Allwin21 Corporation

GaSonics AURA 1000 Stripper
with
Allwin21
AW1008 Upgrade Kit

Operator's Manual

Allwin21 Corporation
220 Cochrane Circle, Morgan Hill, CA 95037

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GASONICS AURA 1000
AUTOMATED STRIPPER SYSTEM
WITH
ALLWIN21
AW1008 UPGRADE KIT

OPERATOR'S MANUAL

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Morgan Hill, California, 95037

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Field service support and parts are available from Allwin21 Corporation. The office is open Monday through Friday, 9:00 a.m. to 5:00 p.m., Pacific Time.

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PREFACE

INTENDED AUDIENCE

This manual has been written for technicians and process development engineers working with the Allwin21 System. It provides an overview of the system and its operation, as well as specific operating instructions. It also includes minor service and some troubleshooting procedures.

MANUAL CONVENTIONS

MENUS, BUTTONS, COMMANDS AND MODES

The following font conventions are used in this manual.

Bold
Software screen selections are represented in **bold** type.

Italic
Screen names are shown in *italic* type.

First Letter Capitalized
Operating modes are shown in normal type with the first letter capitalized.

For example:
"Select **Recipe** from the *Main Menu* screen to enter the Recipe Programming mode."

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1. INTRODUCTION

1.1 SYSTEM OVERVIEW

The GaSonics AURA 1000 Stripper System with the Allwin21 Upgrade Kit (Allwin21 System) has been designed to be customer-installed and maintained. The Allwin21 System is a PC controlled photoresist stripping system. It strips the front and back surfaces of a single wafer for short periods of time.

The Allwin21 System is a fully automated, cassette-to-cassette, single-wafer processing system.

The Allwin21 System generates plasma of oxygen and/or other gasses in a reaction chamber. This concentrated reactive mixture then flows downstream, reaching a state of electrical neutrality. Although highly reactive, it is no longer electrically damaging to the wafer. The mixture then enters the process chamber, where the dissociated oxygen reacts with the photoresist and oxidizes the photoresist from the wafer.

The main component of the plasma reaction is atomic oxygen (normal oxygen consists of two, atoms, while atomic oxygen consists of only one).

1.1.1 SYSTEM DESCRIPTION

The system is controlled by a Pentium class PC computer running the AW-ASH control software, and interacts with the user through a touch screen display.

The system has two modules: The main unit contains the processing chamber, controller, RF generator, and wafer handling system. The second unit contains the vacuum pump.

Allwin21 provides, as an option, the above two modules as an integrated system. The vacuum pump is available from Allwin21 as a separate option.

The RF power used in the process is supplied by the RF generator. The process gasses used in the system are metered through mass flow controllers calibrated for nitrogen (N_2). A correction factor is entered into the control software to compensate for the different masses of gasses. A connection is provided for a vacuum pump for evacuating the system to the operating pressure.

The computer permits the user to operate the machine manually or automatically through a recipe programmable by the user.

The equipment transfers photoresist-coated wafers from a send cassette on a platform to the process chamber for stripping (ashing) photoresist, and then transfers them to a receive cassette after processing and cooling.

1.2 SYSTEM FEATURES

- Single wafer processing
- One-to-four process gas MFC's
- 4", 5", and 6" wafer capability
- Programmable process recipe control
- Automatic wafer loader/unloader
- Infrared heat source for process temperature control.
- Downstream processing: No wafer radiation damage.
- Soft-start vacuum system.
- Equipped with hard-wired safety interlocks to prevent damage to the system or injury to either the product or to personnel.
- Front and backside photoresist removal
- Automatic photo emission type end-point detection
- In-line cassette-to-cassette.
- Compact: 34" W x 36" D x 54" H

1.3 SOFTWARE OVERVIEW

The AW-ASH software is an advanced control software standard on the Allwin21 system. This document provides a general discussion of the function and calibration of the control software.

The control software allows full control and diagnostics of the Allwin21 system. In addition, it allows the creation of recipes for automated control of all aspects of the process.

2. THEORY OF OPERATION

2.1 OPERATION

2.1.1 SYSTEM ELECTRONIC COMPONENTS

The major components consist of the main computer, touch screen display module, interface/interlock board, thermocouple, baratron meter, end point detector (optional), and plasma generator.

2.1.2 MAIN COMPUTER

The main computer is the central control for all Allwin21 functions. The unit sequences all mechanical and pneumatic functions, monitors sensors and the touch screen display, calculates various quantities to derive operational parameters, stores process recipes, and assists with troubleshooting when required.

2.1.3 TOUCH SCREEN DISPLAY

The touch screen display unit functions as the interface with the operator, accepting and displaying data.

The unit is connected directly to the main computer.

2.1.4 INTERFACE / INTERLOCK BOARD

The Interface/Interlock Board is independent of the computer. It interfaces to the main computer and receives and monitors critical function signals from sensors located throughout the machine. All communication between the main computer and the machine passes through this board. Depending on sensor status, the Interface/Interlock Board will allow operations to process as required. If all signals are in a non-alert status, the computer will step through the process normally. If an abnormal condition is detected, operation will be inhibited until the abnormal condition is corrected. In addition, LED indicators, located on the Interlock Board, illuminate to show both the sensor and instantaneous interlock status.

2.1.5 PLASMA GENERATOR

The plasma generator is a part of the reaction chamber. A magnetron provides the microwave energy via a waveguide to the ceramic/quartz reaction chamber, where the plasma is created.

2.1.6 AC POWER DISTRIBUTION

208VAC 3-Phase power enters through a power/control enclosure at the rear of the system. The enclosure contains all circuits utilizing a hazardous potential, including those still active with circuit breakers off. A control transformer powers both the emergency off interlocks and normal on/off functions. A small connector located at the rear of this enclosure allows for connecting the EMO (Emergency Off) interlock serially to as many safety interlock switches as required. Power to the rest of the system is through two terminal strips located under the top clover of the enclosure.

Immediately above the power/control enclosure is a hinged panel, which contains:

- The low voltage switching power supply.
- The magnetron high voltage power supply.
- Filament transformer.
- Five solid-state relays.
- One mechanical relay.
- Thermocouple gauge power supply/amplifier.
- Cabinet ventilation flange.
- Circuit breaker box (located behind the front RF shield).

2.2 INFRARED HEAT SOURCE

Three lamps, located under the process chamber, provide thermal energy to speed difficult processes using baked or implanted resists.

The lamps operate independently of each other, and are controlled by the computer process program.

All three lamps are rated at 1000 watts. All lamps are used to rapidly heat the wafer and maintain the temperature during the stripping process.

2.3 PNEUMATIC/MECHANICAL COMPONENTS

The major pneumatic/mechanical components consist of the vacuum system, mass flow controller(s), pneumatics, wafer handling system, and the plasma generation system.

Pneumatics are enabled only when the computer has determined that the system is in an appropriately safe state.

2.3.1 VACUUM SYSTEM

The process chamber is evacuated in two stages: a soft-start valve opens to gently pull the chamber down to around 20 torr through a manifold around the inside top of the chamber; at 20 torr, the main vacuum valve opens to pull the chamber the rest of the way down to process pressures. This two-stage evacuation prevents any particles that may remain in the chamber from a previous process from being stirred up by the turbulence of a rapid application of vacuum.

With the main vacuum valve open, the system is able to maintain operating pressure with gas flows up to 10 LPM.

A baratron meter is used to derive the pressure signals that are displayed on the touch screen and used to monitor the process.

2.3.2 MASS FLOW CONTROLLERS (MFC'S)

MFC's are used to enter process gasses into the plasma chamber. Setpoints for process flows are entered into the recipe during setup, and displayed on the front panel during the process. Both the setpoint and the actual value are available during the process.

2.3.3 PNEUMATIC SYSTEM

Nitrogen or Clean Dry Air (CDA) is used to power the pneumatics system. This includes the bellows valves used in the vacuum system.

The entire pneumatics system is enabled by a solenoid that is under computer control. The solenoid only allows the system to pressurize when conditions are safe. This solenoid also vents the pneumatics system upon power down.

On the robotic wafer handling system, there is also a house-vacuum connection on the rear utility panel that is connected to the wafer handling system to supply the vacuum chuck.

2.3.4 PLASMA SYSTEM

The plasma generation system is based on microwave excitation of oxygen in a quartz or ceramic plasma tube. The process gasses flow into one end of the tube, are turned into a plasma as they pass through, and flow out the other end through an orifice. As this "exhaust" of the plasma process enters the stripping chamber, it is a highly-reactive but electrically inert gas that will not damage the wafer, yet will efficiently strip away even the most heavily-implanted resist that may be placed in its path. To ensure that the entire wafer is stripped evenly, a ceramic distribution plenum (or "showerhead") is located just below the orifice to distribute the gas flow proportionally across the wafer surface.

3. SAFETY PRECAUTIONS

3.1 OVERVIEW

This section provides information intended to prevent damage to the Allwin21 system and injury to operation and maintenance personnel. All hazards are not covered, only those most prevalent and serious. Your full understanding of the capabilities and limitations of this equipment is necessary for safe and efficient operation.

WARNING

Only Allwin21 or qualified personnel should install, start up, operate and/or repair the Allwin21 system. Damage to the system or injury to personnel could result if the preceding actions are carried out by unqualified personnel.

Prior to applying power or starting up the system, follow these safety precautions:

- Check all utilities for proper connections. Connect only those gases specified for use in the system.
- Make sure the cabinet doors and system covers are closed.
- Check the scrubber exhaust to make sure it is properly connected to the facility scrubber. Ensure the facility scrubber is operating properly. Check the gas outlet for any restrictions.

3.2 NOTES, CAUTIONS AND WARNINGS

When operating and maintaining the Allwin21 system, the following safety procedures and precautions must be followed to avoid certain hazards. Observe all warnings and cautions. Their purpose is to protect personnel from injury and long term health hazards and to protect the machine from damage.

Pay special attention to notes, cautions and warnings located in appropriate areas in this manual.

NOTE
Notes provide additional important information which requires special attention.

CAUTION
Cautions alert you to avoid system damage.

WARNING
Warnings are given for personnel safety to prevent bodily harm.

3.3 SAFETY FEATURES

The Allwin21 system incorporates several features to prevent injury either to wafers or personnel.

- There is a watchdog timer on the interface board. This shuts the system down if the communication between the computer and the system is interrupted or the software freezes.
- The RF system is interlocked to prevent their inadvertent operation with the door open.
- All hazardous voltages are removed from readily accessible areas with machine power-off, even if the main circuit breaker is still on.
- Waveguide design eliminates leakage of microwave energy.
- The Emergency Off system can be extended to a customer-specified location, or tied into a master system as desired.
- Pneumatic: The pneumatics is used to operate the Positive Shut-off valves and the chamber door. If there is no air pressure, the shut-off valves will close. If the power is removed from the Allwin21 system, then the pneumatic gas valves close automatically.

3.4 GAS HANDLING

Be aware of the following cautions when working with gases in the Allwin21 system:

- Only use gases that have been specified for use in the Allwin21 system. Typically these include 02, CF_4, N_2.

CAUTION

Allwin21 Corp. is not liable for the use of gases not recommended by the factory.

- Make sure the specified gases are connected to the proper inlets on the rear panel.

WARNING

Failure to properly connect the gas lines may result in dangerous gas mixture that could cause harm to personnel and/or the system.

WARNING

There will be no chemical exposures during normal routine maintenance. However, if the need arises that a gas valve has to be changed, then it is the maintenance person's responsibility to follow all safety procedures for gas exposure.

3.5 HAZARDS

The Allwin21 system presents certain hazards if operated or maintained improperly. These fall into the following categories:

- Electrical shock hazards
- Process gas hazards
- Process byproduct hazards
- Oxygen hazards
- Thermal hazards.

3.5.1 ELECTRICAL SHOCK HAZARDS

The Allwin21 system requires electrical power which is distributed through the machine. Safety interlocks are installed to shut off electrical power to the system when the cover is removed. Only qualified troubleshooting maintenance technicians should be permitted to work on an uncovered Allwin21 system. Allwin21 assumes no liability for injuries or deaths caused by operation with interlocking devices defeated. Caution and safety measures characteristically taken with AC and DC circuitry are imperative.

3.5.2 PROCESS GAS HAZARDS

An Allwin21 system process may use these two process gases: 0_2 or CF_4, depending on user application. 02 is an oxidant and it supports combustion. It must be handled with care.

3.5.3 PROCESS BYPRODUCT HAZARDS

The process byproducts found in the chamber surfaces of the Allwin21 system should be treated as potentially hazardous.

WARNING

Avoid skin, eye, and respiratory contact with process byproducts. Some byproduct chemistries have hazardous characteristics. Failure to avoid skin, eye, and respiratory contact with process byproducts may result in injury or death of personnel.

Due to the variations in chemistry employed to meet application requirements, the exact constituents of effluents from the process family cannot be defined. However, the following general precautions should be observed:

- Solvent-proof neoprene or viton gloves should be worn while maintaining the chamber surfaces and its accessories.

Allwin21 Corp. claims no responsibility for the safety of the byproducts of the Allwin21 system.

3.5.4 OXYGEN HAZARDS

In stripping systems, oxygen (O_2) may be utilized as a process gas, either alone or in conjunction with other gases. A possible EXPLOSIVE condition exists.

Oxygen is an oxidizing agent which accelerates combustion. Contact with flammable materials may cause fire or explosion. Any time there is heat, and if the concentration of oxygen is greater the 21% of the volume, the condition for an explosion exists. It should be noted this potential condition exists anytime oxygen is connected to the system.

Use appropriate procedures when processing with oxygen.

3.5.5 THERMAL HAZARDS

The quartz tray and isolation tube must be allowed to cool down before they are serviced. Allow 20 to 30 minutes for the quartzware to cool before touching. Burns may result if the quartzware is touched before the cooling time elapses.

In addition, use of solvents, such as IPA (isopropyl alcohol) or acetone to clean the chamber, may pose a hazard if used while the quartzware is still hot.

> 🏷 NOTE
>
> **The control system contains two safety shutoffs. The first is a watchdog timer that turns OFF the heating lamps and RF if the control software has been interrupted for more than approximately 2 seconds.**
>
> **The second shutoff shuts down the heating lamps, RF and the MFC's if the measured temperature is above 350°C. These high readings indicate that the thermocouple is broken or disconnected from the Controller board, in which case the interface reads something greater than 350°C.**

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4. POWER-UP & POWER-DOWN

4.1 OVERVIEW

This section describes how to power up and power-down the Allwin21 system. Prior to applying power to the system, a visual inspection of the facilities is required. It is also recommended that you read the list of safety precautions given in the *Safety Precautions* section of this manual.

To complete the following procedures, you must first be familiar with the use of the menu screen to execute and interrupt a cycle in Run mode.

If any irregularities occur during power-up, power down the system and immediately notify the service engineer in charge.

WARNING

Check the system utility connections and sources before switching on the Allwin21 system.

4.2 UTILITIES INSPECTION

Inspect the system utility connections and sources before switching on the Allwin21 system.

Visually inspect the following utilities to make sure connections are secure:

- Electrical power.
- Gas-handling inlets.
- Nitrogen or Clean Dry Air (CDA) inlet for system pneumatics.
- Purge and process vacuum.
- Robot chuck vacuum
- Scrubber Exhaust

Check the Utilities Specifications section in the appendix for proper settings.

If any of the utilities are disconnected or any connections appear to be leaking, correct the problem. Make sure the house scrubber is operating if processing with hazardous gases or processing wafer which outgas.

NOTE
Before applying power to the system, the PC-controller computer must be connected; the purge gas must be turned on.

4.3 FRONT CONTROL PANEL

The controls and indicators used for system operation are located on the front of the Allwin21 system. These controls and indicators are:

- Power ON / OFF buttons
- Alarm Indicator light
- Emergency OFF button

POWER ON / OFF BUTTONS

Normally, system power is turned on and off by two buttons on the front panel of the machine. Press the Power On (red) button to turn system power on.

ALARM INDICATOR LIGHT

This indicator light flashes on and off when the system requires operator attention.

EMERGENCY-OFF BUTTON

The quickest way to shut the entire system down in the event of an emergency is to press the Emergency-OFF (EMO) button. Pressing the EMO immediately interrupts all process chamber, robot, and gas feed activities.

There are two EMOs: one is located on the front panel, the other is located at the rear left of the machine.

4.4 POWER-UP PROCEDURE

The following steps describe the proper power-up sequence for the Allwin21 system.

Step 1. Ensure that the system power input circuit breakers and power switches are set as indicated below:

- The wall circuit breaker(s) for the computer and Allwin21 system are ON.

Step 2. Ensure all gas valves are turned off.

Step 3. Make sure the EMO buttons are reset.

Step 4. Verify there is no restriction to the cabinet exhaust. Verify it is set to the proper flow rate.

Step 5. Turn on the process vacuum pump.

Step 6. Turn ON the POWER switch on the control panel.

WARNING

Do not depress the START pushbutton while hands or face are in any mechanical movement paths of the Allwin21 system.

Step 7. Wait for the computer to boot and the system to initialize. The system *Main Menu* should appear on the monitor screen after initialization. If nothing appears on the monitor screen, check that the monitor is on and all cables are connected properly.

Step 8. Turn on the gas valves. Verify the input pressure is set to the proper pressure.

The Allwin21 system is now ready for operation.

4.5 SYSTEM OPERATION

During system operation, be aware of the following:

- Experimental substrates contain unknown impurities which may outgas during processing.

WARNING

Allwin21 Corp. cannot anticipate the number and variety of materials a user may experiment with, and is not responsible for any potential hazards which may result from wafer outgassing.

4.6 MAINTENANCE

During maintenance operation, observe the following precautions:

- Do not use replacement parts that are not provided or recommended by Allwin21 Corporation.

CAUTION

Allwin21 Corporation is not liable for any damage or injury that may occur when unauthorized parts are used.

- Disconnect power to the system at the main disconnect box before performing any maintenance activity that requires the removal of access covers. Use proper lockout/tagout procedures.

4.7 POWER-DOWN PROCEDURE

The Allwin21 system may be left with power on continuously, unless maintenance to the system requires removing power to the system.

> 🏷 NOTE
>
> **Allwin21 Corp. recommends leaving the computer on when the system is not in use. The system should be turned off for maintenance and service.**

Step 1. Turn off the Allwin21 system by pressing the Power Off button on the front panel.

Step 2. Turn off the machine main power breaker/switch as required.

Step 3. Turn off the process vacuum pump.

Step 4. If any accessories are being used with the system, turn them off as necessary.

5. BASIC OPERATION

5.1 OVERVIEW

The Allwin21 system consists of a reaction chamber, a wafer transport robot, cassette stations, and a computer running the AW-ASH GUI control software. The wafers to be processed are in a cassette and placed on the SEND cassette station. The robot then moves a single wafer into the reaction chamber.

The controller uses a set of operating instructions known as recipes to control the Allwin21 system. These recipes are created by the Process Engineer to monitor and control the parameters of the processing cycle. The Operator then uses the control software to select and run the process parameters (steady state temperature, process time, ramp rates, etc.).

The control software program is also used to create, delete, copy, modify and store the recipes and to execute system diagnostics.

The full control of the Allwin21 system is done through the control software and the front control panel.

To get an understanding of how to operate the Allwin21 system, you must first be familiar with the use of the menu screens to execute and interrupt a cycle in Run mode. This section provides a discussion of the operation of the Allwin21 system. Calibration and diagnostics of the Allwin21 system are discussed in the maintenance section.

5.2 SOFTWARE FEATURES

The system is controlled by menu commands from the control software. This software allows a great deal of flexibility and control of the Allwin21 machine.

The AW-ASH control software features the following:

- Automated calibration of all subsystems from within the control software. This allows faster, easier calibration, leading to enhanced process results.
- Closed-loop temperature control with pyrometer or thermocouple temperature sensing.
- Recipe creation. It features a recipe editor to create and edit recipes to fully automate the processing of wafers inside the Allwin21 system chamber.
- Validation of the recipe so improper control sequences will be revealed.
- Storage of multiple recipes, process data and calibration files so that process and calibration results can be maintained and compared over time.
- Passwords provide security for the system, recipe editing, diagnostics, calibration and setup functions.
- Simple and easy to use menu screens which allow a process cycle to be easily defined and executed.
- Troubleshooting features which allow engineers and service personnel to activate individual subassemblies and functions.
- The control software runs on any Pentium class PC computer with a parallel (printer) port. The computer interfaces to the Allwin21 system with only 1 cable, the control interface cable.
- The interface board inside the machine that translates the computer commands to control the machine has a watchdog timer. If this board looses communication with the control software, it will shut down all processes and halt the system until communication is restored.

USING THE MENU SCREENS

This section is a general description of how to use the controls of the AW-ASH Control Software. It will cover the use of buttons, editable fields, data display fields and filename lists.

Buttons

Buttons are rectangular boxes with a phrase on them describing their function. They may also have a value on them describing its current state. The color of a button is also important. It also defines the current state of the function of the button. The color, however, is defined by the function of the button. Buttons that are gray in color are inactive and cannot be selected.

Clicking on a button changes its state. Thus, the button may change color and the value describing the current state will change.

Editable Fields

Editable Fields are data entry fields where the operator can enter information into the control software.

To edit the field, the operator must first select it by clicking on it. This enables the ability to edit the field. The operator now types in the desired information and presses ENTER when finished. The information now is displayed in the field, replacing what was there previously.

Data Display Fields

Data Display Fields are very similar to Editable Fields, except the operator cannot change the information being displayed in them. They look just like Editable Fields, except they are like a pushbutton that is always down. Also, when the operator clicks on them, nothing happens.

Filename Lists

Filename Lists display a list of filenames or directories pertaining to the type of information the file contains in a List Box. For example, filenames of files which contain recipes are only displayed in Recipe Filename Lists.

The number of filenames the Filename List can display is limited to its size on the screen. However, there may be more filenames for that type of list than can be displayed at one time. The operator can scroll through the list of filenames by using the slider to the right of the list, or using the up and down arrow keys on the keyboard.

A selected filename is highlighted in red. It may be selected by clicking on the name. It is also displayed in the field above the list of filenames. The operator can also select a filename by manually typing in the filename into the field above the list (see Editable Fields above).

A filename can also be deleted. The operator would first select the filename to be deleted. Then the operator would either click on the red box with an 'X' in it (located in the upper right corner of the List Box) or press the **Delete** key on the keyboard.

> NOTE
>
> **Deleting a filename will remove the filename and all information it contains permanently.**

Exit a Screen

Exit the screen by clicking on the 

button or pressing **ESC** on the keyboard.

Many screens allow the user to change the values for parameters, such as the *Recipe Editor* and the *System Setup*. The user needs to save the information before exiting the screen. However, if the user didn't save the information before exiting the screen, a dialog box will appear asking if the information should be saved.

Click **Yes**	(or press **Y** on the keyboard) to save the information.
Click **No**	(or press **N** on the keyboard) to discard all changes since the last save.
Click **Cancel**	(or press **ESC** on the keyboard) to go back to the editing screen and continue editing. It does not save any changes.

5.3 RUNNIG A LOT

The controller uses a set of operating instructions known as recipes to control processing wafers in the Allwin21 system process chamber. These recipes are created by the Process Engineer to control the parameters of the processing cycle. The Engineer will also create a wafer transfer sequence for the recipe to move the wafers to the different stations. The operator then uses the menu-driven control software to select and run the sequence.

The Wafer Transport Module (WTM) moves wafers from the SEND cassette to the process chamber. After the wafer has been processed according to the recipe, it is removed and placed into the RECEIVE cassette.

This section will explain step-by-step how to run a cassette of wafers. This procedure is the same for the *Process for Production* screen (Figure 6.1) and the *Process for Engineer* screen (Figure 6.2). These screens can be accessed by clicking on the appropriate button from the *Main Menu*, 

or 

.

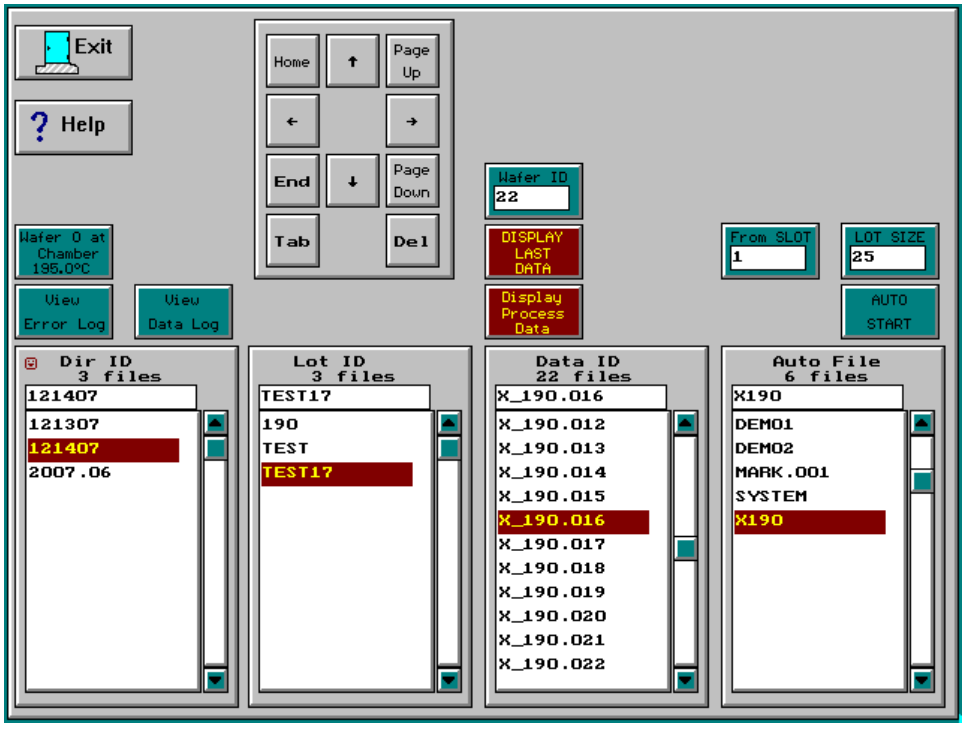

Figure 5.1: Process for Production screen, basic functions

Location: Main Menu ➔ Process for Production

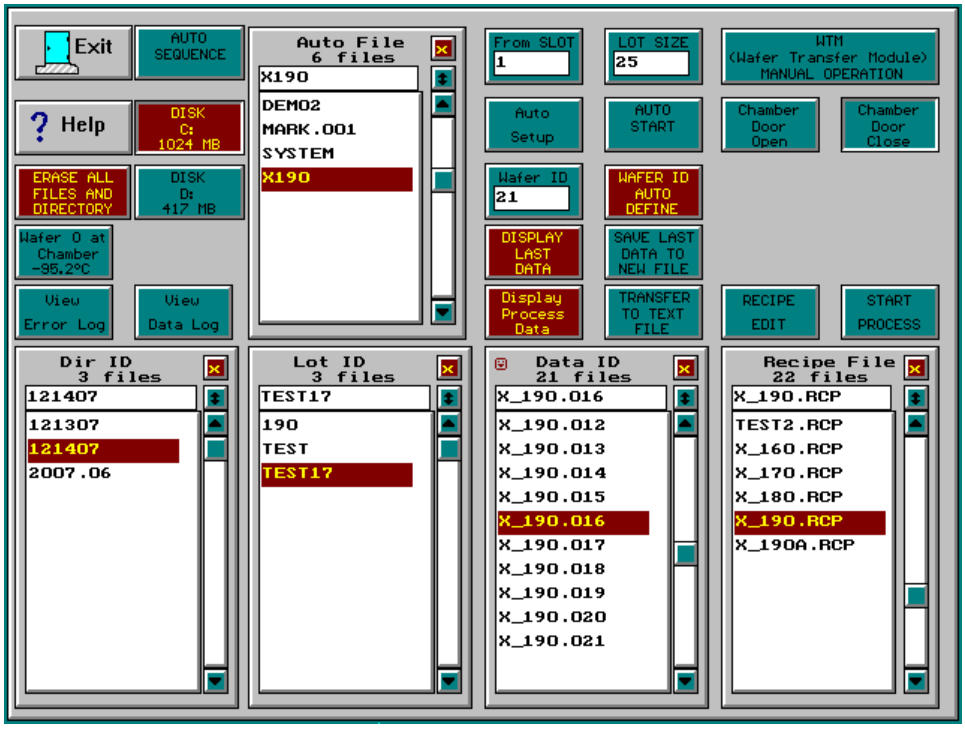

Figure 5.2: Process for Engineer screen

Location: Main Menu ➔ Process for Engineer

STEP 1. **SELECT A SEQUENCE**

The first step for using the control software is to select a sequence. Select a sequence from the list of sequences in the column "Auto File". A sequence name that is at the top of this column and is highlighted means it is selected. Use the slider to the right of the list to display sequences that are not visible in the list window. Click on the sequence to select it.

STEP 2. **SELECT WHERE THE PROCESS DATA WILL BE STORED**

The process data for each wafer are stored on the hard drive after the process ends. The place on the hard drive they will be stored needs to be specified so they can be recalled later without searching through possibly hundreds or thousands of files.

First, select a "Dir ID" from the list of available Directory IDs. Then select a "Lot ID" from the list of Lot IDs.

STEP 3. PLACE THE CASSETTES ON THE MACHINE

Place a cassette with wafers in it on the SEND cassette station and an empty cassette on the RECEIVE cassette station.

The cassette station designated as the Send Cassette Station is defined as the first station in the sequence. Though this is user defined, it is customary to use the left cassette station as the Send Cassette Station.

STEP 4. RUN THE SEQUENCE

To run the selected sequence for a cassette of wafers, click on the **Auto Start** button. This will display the *WTM Manual Operation* screen (Figure 6.3) and then the *Process Monitor* screen (Figure 6.4). When this screen is displayed, the process will begin processing the wafer inside the process chamber according to the selected Recipe.

When the *WTM Manual Operation* screen is shown, the robot will check the chamber and the receive cassette (if **Checking the Receive Cassette** is enabled in the *System Setup screen*) for any wafers.

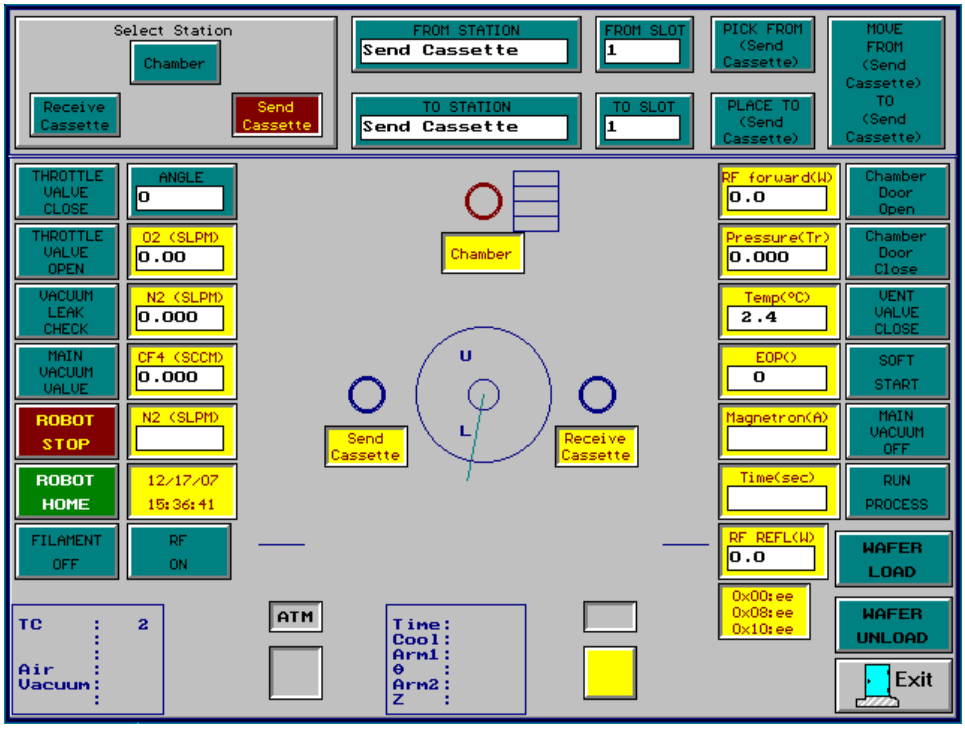

Figure 5.3: WTM Manual Operation

If no wafers are found, then the robot will remove a wafer from slot one of the SEND cassette and place it in the chamber. When the wafer has been placed inside the process chamber, the *Process Monitor* screen will be displayed and the process control will begin processing the wafer according to the selected Recipe. Once the process has ended, the robot will remove the wafer from the chamber and place it into the RECEIVE cassette and pick another wafer for processing, until all the wafers specified in **Lot Size** has been processed.

Process Monitor Screen

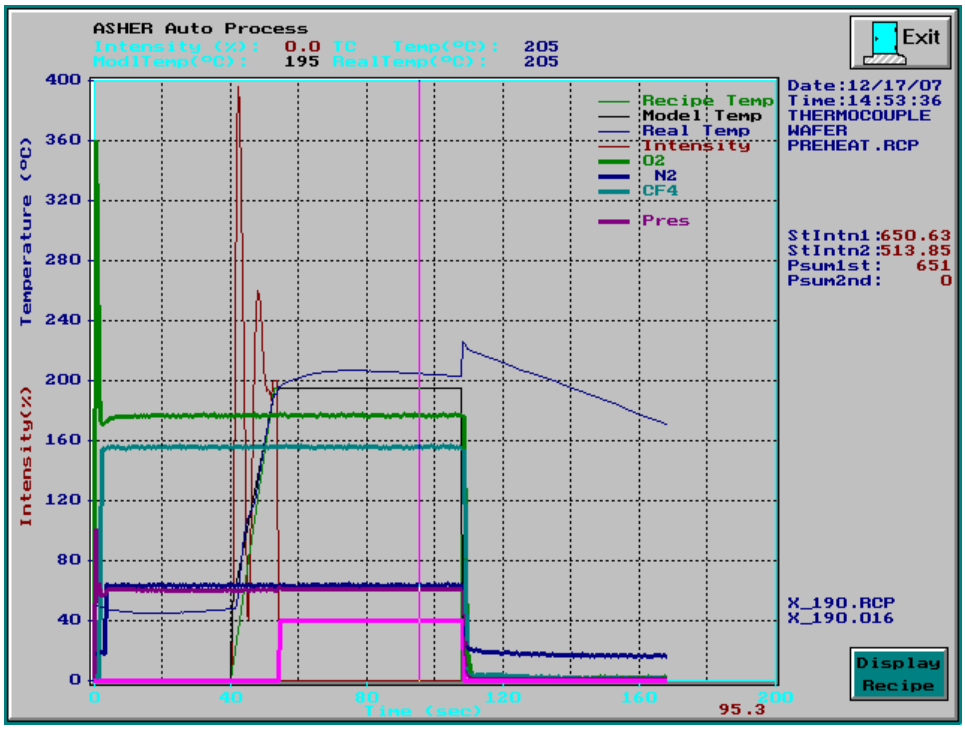

Figure 5.4: Process Monitor screen

The *Process Monitor* screen shows a completed process curve. In this figure, the x-axis indicates the process time and the y-axis indicates the process temperature. There are four curves to display the monitored process:

thin Green	The recipe temperature as defined by the Recipe.
Blue	The real, measured temperature during the wafer process.
Red	The intensity of the lamps.
thick Green	The N_2 flow rate
Purple	The pressure inside the process chamber.

5.4 STOP PROCESS

A process may be interrupted and stopped by pressing the ***ESC*** key on the keyboard or clicking on the ***EXIT*** button. A wafer transfer may be stopped by clicking on the ***STOP*** button.

5.5 REVIEW THE PROCESS DATA

To view the last run process data graphically, click on the **Display Last Data** button. This will display the process data on a screen very similar to the *Process Monitor screen*.

To view process data from previous runs, select the process data to be viewed from the "Data ID" column, and then click on the **Display Process Data** button.

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A. SYSTEM REQUIREMENTS

Flow Rate and Pressure Requirements

Name	Bulkhead Flow	Bulkhead Pressure	Fitting	Comments
02	0-10 SLPM (in use)	20-30 psi	1/4" Male VCR	Gas #1
N2	0-1 SLPM (in use)	20-30 psi	1/4" Male VCR	Gas #2
CF4	0-1 SLPM (in use)	20-30 psi	1/4" Male VCR	Gas #3
Customer Option	0-10 SLPM (in use)	20-30 psi	1/4" Male VCR	Gas #4
N2 Purge	Min 90 SLPM (in use)	19-21 psi	1/4" Male VCR	Purge
N2 or CDA (Air)		80-90 psi	1/4" Male Swagelok	Pneumatics
Vacuum	165 CFM	Pump to system distance: 20 ft. max.	2" NW 50 Flange	Vacuum Pump
Exhaust	250 CFM ≥ (0 - 2000 ft. elev.) 350 CFM ≥ (2000 - 6000 ft. elev.)		6" Flange	Cabinet Exhaust
Vacuum Robot	1.2 CFM CDA	20 inches hg or more	1/4" Male Swagelok	Handling System

Electrical Requirements

Name	Voltage	Current	Frequency	Configuration
Main Power	208 VAC ±5%	25 Amps per phase	60 Hz	3 Phase - Y 3 Hot, 1 Neutral, 1 Ground

B. MANUAL REVISION HISTORY

Date	Description
07/24/09	Initial Release

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