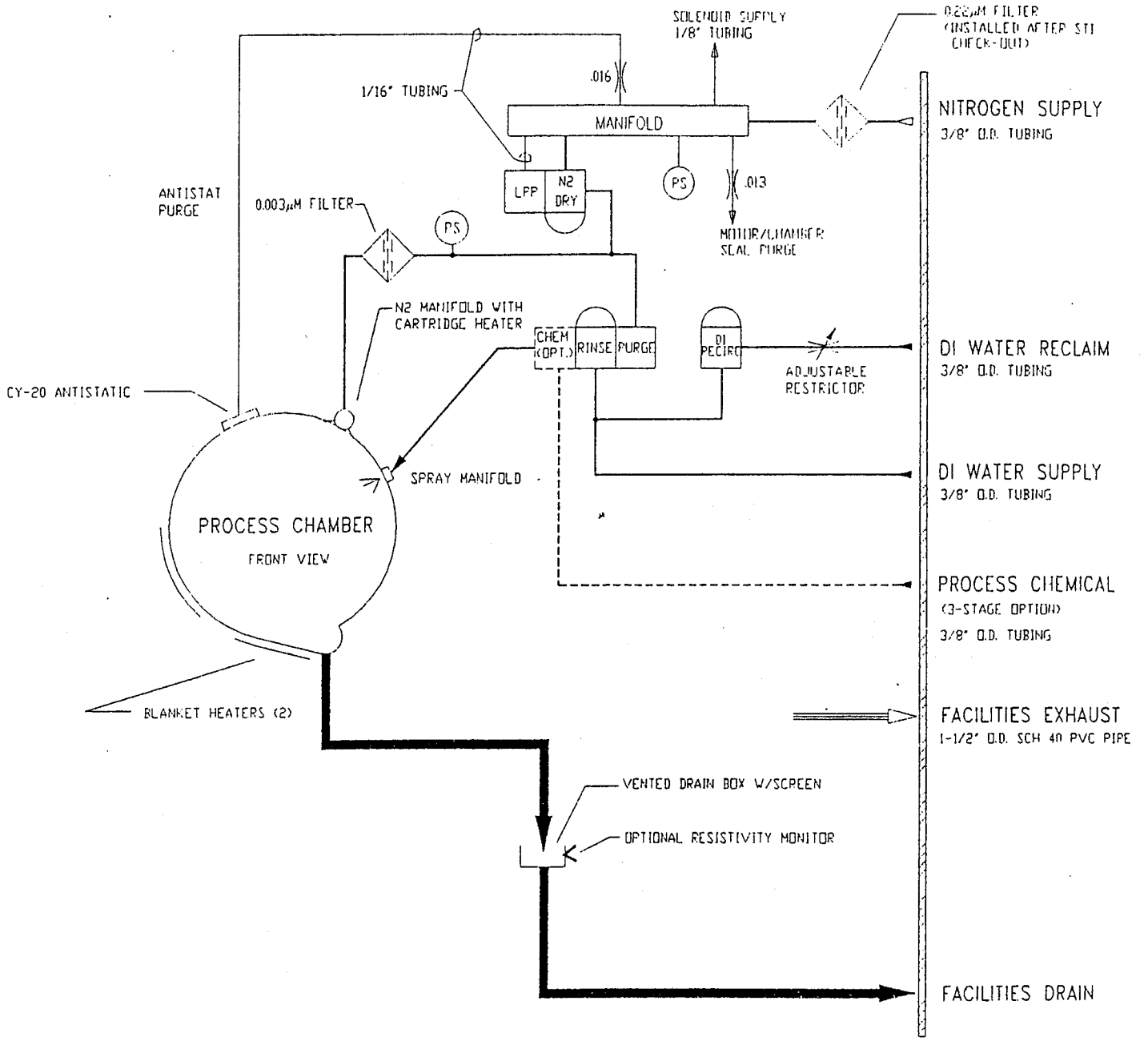
Electrical Drawing List

Electrical Schematics

LEGEND OF SYMBOLS

SEMITOOL FLUID FLOW SCHEMATICS

SYMBOL	DESCRIPTION	PURPOSE
	Directional Flow – Gas	
	Directional Flow – Liquid	
	Pressure Regulator	Reduce and control pressure of a gas or liquid.
	Pressure Gauge	Visual indication of line pressure.
	Pressure Switch	Provide electrical signal of pressure change past setpoint.
	Check Valve	Allow flow in one direction only.
	Pressure Relief Valve	Limit line pressure to a maximum preset value.
	Inline Filter	Filtration of chemical, DI water, or nitrogen.
	Inline Heater	Typical N2 heater.
	Heater	Chemical or DI tank heater: immerion or external.
	Restricted Orifice – Fixed	Reduce pressure/volume to a fixed level.
	Restricted Orifice – Adjustable	Mechanical adjust flow rate for chem, DI recirc line, etc.
	Semitool Pneumatic Valve	Supply, drain, or diverter functions for liquids or gases.
	Slow-acting Pneumatic Valve	Delayed open/close for liquids or gases.
	2-Way Manual Ball Valve or	Used to drain tanks, filters, or provide manual shutoff. Angle pattern of above.
	3-Way Manual Ball Valve	Used to select one of two paths of fluid flow.
	Pump (Pneumatic or Electric)	Chemical delivery to process chamber.
	Metering Pump	Controlled pumping for mixing chemicals.
	Sensor (Switch Type)	Liquid level indicator on tanks, vessels, fluid lines, flowmeters, etc.
	Flowmeter (Rotameter)	Indicate visual rate of flow in liquid or gas line.
	Flowsensor (Turbine type)	Provides analog input of flow rate to controller.
	Parallel-Plumbed Valve	One electric solenoid controls more than one pneumatic valve, in parallel operation (all open/all close).
	Cross-Plumbed Valve	One solenoid operates more than one pneumatic valve, in opposing operation (one opens, other closes).



NOTES:

1) All tubing is 3/8" O.D. unless otherwise noted.
2) Valves are normally closed, except WATER RECIRC is normally open.
3) RECIRC is open when RINSE is closed. RECIRC closes when RINSE opens.
4) This symbol represents a slow-acting valve.

SOLENOIDS

N2 SUPPLY
1/8" I.D. TUBING

CHAMBER DI WATER RINSE	RINSE
N2 PURGE OF SPRAY MANIFOLDS	PURGE
N2 DRY	N2
LOW PRESSURE BOWL PURGE	LPP
ROTOR STOP POSITIONER	RSP
INFLATE DOOR SEAL	DOOR SEAL
3-STAGE OPTION -- SPRAY PROCESS CHEMICAL	CHEM
AUTO SWING DOOR ONLY — CLOSE DOOR	DOOR CLOSE
AUTO SWING DOOR ONLY — OPEN DOOR	DOOR OPEN
VERTICAL AUTODOOR OPTION ONLY — MOVE DOOR IN	DOOR IN
VERTICAL AUTODOOR OPTION ONLY — MOVE DOOR OUT	DOOR OUT

OPTIONS:

1) 3-STAGE (PROCESS)
2) VERTICAL AUTODOOR
3) AUTO SWING DOOR

LINE SIZES (O.D.)

- 1/4"
- 3/8"
- 1/2"
- 3/4"

SEMITOOL KALISPELL, MT

FLUID FLOW, RINSER DRYER
240, 260, 270, 280 CHAMBERS
470, 480, 870 CHAMBERS

BY	DATE	DRAWING NUMBER:	REV
DRAWN: R. ENGLISHBEE	6-23-94		
EDIT		SPEC NO.	SHEET 1 OF 1
APPROVED:			

Date: 4/28/89

UNDERSTANDING THE SEMITOOL PORT MAP

The port map can give the technician important troubleshooting information. The port map, flow diagram, and built-in diagnostics are fundamental tools of the service technician. This document is intended to help the technician understand the format of the information presented in the port map.

Below is a sample of a typical port map from a recent tool:

(KEYS TO COLUMN DESCRIPTIONS BELOW:)

A B C		D	E	F G	H	I	J	K
Port Bit	Signal	Port True	Board ID	PCB End	PCBV True	Transition Conn. ID	Pin	DEVICE
INP-1	+24		INP-1	J2 40		INP-1	40	
INP-1	+24V		INP-1	J2 39		INP-1	39	
INP-1	GND		INP-1	J2 2		INP-1	2	
INP-1	GND		INP-1	J2 1		INP-1	1	
INP-1	GND		INP-1	J2 4		INP-1	4	
INP-1	GND		INP-1	J2 3		INP-1	3	
INP-1	+24V		INP-1	J2 37		INP-1	37	
INP-1	+24V		INP-1	J2 38		INP-1	38	
AO 0	START SWITCH IS PRESSED	O	INP-1	J2 6	CV	INP-1	6	OPERATOR SWITCH
AO 1	STOP SWITCH IS PRESSED	O	INP-1	J2 12	CV	INP-1	12	OPERATOR SWITCH
AO 2	ABORT SWITCH IS PRESSED	O	INP-1	J2 5	CV	INP-1	5	OPERATOR SWITCH
AO 3	DOOR SWITCH IS PRESSED	O	INP-1	J2 18	CV	INP-1	18	OPERATOR SWITCH
AO 4	DOOR IS CLOSED	O	INP-1	J2 8	CV	INP-1	8	DOOR SWITCH
AO 5	DOOR IS OPEN	O	INP-1	J2 10	CV	INP-1	10	DOOR SWITCH
AO 6	DOOR IS IN	O	INP-1	J2 16	CV	INP-1	16	DOOR SWITCH
AO 7			INP-1	J2 14		INP-1	14	
A1 O	KEY SWITCH IS IN PROGRAM	O	INP-1	J2 7	CV	INP-1	17	KEY SWITCH

The columns of information are as follows:

A PORT number. Inputs and outputs from the computer are arranged in groups of eight known as "ports". Each port can be selected by the CPU via its unique address. The base address of the card is set via DIP switches on the card. "AO" is the hex address for the first input port in our sample system. Our input cards contain four sequentially numbered ports.

B BIT. Each port consists of eight "bits". Since a device can be hooked up to each bit of a port; our input board port map organizes the inputs in groups of eight. Note that the diagnostic routines also display the inputs in groups of eight. The diagnostic routines (also known as "port display") are entered by setting the key to SERVICE and selecting a menu tree sequence similar to UTILITIES and PORT DISP(lay).

C SIGNAL. This is a description of the function assigned to this port and bit.

D PORT TRUE. This is a description of what the technician will observe in the diagnostic routine when the signal description is met. For example, when the start switch is pressed, the technician should observe a "0" in port AO bit 0 of the diagnostic routine. When the start switch is not pressed, the technician should see a "1" in the diagnostic routine.

We are working our way from the CPU towards the outer world as we work our way from left to right across the port map.

E BOARD ID. This is the identifier showing which board we are talking about.

F PCB (printed circuit board) END. The start switch signal of our example exits from the STD board "INP-1", connector "J2" on pin "6". Page 1 of our port maps generally indicate the relationship between board ID and Semitool part number. In this case the board INP-1 is a Semitool P/N I4830-501, so the technician would refer to drawing I4830 to locate J2 pin 6.

G PCBV TRUE. This gives the technician the voltage reading he would find on the signal in question when the signal description is met. In our example, when the start switch is pressed, the voltage at J2-6 of the input board would be 0 volts. (Pressing the switch grounds the input board signal.) The input board circuit has a pull up resistor to +24V, so if the start is not pressed, the voltage would be +24V.

H TRANSITION CONN. ID. Since signals exit from the STD boards on ribbon cable, it is not particularly convenient to measure voltages at the STD card edge. We use a small board (P/N I4873) which makes the transition from ribbon cable to discrete wires. This ID tells which transition connector the signal goes to.

I PIN. This indicates the pin number of the signal as it enters the transition connector. With input and output boards, we use 40 pin ribbons, connected "1 to 1". However, in other cases such as serial boards, the 40 pin ribbon at the transition connector splits out to four 10-pin connectors at the STD serial board. The technician can easily see the relationship between the connector and pin numbers at the STD board and the transition connector by looking at the port map.

Because the relationship between the ribbon cable pin numbers and the three rows of discrete terminal screws is not obvious to the service technician, we generally mark the screw terminals in the tool by their port and bit IDs (A00 in this example).

J DEVICE. This gives the technician a brief description of what the I/O device is. In the case of our example, it is an operator switch (which would be labeled "START"). The signal may have to pass through connectors on its way to the final device.

Most of our drawing sets include a block diagram which shows typical wiring for inputs and outputs. In cases (such as our example) where there is nothing else in the circuit, the typical wiring example and port map give the technician the information he needs to troubleshoot the tool. Consequently, the information will not be repeated in expanded schematic form on the wiring diagram. However, if a signal terminates in more than one device or it connects to something other than a switch, lamp, solenoid, etc., the technician should check the wiring diagram for details of the circuit.

The format of the other sections of the port map is similar to that of the example. However, the additional comments below may be helpful.

1) OUTPUT BOARDS. A typical output example follows:

BO 4 DEL COLD DI TO SPRAY MANF. 1 1 OUT-1 J2 6 OV OUT-1 6 SOLENOID

Using the same interpretation used for the inputs, we conclude that writing a "1" to port BO4 will cause the controller to DEL(iver) COLD DI to SPRAY MAN(ifold)1. While we are delivering DI, we will find that the voltage at J2-6 of the output board is O volts. This will energize the appropriate solenoid. The other side of the solenoid is connected to the +24 V power supply. While port BO4 is a "0", we will not energize the solenoid. Since our output boards use open collector transistors the voltage at J2-6 of the output board should measure +24 volts. (The solenoid acts as a pull up.)

2) DOOR NOMENCLATURE. We use MOVE DOOR CLOSED, MOVE DOOR OPEN, MOVE DOOR IN, and MOVE DOOR OUT as descriptions for some of our autodoor outputs. Most (but not all) of our door designs open by moving the door OUT (away from the chamber) then down (OPEN). They close by moving CLOSED, then IN to seal the chamber. However, some doors open by moving up or swinging to left or right.

3) NORMALLY OPEN DRAIN. To reduce the chance of a leak backing up in the chamber, Semitools are usually designed so that one of the drains is open at all times. The normally open drain is different from the others mechanically, pneumatically, and electrically. For example, this drain might be named "CLOSE CHEM 2 DRAIN" (N.O.) to highlight that it is normally open. The spring in the drain should cause this drain to be open when air and power are turned off. When CDA is turned on, the pneumatic plumbing should be such that the valve is piloted to remain open. When power is applied to the tool, again the valve should stay open. When the output solenoid is energized, the valve closes

4) MOTOR BOARDS. The ports of the motor boards are shown in the same format as the input and output boards. However, with this board, the ports for "ROTOR TACH INPUT" and "ROTOR DRIVE OUTPUT" are associated with counters and timers on the board. These are AC signals when the rotor is turning, so a "-" is shown in the PORT TRUE field.

5) SERIAL BOARDS. A typical serial board example follows:

E8	SER-1 Gnd	SER-1 J3 1	SER-1	11	
E8	N/C	SER-1 J3 2	SER-1	12	
E8	(Channel 1 RS422 RX-)	SER-1 J3 3	SER-1	13	
E8	N/C	SER-1 J3 4	SER-1	14	
E8	SER- Gnd	SER-1 J3 5	SER-1	15	SER-1 DB25-7
E8	(Channel 1 RS422 TX-)	SER-1 J3 6	SER-1	16	
E8	N/C	SER-1 J3 7	SER-1	17	(SECS HOST)
E8	N/C	SER-1 J3 8	SER-1	18	
E8	Channel 1 RS232 RX	SER-1 J3 9	SER-1	19	SER-1 DB25-3
E8	Channel 1 RS232 TX	SER-1 J3 10	SER-1	20	SER-1 DB25-2

In the example serial channel, the Semitool serial board will transmit on pin J3-10, which connects to pin 2 of the 25 pin "D" connector on the back of the Semitool. This line would go through external cables to eventually connect to the receive line of the SECS host computer. We expect the transmit line of the SECS host to come in on pin 3 of the Semitool rear panel connector. This signal would connect to J3-9 of the serial board, our receive pin. The rear panel 25 pin "D" connector should be labelled "SERIAL 1". The transition connector terminal which connects to J3-9 would be marked "1RX" (channel 1 receive and J3-10 would be marked "1TX".

Many personal computers will require a "crossover" cable (pin 2 of each end connects to 3 of the other) between the Semitool and PC serial plug. We sometimes show examples of how to pin out the interconnecting cable at the bottom of the serial board page of port map.

Note that the serial board has provisions for both RS232 level signals (+/-12V) and RS422 level signals (+5V and OV), selected by shorting jumpers on the serial board. Our example uses RS232 signals. Consequently there is no connection to J3-3 or J3-6. The port map shows the RS422 functions that are assigned to these pins in parentheses.

6) A/D BOARD. A typical port map example follows:

Port Bit	Signal	Port True	Board ID	PCB End	DEVICE	
	GROUP 0, THERMOCOUPLES		STI P/N 14148			
						PIN
7 6 4	GROUP 0 ADDRESS		A/D	PO-1	TC BOARD	P1-1
7 4 0	GROUP 0 DATA		A/D	PO-2	TC BOARD	P1-2
7 5 0	GROUP 0 I/O CLOCK		A/D	PO-3	TC BOARD	P1-3
7 2 0	GROUP 0 CTRL 2		A/D	PO-4	TC BOARD	P1-4
7 6 0	GROUP 0 CS		A/D	PO-5	TC BOARD	P1-5
7 2 1	GROUP 0 CTRL 1		A/D	PO-6	TC BOARD	P1-6
	GROUP 0 +12V		A/D	PO-7	TC BOARD	P1-7
7 2 2	GROUP 0 CTRL 0		A/D	PO-8	TC BOARD	P1-8
	GROUP 0 GND		A/D	PO-9	TC BOARD	P1-9
7 2 3	GROUP 0 CTRL 3		A/D	PO-10	TC BOARD	P1-10
			STI BOARD P/N 14885	TBI PIN		
	GROUP 0 CHANNEL 0			1	TANK 1	WHITE TC +
				2	TANK 1	RED TC-
	GROUP 0 CHANNEL 1			3	TANK 2	WHITE TC+
				4	TANK 2	RED TC-

The RAM/Analog control board has a combination of input and output ports which are used to control external analog modules. The board is organized into four groups to allow control of four sets of thermocouples, resistivity monitors, etc. The upper section of the port map (ADDRESS, DATA, I/O CLOCK etc.) shows the control signal connections between the STD A/D board and the thermocouple module (P/N I4885). For example, ADDRESS is a control signal used to select the desired channel of the thermocouple module. It would exit the STD card (I4889) via PO pin 1 and enter the thermocouple module (I4885) via P1-1. The lower section shows the thermocouple connections and channel assignments on the thermocouple module. Since the A/D converters cannot be operated manually by the technician, the ports and bits (such as port 76 bit 4) are not shown on the port display. The data from the A/D converters is available to the technician in a separate A/D diagnostic screen.

****

PORT/BIT MAP FOR PSC-101
RINSER DRYER

****

ADDRESS	FUNCTION
00-1FH	DISPLAY DIGIT DRIVERS
20-3FH	DISPLAY SEGMENT DRIVERS
20-3FH	MULTIPLEXED INPUT SWITCHES
40-5FH	OUTPUT SOLENOID AND RELAY DRIVERS
60-7FH	RETROFIT INPUT AND OUTPUT RELAYS
80-9FH	SERIAL COMMUNICATION (RS232)
C0-DFH	TACH AND MOTOR DRIVE

MULTIPLEXED INPUTS

PORT BIT		PORT TRUE	CONNECTOR PIN	CONNECTS TO
20 0 0	PROGRAM LEFT SW.	0	J1-5	N.O. SWITCH (MOM.)
20 0 1	PROGRAM RIGHT SW.	0	J1-6	N.O. SWITCH (MOM.)
20 0 2	PROGRAM LESS SW.	0	J1-8	N.O. SWITCH (MOM.)
20 0 3	PROGRAM MORE SW.	0	J1-7	N.O. SWITCH (MOM.)
20 0 4	SW. IS IN PROGRAM	0	J1-3	N.O. SWITCH (MOM.)
20 0 5			J1-4	
20 0 6			J1-9	
20 0 7			J1-10	
20 1 0	START SWITCH	0	J2-31	N.O. SWITCH (MOM.)
20 1 1	STOP SWITCH	0	J2-32	N.O. SWITCH (MOM.)
20 1 2	DOOR TOGGLE SWITCH	0	J2-29	N.O. SWITCH (MOM.)
20 1 3	DOOR SAFETY SWITCH	0	J2-25	N.O. SWITCH (MOM.)
20 1 4			J2-27	
20 1 5	MOTOR IS NOT OVERTEMP	0	J2-28	
20 1 6	VIB. IS NOT EXCESSIVE	0	J2-30	N.O. RELAY CONTACT**
20 1 7			J2-35	
20 2 0	N2 PRESSURE IS GOOD	0	J2-42	N.O. PRESSURE SWITCH
20 2 1	BOWL IS COLD	0	J2-39	N.C. THERMAL SWITCH
20 2 2	(DOOR IS CLSD [2,3]*)	0 ***	J2-40	N.O. MAGNETIC SWITCH
20 2 3	(DOOR IS OPEN [2,3]*)	0 ***	J2-37	N.O. MAGNETIC SWITCH
20 2 4	DOOR IS IN [1,3]*	0 ***	J2-38	N.O. MAGNETIC SWITCH
20 2 5	DI FLOW IS OK	0	J2-26	N.O. FLOW SWITCH
20 2 6	N2 FLOW IS ABOVE LOW	0	J2-34	N.O. FLOW SWITCH
20 2 7		0	J2-36	
20 3	SEE PAGE 3			
20 4	SEE PAGE 3			
20 5	SPARE OPTO INPUT	X	N/C	OPTO ISOLATOR
20 6	TIMER TIMEOUT	X	N/C	
20 7	CLEAR MEMORY	0	N/C	N.O. SWITCH (MOM.)

*** SWITCH CLOSURES WILL MULTIPLEX A LOW VOLTAGE ONTO THE 8255 INPUTS WHICH THE DIAGNOSTIC ROUTINE DISPLAYS AS A "0".

* (1) = USED IN MANUAL DOOR DESIGN
* (2) = USED IN TWO SENSOR AUTODOOR DESIGN
* (3) = USED IN THREE SENSOR STANDARD AUTODOOR DESIGN

** SENSOR HOLDS N.O. CONTACTS CLOSED UNLESS EXCESSIVE VIBRATION IS PRESENT.

MULTIPLEXED INPUT DIPSWITCHES

Port BIT S.S.	SIGNAL	PORT TRUE	PCBV TRUE	CONNECTOR PIN	CONNECTS TO
20 3 0		1	5VOLTS	N/C	SWITCH #1-8
20 3 1	EN STEP ADVANCE/HOLD	1	5VOLTS	N/C	SWITCH #1-7
20 3 2	EN PARAMETER CLEAR	1	5VOLTS	N/C	SWITCH #1-6
20 3 3	ENABLE PROGRAM MODE	1	5VOLTS	N/C	SWITCH #1-5
20 3 4	ENABLE SERVICE MODE	1	5VOLTS	N/C	SWITCH #1-4
20 3 5	BAUD RATE SEL. 0	1	5VOLTS	N/C	SWITCH #1-3
20 3 6	BAUD RATE SEL. 1	1	5VOLTS	N/C	SWITCH #1-2
20 3 7	BAUD RATE SEL. 2	1	5VOLTS	N/C	SWITCH #1-1
20 4 0		1	5VOLTS	N/C	SWITCH #2-8
20 4 1		1	5VOLTS	N/C	SWITCH #2-7
20 4 2		1	5VOLTS	N/C	SWITCH #2-6
20 4 3		1	5VOLTS	N/C	SWITCH #2-5
20 4 4		1	5VOLTS	N/C	SWITCH #2-4
20 4 5		1	5VOLTS	N/C	SWITCH #2-3
20 4 6		1	5VOLTS	N/C	SWITCH #2-2
20 4 7		1	5VOLTS	N/C	SWITCH #2-1
60 0	START	0	120VAC	P7-1	OPERATOR SWITCH
60 1		0		P7-5	
60 2	STOP	0	120VAC	P7-2	OPERATOR SWITCH
60 3	RESISTIVITY REACHED	0	120VAC	P3-10	TC-40 MONITOR
60 4	N2 PRESSURE IS GOOD	0	120VAC	P7-3	PRESSURE SWITCH
60 5		0		P7-6	
60 6		0		P7-4	
60 7		0		P7-7	

SERIAL PORT RS232

80	RS232 CHANNEL		
	RX		J10-3
	TX		J10-2
	GROUND		J10-7

TACH AND MOTOR PORT

C0	TACH COUNTER INPUT	J2-2
C2	MOTOR DRIVE OUTPUT	

A DIPSWITCH CLOSURE IS READ AS A "1" AT THE INPUT PORT.

Port Bit	SIGNAL	PORT TRUE	PCBV TRUE	CONNECTOR PIN	CONNECTS TO
40 0	(CHEM)	1	0VOLTS	J2-10	SOLENOID
40 1	INFLATE DOOR SEAL	1	0VOLTS	J2-9	SOLENOID
40 2	PURGE MANIFOLD	1	0VOLTS	J2-12	SOLENOID
40 3	EXTEND RSP	1	0VOLTS	J2-11	SOLENOID
40 4	SRD IS IN PROCESS	1	0VOLTS	J2-7	GREEN LAMP IN SW.
40 5	LOW PRESS N2 PURGE	1	0VOLTS	J2-14	SOLENOID
40 6	ENABLE RINSE VALVE	1	0VOLTS	J2-13	SOLENOID
40 7	ENABLE DRY VALVE	1	0VOLTS	J2-16	SOLENOID
41 0	BL MOTOR START/STOP	1	0VOLTS	J9-4	AUTOMOTION MOTOR C.
41 1	BL MOTOR BRAKE RELEASE	1	0VOLTS	J9-5	AUTOMOTION MOTOR C.
41 2	(MOVE DOOR OPEN) *	1	0VOLTS	J2-20	SOLENOID
41 3	(MOVE DOOR CLOSED) *	1	0VOLTS	J2-19	SOLENOID
41 4	(MOVE DOOR OUT) **	1	0VOLTS	J2-21	SOLENOID
41 5	(MOVE DOOR IN) **	1	0VOLTS	J2-22	SOLENOID
41 6		1	0VOLTS	J2-17	
41 7	BL MOTOR REVERSE	1	0VOLTS	J9-6	AUTOMOTION MOTOR C.
42 0					
42 1	A/D DATA (INPUT)	-	SERIAL DATA		A/D CONVERTER
42 2	ROTOR IS UPRIGHT(INPUT)	0	0VOLTS	J2-1	OPTO SENSOR ON MOTOR
42 3					
42 4	ENABLE ROTOR MOTOR CR17	1	0V-90VDC	P3-1	MOTOR A+
42 5	ENABLE N2 HEATER CR18	1	120VAC	P3-4	N2 CARTRIDGE HEATER
42 6	ENABLE BOWL HEATER CR19	1	120VAC	P3-5	BLANKET HEATER
42 7	ENABLE ANTISTAT CR20	1	120VAC	P3-6	ANTISTATIC DEVICE
61 0	ENABLE PROCESS LAMP	1	0VOLTS	P7-8	SIGNAL TOWER LAMP
61 1	ENABLE UNLOAD LAMP	1	0VOLTS	P7-17	SIGNAL TOWER LAMP
61 2	ENABLE READY LAMP	1	0VOLTS	P7-16	SIGNAL TOWER LAMP
61 3	ENABLE ALARM LAMP	1	0VOLTS	P7-15	SIGNAL TOWER LAMP
61 4		1	0VOLTS	J2-47	
61 5		1	0VOLTS	J2-48	
61 6		1	0VOLTS	J2-49	
61 7		1	0VOLTS	J2-50	

NOTE: * INDICATES THAT THESE TWO BITS ARE USED WITH SWING DOOR (SR DOOR).
** INDICATES THAT TWO ADDITIONAL BITS BESIDES * ARE USED FOR AUTODOOR.

REVISION HISTORY FOR PSC-101

DATE	CHANGES
3/1/90	ADD MOTOR OVERTEMP INPUT BIT 20 1 5. CHANGED BIT 20 2 1 NAME. WAS "BOWL IS AT TEMP = 1"
9/14/90	ADD SIGNAL TOWER OPTION USING BITS 61-0, 61-1, 61-2, 61-3 TO ENABLE THE FOUR LAMPS. ADD DOOR SAFETY SWITCH.
1/30/91	REMOVED "AUTOLOAD SWITCH" FROM BIT 20 1 4, ADDED "VIBRATION IS NOT EXCESSIVE" AT BIT 20 1 6.
8/27/93	ADDED N2 FLOW IS ABOVE LOW BIT.

PSC-101 Electrical Drawing List
Brushed Motor
Dwg Set (101-1

Drawing Number	Rev	Description
16017	H	PSC-101 WIRING SCHEMATIC (110V BRUSHED MOTOR)
16709	AC	PSC-101 MAIN LOGIC BOARD, ASSEMBLY
16012	M	PSC-101 MAIN LOGIC BOARD, SCHEMATIC
16707	C	PSC-101 DISPLAY BOARD, ASSEMBLY
16011		PSC-101 DISPLAY BOARD, SCHEMATIC
16710	J	+24VDC AND DUAL +5VDC POWER SUPPLY, ASSEMBLY
16013	C	+24VDC AND DUAL +5VDC POWER SUPPLY, SCHEMATIC
16730	I	OPTICAL SWITCH MOUNTING BOARD
AUTODOOR OPTION		
16725	A	PSC-101 OPERATOR CONTROL PANEL (REMOTE)
SIGNAL TOWER OPTION		
16739	B	SIGNAL TOWER INTERFACE, ASSEMBLY
16055	I	SIGNAL TOWER INTERFACE BOX, SCHEMATIC
EPO OPTION		
16020	E	SRD EPO WIRING DIAGRAM
EA-10 END ALARM OPTION		
16064	B	EA-10 SRD END ALARM WIRING DIAGRAM
OPTICAL LEAK DETECTOR OPTION		
16755		+24VDC LEAK DETECTOR ASSEMBLY & SCHEMATIC
23735		PSC-101 RM-20 CABLE ASSEMBLY
24009		PSC-101/PSC-102 BLOCK DIAGRAM

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