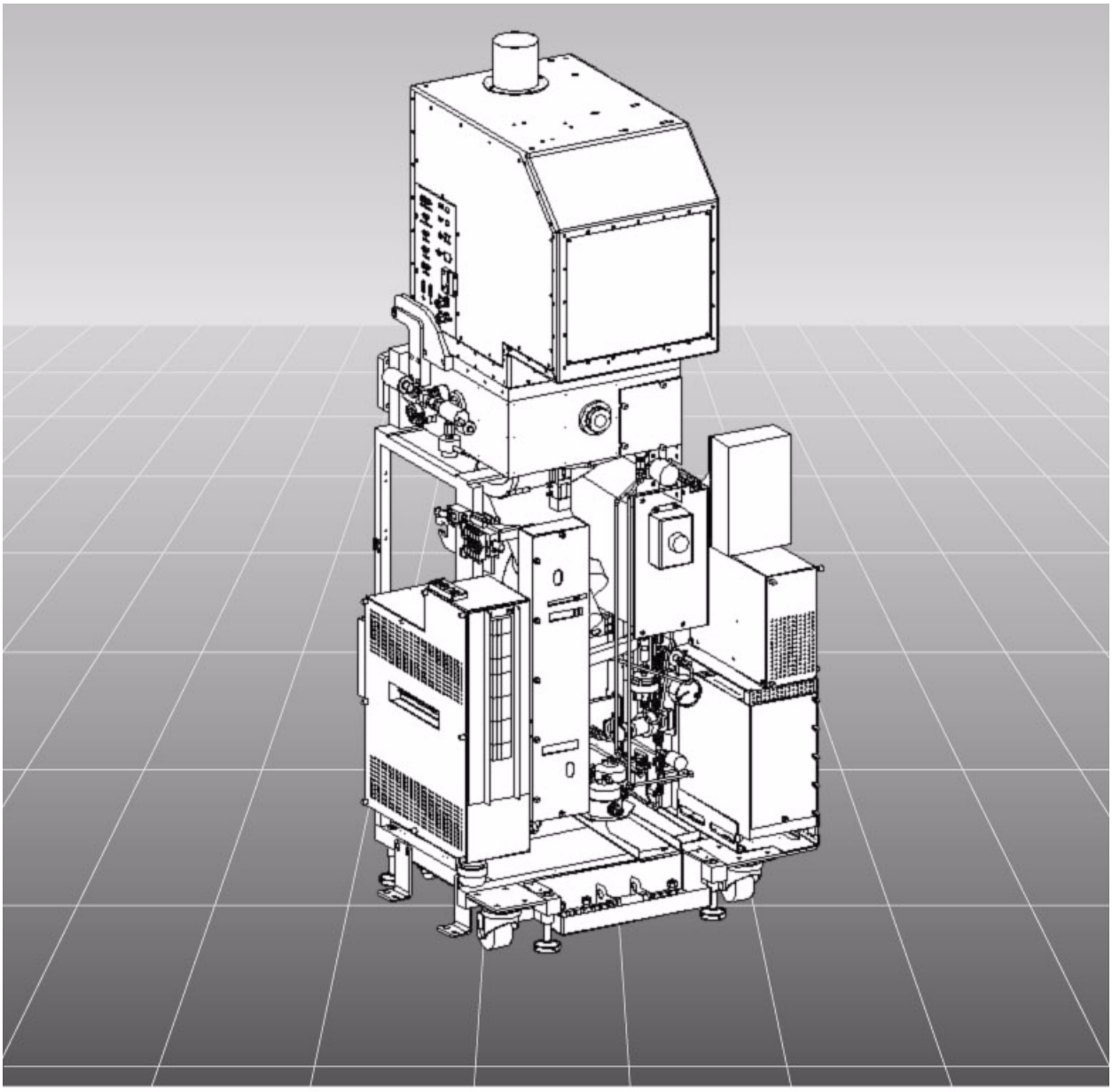
2300™ Microwave Strip Module

Installation Guide



Lam RESEARCH

Revision A

2300™ Microwave Strip Module

Installation Guide

PM BOM Version 571-801736-700

Ship With Integration BOM Version 573-802896-701

2300 Etch Software Version 1.4.2

System Version 2300

Revision A
September 2001

Revision A September 2001—First Printing (ECN Released)

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Part Number: 406-240351-001

Safety Preface

The safety guidelines for the equipment in this manual do not purport to address all the safety issues of the equipment. It is the responsibility of the user to establish appropriate safety, ergonomic, and health practices and determine the applicability of regulatory limitations prior to use. Potential safety hazards are identified in this manual through the use of words Danger, Warning, and Caution, the specific hazard type, and pictorial alert icons.

Hazard Levels

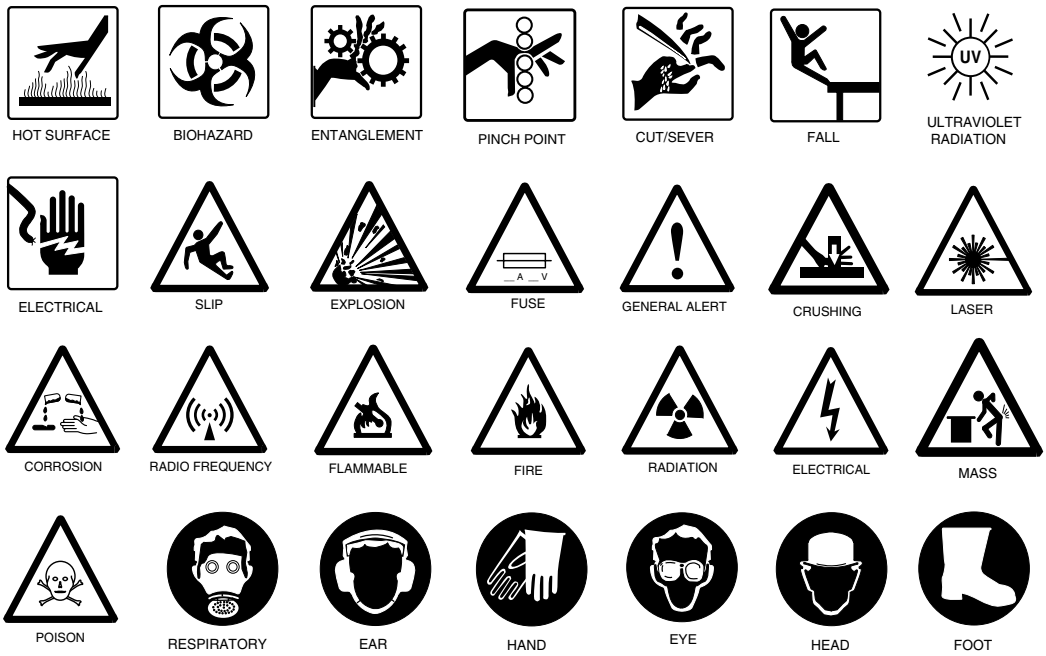
Danger: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This is limited to the most extreme situations.

Warning: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution: Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also alert users against unsafe practices.

Notice: Indicates a statement of company policy (that is, a safety policy or protection of property).

Pictorial Alert Icons



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2300™ Microwave Strip Module

Installation Guide

PM BOM Version 571-801736-700

Ship With Integration BOM Version 573-802896-701

2300 Etch Software Version 1.4.2

System Version 2300

Cleanroom Version

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September 2001

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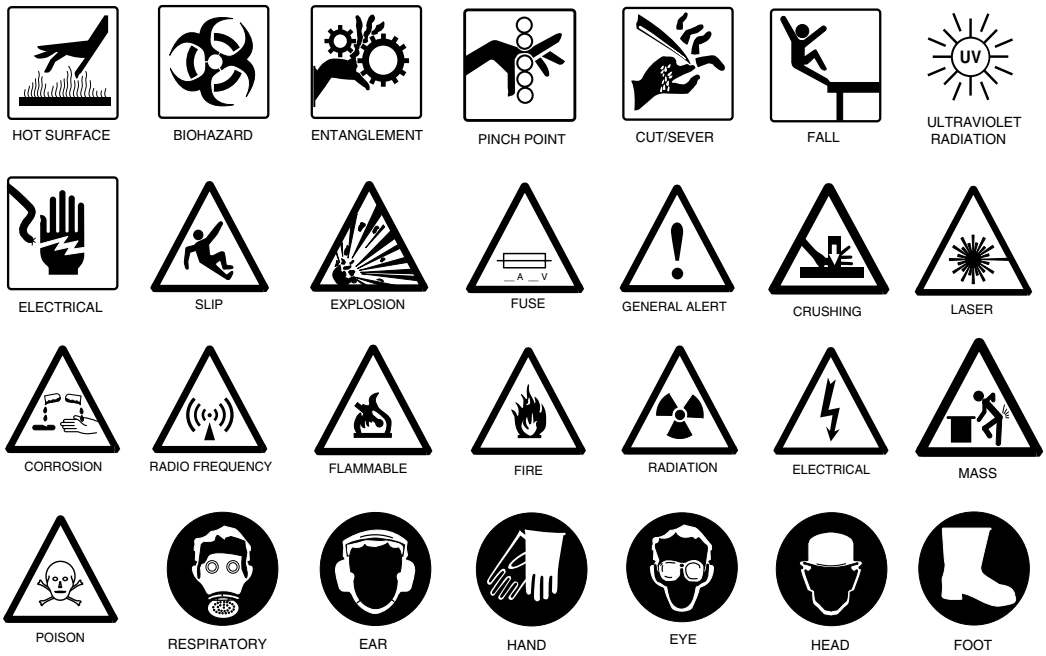

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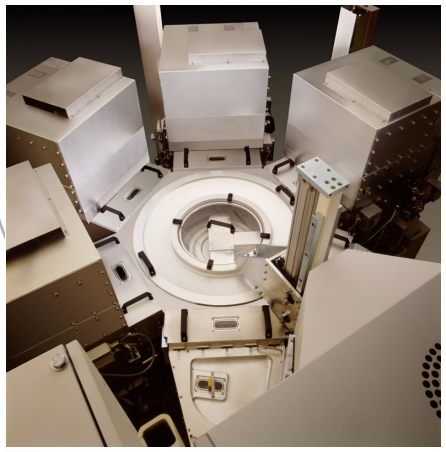
2300™ Etch Series



Lam's new 2300 etch series is the low-risk solution for sub-100 nm volume production on 300 mm substrates. The 2300 suite of products brings Lam's tradition of excellence in etch processing to 300 mm wafers with the 2300 Exelan®, the 2300 Versys™ Silicon and the 2300 Versys™ Metal. The Versys conductor chambers have 200 and 300 mm capability, and all systems for conductor and dielectric films are available in a four chamber configuration. The compact 2300 series design reduces the floorspace for high-volume production while still providing full service access.

The 2300 etch systems also enable wafer fabs to have one platform independent of their technology roadmap. Lam's 2300 etch series of products lowers the risk of transitioning from 200 to 300 mm wafers, of changing from metal etch to dual damascene, and of moving 300 mm volume production from 150 nm to sub-100 nm technology nodes.

Extensive use of modeling during system design has ensured that the best technology has been incorporated into all of the systems, optimizing chamber conductance, thermal characteristics, and plasma uniformity. The 2300 etch series also builds on the production experience of Lam's 200-mm Alliance® etch systems, preserving the production benefits of repeatability, damage-free processing, and process flexibility.

The 2300 Exelan leverages Lam's successful Dual Frequency Confined™ (DFC™) plasma technology currently used on Exelan, Lam's fastest ramping product, to 300 mm processes and next-generation applications. Developed processes include both critical and noncritical etch. DFC technology has become the most successful production-proven technology for oxide copper-damascene applications, and customers are evaluating it for leading-edge, low k, dual damascene. 2300 Exelan provides leading edge solutions, with the industry's best damage performance and the lowest CoO.

Versys conductor etch systems rely on Lam's production-proven Transformer Coupled Plasma™ source to support in situ process solutions for leading edge device structures. Both systems deliver superior performance, have large process windows, and process complex film stacks in situ with a single chamber configuration. Versys Silicon processes metal gate and STI with top corner rounding in situ. Versys Metal provides excellent process results with serial etch and strip on a single platform to control corrosion. Both Versys etch systems drive CoO down, to compete with the lowest cost systems in the industry.

Lam's 2300 etch systems offer the lowest risk path to 300-mm production. The systems allow processes to be fully matured in 200 mm volume production before they are transferred in the same chamber to 300 mm substrates. With a production-proven technology, advanced process capability, low capital investment, and the flexibility that delivers high volume throughput, Lam's 2300 Etch Series is the low risk solution for all 200 and 300 mm production lines at sub-100 nm technology nodes.

Contents

Figures

Tables

1
Overview

This manual contains the necessary information for the initial start-up of the 2300™ Microwave Strip Module on the 2300 etch platform.

The core manual comprises a three-ring binder with a transport module section that guides the customer through a step-by-step process to start-up the 2300 Microwave Strip Module.

The customer also receives an individually wrapped process module package for each process module type ordered. Each package contains process module- specific information and step-by-step instructions for initial system start-up. In addition, appendices have been provided to compile and summarize required data. The process module packages are inserted into the manual by the customer, in the appropriate tabbed sections.

Equipment checkout procedures include:

- Setting equipment controls
- Powering up the stripper and all auxiliary equipment

System start-up procedures include:

- Initialization, calibration, and test of the wafer transport system
- Testing of all vacuum and gas lines for leaks
- System software configuration
- Logging of initial system data

Changes Since Last Revision

This is the initial release of this manual.

Reference Documentation

Table 1–1 lists all the related manuals referenced in this manual.

Table 1–1. 2300 Etch System Manual Part Numbers

Part number	Description
405-240311-001	*2300 Transport Module Facility* manual
405-240351-001	*2300 Microwave Strip Module Facility manual*
406-240311-003	*2300 Transport Module Maintenance Vol. 1*
406-240311-001	*2300 Transport Module Installation* manual
406-240311-002	*2300 Transport Module Operation* manual
406-240351-003	*2300 Microwave Strip Module Maintenance* manual
406-240390-002	*2300 Etch Systems Safety* manual

Note Cleanroom versions of the above manuals (except facility manuals) begin with the prefix 409, rather than 406. Facility manuals are not available in cleanroom version.

How to Contact Us

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Safety

Training

All operating personnel must have the appropriate safety training pertaining to the hazards of the system.

Emergency Off

All Lam etchers include an emergency off (EMO) system that enables an operator or service technician to quickly disconnect power to the unit. Large, red, palm-sized buttons are located around the tool, readily accessible in an emergency. Pushing any one of these buttons shuts off main alternating current (AC) and microwave source power and closes all gas valves.

Note Pushing an **EMO** button does *not* cut power to the 2300 system software interface.

Environmental Regulations

Environmental regulations and requirements vary by the geographic location or governmental jurisdiction in which the product is installed. Various local, regional, and national standards either exist or are emerging for the environmental performance of semiconductor process equipment.

Existing environmental requirements, as they pertain to process equipment, include the following categories: air emissions such as hazardous air pollutants (HAPS), perfluorocarbons (PFCS), volatile organic compounds (VOCS), water effluent, and solid or liquid hazardous wastes. In addition, performance requirements developed by the semiconductor industry are emerging in the areas of water and energy use efficiency. Lam participates in these discussions and tracks all important developments, some of which will be included in future facility manuals as industry or company standards are developed.

Point-of-Use Abatement

Point-of-Use (POU) emission abatement systems are designed for treating air emissions from the outlet of a specific semiconductor process to remove compounds of interest before they enter the facility's main exhaust ductwork. This distinction separates POU systems from facility-level abatement systems that treat the collected exhausts of an entire facility, or large portion thereof. A typical POU system can serve from one to four similar process modules.

Several types of POU systems currently exist in the marketplace for specific classes of effluents such as HAPS (wet-scrub with chemical, wet-scrub without chemical, oxidation, and so forth). Specific equipment is typically neither provided by nor recommended by system suppliers as standard peripheral equipment. As development of such equipment continues to evolve, this may change. Currently Lam is engaged in several research and development efforts for such equipment.

The SEMATECH Transfer Document *Point-of-Use Control Systems for Semiconductor Process Emissions* provides guidance in the identification and selection of POU systems for particular process applications. In all cases where such equipment is used with Lam products, it is essential that the end-user investigates and complies with any environmental regulations which may be particular to the jurisdiction where the equipment is employed.

HAPS Regulations Management

Some HAPS emissions data for the 2300 Microwave Strip Module currently exists.

Energized Electrical Work Types

The *Environmental, Health, and Safety Guidelines for Semiconductor Manufacturing Equipment* (SEMI S2-0200) defines four types of electrical work. The four types are as follows:

Type 1 Equipment is fully deenergized.

Type 2	Equipment is energized. Energized circuits are covered or insulated. Type 2 work includes tasks where the energized circuits are or can be measured by placing probes through suitable openings in the covers or insulators.
Type 3	Equipment is energized. Energized circuits are exposed and inadvertent contact with uninsulated energized parts is possible. Potential exposures are no greater than 30 volts alternating current (VAC) root mean square (RMS), 42.4 VAC peak, 60 volts direct current (VDC), or 240 volt-amperes in dry locations.
Type 4	Equipment is energized. Energized circuits are exposed and inadvertent contact with uninsulated energized parts is possible. Potential exposures are greater than 30 VAC RMS, 42.4 VAC peak, 60 VDC, 240 volt-amperes in dry locations. Potential exposures to radio-frequency currents, whether induced or via contact, exceed the limits in Table A5-1 of Appendix 5, SEMI S2-0200.

The applicable electrical work types are indicated in the Safety section at the beginning of each procedure.

Lockout/Tagout

Lam recommends that you carefully complete the following lockout/tagout procedures described below before servicing the unit. These tasks must only be performed by qualified and authorized technicians.

Shutdown

▶ **To shut down,**

1. Before servicing, inform all affected personnel that you will shut down the unit for servicing and that you will lock out all energy sources.
2. Shut down the unit using normal shutdown procedures (see *the 2300 TM Operation* manual).
3. Lockout and tagout as necessary.

A lockout is a method of keeping equipment from being energized and endangering workers. Lockouts use the following methods:

- A disconnect switch, circuit breaker, valve, or other energy-isolating mechanism is put in the safe or off position.
- A device is often placed over the energy-isolating mechanism to hold it in the safe position.

In a tagout, place the energy-isolating mechanism in the safe position and attach a written warning.

Lockout and tagout the following energy sources and sources of hazardous chemistry:

- Platform electrical supply
- Electrical supply for the temperature control unit
- Supply of all process gases

Note Verify that all sources of energy have been disconnected by restarting the unit at the front control panel and by observing that the power on indicator light is off.

Start-up After Servicing

▶ **To restart after servicing,**

1. Ensure that you remove all tools and other foreign objects from the unit.
2. Restore all guards and enclosure panels to their normal operating positions.
3. Check the area around the unit to ensure that all personnel are at a safe distance.
4. Verify that all controls are in the off or neutral positions.
5. Remove the locks and tags that were placed on the energy sources.
6. Notify all area personnel that you will energize the unit.
7. Energize the unit.

Microwave Source Covers

Install the microwave source covers properly onto the system prior to engaging microwave power. The microwave source covers shield the user from the effects of microwave radiation. All operating personnel must use caution when working in the vicinity of microwave power. All microwave source covers are hardware interlocked to prevent microwave power from being applied without the cover installed.

Leak Detection

Containment of hazardous gases and detection of leaks are provided by a combination of on-board features and facilities infrastructure. The first priority is leak prevention, which is provided by physical containment, including back-up or double containment. The next priority is assuring proper evacuation of gases should containment systems fail or subatmospheric pressures are not maintained.

On-board safety systems continuously monitor chamber vacuum. Should this fall out of specification, a red alarm is signaled and the system returns to a safe, standby state.

Specific module containment features include:

- A differential-pressure switch interlock that shuts off all gas being supplied to the system if the etcher gas box exhaust is lost
- Vacuum interlocks in reaction chambers that cut off the flow of process gases and any microwave power being supplied if vacuum pressure is lost
- A pressure switch that shuts off the supply of process gases to the main chamber if the integrity of the line supplying gases from the gas box to the reaction chamber is broken
- Double contained gas lines.

Lam recommends that the customer provide an additional level of protection by augmenting the containment features described above with leak detectors located in the breathing zone in work areas adjacent to the main chamber and in the scrubbed exhaust from the on-board gas panel.

Manual Mode

Only factory-trained personnel should operate the system when it is in the manual mode, because many of the software interlocks are bypassed when the system is placed in the manual mode. Only operating personnel should use the system when it is in the automatic mode.

Ergonomics

Use proper lifting and handling when working on the system. Improper ergonomic handling may result in injury.

Protective Gear

Wear protective, cleanroom-approved clothing and gloves, safety glasses and a full breathing apparatus whenever appropriate.

See the *2300 Etch Systems Safety* manual for additional safety information.

Enclosure Interlocks

The following enclosures are equipped with interlocks that disconnect AC power to the system if activated. These interlocks are all in series in the 24 volts AC interlock circuit.

- AC enclosure
- DC enclosure

The following interlocks do not turn off AC power to the system. These interlocks operate independent of software control, except as indicated.

Chamber Vacuum Interlock

This interlock is designed to reduce safety hazards inside a reaction chamber before a service technician can access it. A vacuum pressure interlock is triggered when vacuum is not present in the reaction chamber. If triggered, this interlock cuts off the flow of process gases and the RF power supplied to the chamber.

A vacuum interlock is present in the following Lam etcher chambers.

- Main reaction chamber (ALL)

Gas Box Exhaust Interlock

A differential-pressure switch interlock shuts off all gas being supplied to the system if the gas box exhaust is lost. You can override this interlock during servicing by means of a gas box override switch (scrubber bypass switch) located in the gas box enclosure (also referred to as a gas panel). You must return this pull-out switch to its normal setting before you can close the gas box door and return the system to its normal operating state.

Process Gas Supply Line Interlock

A pressure switch shuts off the supply of process gases to the main chamber if the integrity of the line supplying gases from the gas box to the reaction chamber is broken. The gases are supplied at subatmospheric pressure. The pressure switch activates if the line pressure rises above 75 Torr.

Slot Valve Interlock - Atmosphere

The slot valve is interlocked and controlled by system software. This interlock helps to isolate gases in the reaction chamber by preventing the outer loadlock doors from opening when the load port is not at atmosphere.

Slot Valve Interlock - Vacuum

The slot valve is interlocked and controlled by system software. This interlock helps to isolate gases in the reaction chamber by preventing the inner loadlock doors from opening when the load port is not at vacuum.

Start-Up Identification

Table 1–2 is to be filled out during installation.

Table 1–2. Start-Up Indentification

Customer:
Location:
Microwave Strip process module number:
PM S/N:
Engineer:
Software revision:
Firmware revision:
Facilities release date:

2
Uncrating, Inspecting and Docking the Process Module

Use this procedure to uncrate and inspect the 2300 Microwave Strip Module and to dock the process module to the transport system.

The following sections are found in this chapter:

Reference Documentation

- *2300 Transport Module Facility* manual

Equipment Required

None

Safety

Type 2 task involved.

Preparation

None

Uncrating and Inspecting the Process Module

▶ **To uncrate and inspect the process module,**

1. Verify the system location using the floor layout and facility template.
2. Inspect all module and ancillary equipment crates for damage.
   - Document all damage and tripped tilt switches.
3. Verify that all totes were shipped.
   - Verify that a ship list is attached to all totes and they are all double wrapped.
   - Document all damage and tripped tilt switches.
4. Move the totes and the process module into the fab.
5. Remove bagging and visually inspect the system and tote content for any damage.
   - Document all damaged items found.
6. Take an inventory of the tote contents against the shipping list.
   - Document any missing parts.

Docking the Process Module to the Transport Module

▶ **To dock the process module to the transport module,**

1. Prior to docking the PM to the slot valve mounting surface, be sure to remove the corresponding slot valve controller board. It is mounted directly in the way of the three mounting bolts on one side of the PM.
2. Remove the cover plate and inspect the face seal and O-ring.
3. Clean the mounting surfaces with IPA.
4. Move the 2300 Microwave Strip Module into position directly behind its corresponding slot valve opening. You must align and dock the PM to the TM.

5 Use levelers to lower or raise the PM so its mounting face plate is aligned to the TM's slot valve face plate. (Ensure that there is an equidistant gap on top and bottom).

6 Make sure the guide pins on the chamber are aligned and clear between the PM and the TM.

7 Carefully push the PM into the slot valve opening. Once the PM is docked, use hardware to attach permanently. (Use three screws and washers for each side).

8 Visually inspect the PM and verify that it is properly attached to the TM. See the *2300 Transport Module Facility* manual.

9 Place a level on the lower electrode and adjust the feet on the PM until it's leveled. If possible, at the same time, place a level inside the TM and make sure feet adjustments made to the PM do not affect the TM.

10 Replace the slot valve controller board.

11 Attach seismic the connections.

3
Facilitating the System

Use this procedure to facilitate the 2300 Microwave Strip Module.

This chapter contains the following sections:

Reference Documentation

- *2300 Microwave Strip Module Maintenance* manual
- *2300 Transport Module Maintenance* manual

Equipment Required

- Digital voltmeter

Safety

Type 2 task involved.

Preparation

None

Checking the Input Power Circuit Breakers

▶ **To check the input power circuit breakers,**

1 Verify that all of the PM circuit breakers are off. Ensure that the TM circuit breaker that feeds power to the PM AC box from the TM AC box are off as well.

2 Verify that all printed circuit boards on the PM are properly seated.

Connecting the Process Module EMO Cables

▶ **To connect the process module EMO cables,**

1 Override the applicable signal at the control box.

Note Hold the EMO switch in the override postion until you connect the EMO cable.

2 Remove the EMO jumper.

3 Plug the EMO cable into the TM.

4 Verify that the PM EMO cable is securely connected to J3 on the TM facility panel.

Note You must override the signal at the control box to attach the EMO cable. Remove the EMO jumper from the TM facility panel and plug the EMO cable into the TM facility panel while overriding the signal.

5 Release the EMO override switch.

Checking the PM-to-TM Connections

▶ **To check the PM-to-TM connections,**

1 Verify that the PM communication cable (usually blue) is connected from 1B2P22A on the back of the the PM's VME to J7 on the TM facility panel.

2 Install the CDA cable from the PM's clean dry air (CDA) switch (behind the AC box) to the TM facility panel CDA fitting (adjust to 80-90 psi).

3 Install the N_2 line from the N_2 weldment to the TM facility panel N_2 fitting.

Checking the Vacuum Lines and Plumbing

▶ **To check the vacuum lines and plumbing,**

1 Verify that all plumbing is present for vacuum, and the vacuum line between the PM's corresponding pump and pump manifold is hooked up.

2 Verify that the vacuum pump exhaust is connected to the scrubber.

3 Connect the cooling water supply and return the lines to the vacuum pump.

4 Connect the N_2 ballast to the vacuum pump.

5 Verify that power is routed to the pump.

6 Verify that all pump power phases are present and in correct phasing.

7 Verify that the N_2 ballast is set to the customer's pump requirements.

8 Verify that there are no leaks at the pump.

Checking the Gas Box Connections

▶ **To check the gas box connections,**

1. Verify that all process gases are turned off at the facility bottles.
2. Verify that all facility requirements are routed and connected. Leak check all the gas lines to the gas box connection specified for the PM:
   - Gas lines
   - CDA
   - N_2 pump ballast (foreline)
   - N_2 purge gas
3. Verify that all valves are off or closed inside the gas panel.
4. Verify that the gas delivery line from the gas box to the PM gas 1 input is connected.
5. Install a blank off on the A input. Insure that the customer has incorporated all of their safety requirements into it.
6. Verify that the MFC pre-charge line from the gas box to the PM pump foreline is connected.
7. Verify that LonWorks® cable connects 41J1 on the PM and J2B on the gas panel.
8. Verify that LonWorks cable connects J2A on the gas panel to 41J6 on the PM.
9. Verify that the DC cable connects 3B151 on the PM to J1 connector on the gas panel.
10. Verify that the interlock cable connects J3 on the PM to J3 connector on the gas panel.
11. Verify that the connection between the N_2 purge fitting on the gas panel and the process N_2 regulator on the wall is secure. (Verify pressure is 35-40 psi).

12 Verify that the correct gases are routed to the corresponding fittings on the gas panel. (When the gas flow is turned on, set the process gas regulators to 15-20 psi).

13 Verify that J11 on the gas panel is either jumped-out or used as an interlock.

14 Verify that facilities have routed a scrubbed exhaust line to the PM gas box and that it is on. Also make sure that facilities has routed the pressure switch line from the gas box to the scrubber exhaust.

15 Verify that the scrubber is hooked up to the TCP match enclosure scrubber (flow specification = 530 cubic feet per minute).

Checking the Generator Connections

▶ **To check the generator connections,**

1 Check the water detection circuit by making sure the P1 connector goes to the J1 socket.

2 Verify that the flow switch is plugged into the corresponding component. FS1 is the transformer-coupled plasma (TCP) generator. Place a jumper in FS2.

3 Verify that the TCP match water supply and return lines are plugged in.

4 Make sure all water connections are present. Physically check all water connections to make sure they are secure and none of them pull out of their respective fittings.

Verifying the Emergency Off

▶ **To verify the emergency off (EMO),**

1 Verify that all PM-to-TM cable connections are secure.

2 Verify that the PM main and EMO breaker switches are in working order.

3 Verify that the auxiliary rack EMO switch is in working order (if applicable).

Completing Initial Checks

▶ **To complete the intial checks,**

1 Remove the cover to the DC power supply enclosure and locate the distribution PCB. Using a digital volt meter, place the negative lead to the ground test point (PTA, PT2A, PT4A, PT5A) and the positive lead to each of the following designations. Record the resistance values in Table 3–1.

Warning
Electrical hazard: Make sure the power is off to the system before measuring PCB resistance values.

Table 3–1. Distribution PCB Resistance Values

Distribution PCB	Measured value (Ohms)	Actual value (Ohms)
PT1		686
PT2 (RTN)		0
PT4 (+24V)		687
PT5 (RTN)		0

2 Install the PM AC power cable from the TM AC box (PM's corresponding CB and earthground) to the PM AC box (L1, L2, L3, and earthground).

3 Turn on all system breakers for pumps, TCUs, and the transport module on the TM's AC box or auxilliary AC box.

4 Turn on the user interface (UI) and log on to Windows NT™ on the TM.

5 Remove the cover from the PM AC box and override the safety interlock.

6 Turn on the PM main power circuit breaker located on the AC panel of the TM.

7 Measure voltages inside the PM AC enclosure on LI, L2, L3 contacts to earthground to check for 110 volts AC as well as to each other to see if they are all out of phase. Record the voltage values in Table 3–2.

- Measure voltage across each phase point and verify that 208 volts AC is present.

Table 3–2. PM AC Enclosure Voltage Values

Phase to ground	**X (L1)**	**Y (L2)**	**Z (L3)**
Measured voltage			
Phase to phase	**X-Y (L1-L2)**	**Y-Z (L2-L3)**	**X-Z (L1-L3)**
Measured voltage			

Checking the Power Supply

▶ **To check the power supply,**

1 Apply power to the PM by switching CB1 to the on position.

2 Check the powers supply voltages listed in Table 3–3. Using a DVM, place the negative lead to PTA and the positive lead to each of the following designations. Record the voltage values in Table 3–3.

Table 3–3. Distribution PCB Voltage Values

Distribution PCB	**Measured value (volts)**
PT1	
PT2 (RTN)	
PT4 (+24V)	
PT5 (RTN)	

3 Verify that all eight voltage light emitting diodes (LED's) are illuminated on the VME enclosure.

4 Verify that the VME enclosure fan and DC enclosure fan are on.

5 Verify that all necessary hardware is installed in the PM.

Warning

Warning: Due to the hardware design and the software configuration, it is important to equalize the pressure inside the slot valve to that of the PM if you are opening the door between the two. The potential for damage to the quartz components and the pump stack components (including the turbo) exists if you do not track the equal pressure carefully.

Powering Up the System

▶ **To power up the system,**

1 Power up the system by pressing the **AC/on** button on top of the AC box.

2 Press the **reset** button (labeled **RST**) on the computer, inside the VME.

3 Power up the microwave generator rack by turning on CB6 on the PM's AC box.

4 Verify that the EMO is operating for the PM and TM. See the *2300 Microwave Strip Module Maintenance* manual and the *2300 Transport Module Maintenance* manual.

5 Verify that the robot has been taught entry positions into the PM, and the Z-height is correctly set to clear the slot valve port.

6 The PM should be completely facilitated at this point. If no problems arise continue with the PM functionality tests. Check off every test, and initial and date at the end of each completed section.

Checking the Node Communications

▶ **To check the node communications,**

1 Enter the Lam supplied user name and password in the spaces provided in order to gain access to the 2300 software.

2 Verify that the PM is in focus on the UI. Look in the lower left corner of the UI and verify that the PM2 position is gray.

3 Go to the **Alarm** page and verify that none of the following communication alarms are listed:

Node 1	Node 2	Node 4 (gas panel)
Anafaze controller	Node 3 (gas panel)	

Note Clearing the alarm several times usually clears communication alarms. If you are unable to clear an alarm check that the RJ 45 connector is plugged in completely.

Initials _____ Date _____

Checking the External Interlocks

▶ **To check the external interlocks,**

1 Trip all the safety cover switches and verify that they post an alarm in the **Alarm** page.

2 Install and clear the alarms.

Initials _____ Date _____

Checking the Chamber Lifter

▶ **To check the chamber lifter,**

1 Verify that the depth of the pins when in the down position is 0.010 inches ± 0.005 below the surface of the electrode.

- See the *2300 Microwave Strip Module Maintenance* manual to verify the pins are set at the correct depth.

2 Verify that the height of the pins in the up position are 0.480 inches ± 0.020 above the surface of the electrode.

- Adjust the pin height using the pinlift calibration procedure in the *2300 Microwave Strip Module Maintenance* manual.

3 Verify that the pinlift up and down sensors read the correct position of the lifter.

- If not, see "Calibrating the Pinlift Assembly" in the *2300 Microwave Strip Module Maintenance* manual to adjust the sensors.

Initials _____ Date _____

Completing the Facility Checks

▶ **To complete the facility checks,**

1 Adjust the CDA regulator at the wall to 90 psi.

2 Charge the water cooling lines and verify there are no leaks at the following areas:

- Microwave source
- Manifold blocks (at the bulkhead panel at the rear of the PM)
- Microwave chamber

3 Verify that none of the following water flow alarms are shown on the **Alarm** page:

- Microwave source

4 Disconnect the electrical plug at each of the following water flow sensors (one at a time) and verify the correct alarm is posted:

- Microwave source

5 Connect all the plugs for the water flow sensors listed in step 4 and verify that the alarms clear.

6 Put the chamber under vacuum by using the **Pump Down** function on the **Maintain\Chamber** page of the UI.

Initials _____ Date _____

Completing the Solenoid Test

▶ **To complete the solenoid test,**

1 Activate each of the following solenoids. Verify the corresponding valve receives CDA pressure.

Table 3–4. Solenoid Test

Name	Check
Pin Lifter Down 1-1A	
Pin Lifter Up 1-1B	
Chamber Isolation Valve 1-2A	
Process Gas Shutoff Valve 1 1-2B	
Bypass Gas Shutoff Valve 2 1-3A	
Manometer Isolation Valve 1-3B	
VoDM Isolation Valve 1-4A	
N2 Control Valve 1-4B	
Chamber Cooling Water Valve 1-5A	
Main Water Shutoff Valve 1-5B	
VoDM Isolation Valve 1-6A	
CDA Purge Valve 1-6B	

Initials _____ Date _____

Completing the Chamber and Gas Panel Pump/Purge Test

▶ **To complete the chamber and gas panel pump/purge test,**

1. Select the **pump/purge** function on the **Maintenance\Chamber** page. Verify that the chamber pressure rises and falls during each cycle. See the *2300 Microwave Strip Module Maintenance* manual for more information.
2. Select the **gas panel pump/purge** function on the **Maintenance\Gas Panel** page. Verify there is positive and negative maximum gas flow observed in each MFC during each cycle.

Initials _____ Date _____

Checking the Module Heater Current

▶ **To check the module heater current,**

1. Flip the heater distribution circuit breaker CB2 to the **on** position.
2. Verify that there are no overtemp or ground fault isolation (GFI) conditions present.
3. Go to the **Setup\Temperature** page and set the electrode 1 and electrode 2 channels to 280 degrees Celsius.
4. Set the secondary gas line heater to 100 degrees Celsius.
5. Verify that all temperatures increase steadily and stabilize at the applicable final temperature.

Initials _____ Date _____

Completing the System Leak Check

▶ **To complete the system leak check,**

1. Allow the module to pump down at least 8 hours before proceding with the leakback check.
2. Go to the **Maintenance\Chamber** page and confirm the strip PM is highlighted in the bottom left corner of the screen.
3. Perform an automatic pump down of the PM by clicking the **pump down** macro on the **Maintenance\Chamber** page.
4. Close the reaction chamber manometer isolation valve and perform a 5-minute leakback to determine if the mnometer itself is leaktight. Record the results in Table 3–5.

Table 3–5. Main Chamber Manometer Leakback Rate - Five Minutes

	Start	Stop	Difference
Pressure (mtorr)			
Time (minute)			
Calculated leak rate (mtorr/minute)			
NOTE: Maximum leak specification is less than 3 mtorr/minute			

5. Open the manometer isolation valve for the reaction chamber on the **Maintain\Chamber** page.
6. Close the chamber isolation valve and perform a 5-minute leakback rate. Record the results in Table 3–6.

Table 3–6. Main Chamber Leak Back Rate - Five Minutes

	Start	Stop	Difference
Pressure (mtorr)			
Time (minute)			
Calculated leak rate (mtorr/minute)			
NOTE: Maximum leak specification is less than 0.5 mtorr/minute			

7 Check the gas box leak rate by closing all hand valves at the facility input. Open all valves inside the gas box that are pertinent to gas flow. Pump down, close the isolation valve, and perform a five-minute leakback rate. Record the results in Table 3–7.

Note The difference between the gas box pressure and chamber pressure is the gas box leak rate.

Table 3–7. Main Chamber and Gas Box Leakback Rate - Five Minutes

	Start	Stop	Difference
Pressure (mtorr)			
Time (minute)			
Calculated leak rate (mtorr/minute)			
NOTE: Maximum leak specification is less than 1 mtorr/minute			

Initials _____ Date _____

Calibrating and Zeroing the Manometer

▶ **To calibrate and zero the manometer,**

1 Install a calibrated pressure-monitoring device on the chamber, preferably on the same stack the reaction chamber manometer sits.

2 Open the isolation valve and shut off the chamber ballast.

3 Measure the signal output and verify that the voltage reading matches the pressure reading on the pressure-monitoring device by using the nine-pin extension board or by disassembling the DB9 backshell on the process manometer.

- Example: 100 mtorr = 0.1 VDC. If this is not the case, adjust the zero potentiometer on the process manometer.

4 Record all values in Table 3–8.

Table 3–8. Calibrating the Manometer

Name	Value
Chamber process 10 Torr manometer	
100 Torr manometer	

Initials _____ Date _____

Checking the Pressure Transducer Settings

▶ **To check the pressure transducer settings,**

1 Close all the hand valves at the gas box facility inlets and open all other pertinent valves for gas flow.

2 Each transducer should pump down to negative 17 PSI.

- If not, adjust the transducer to reflect the vacuum inside it to negative 17 PSI.

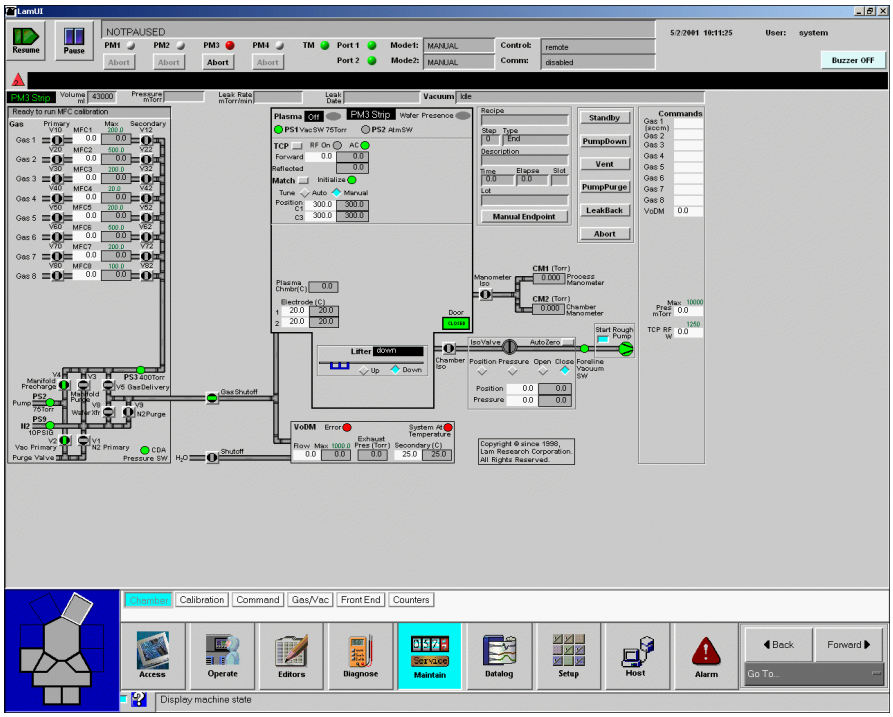
Initials _____ Date _____

Performing a Partial Pressure Test

▶ **To perform a partial pressure test,**

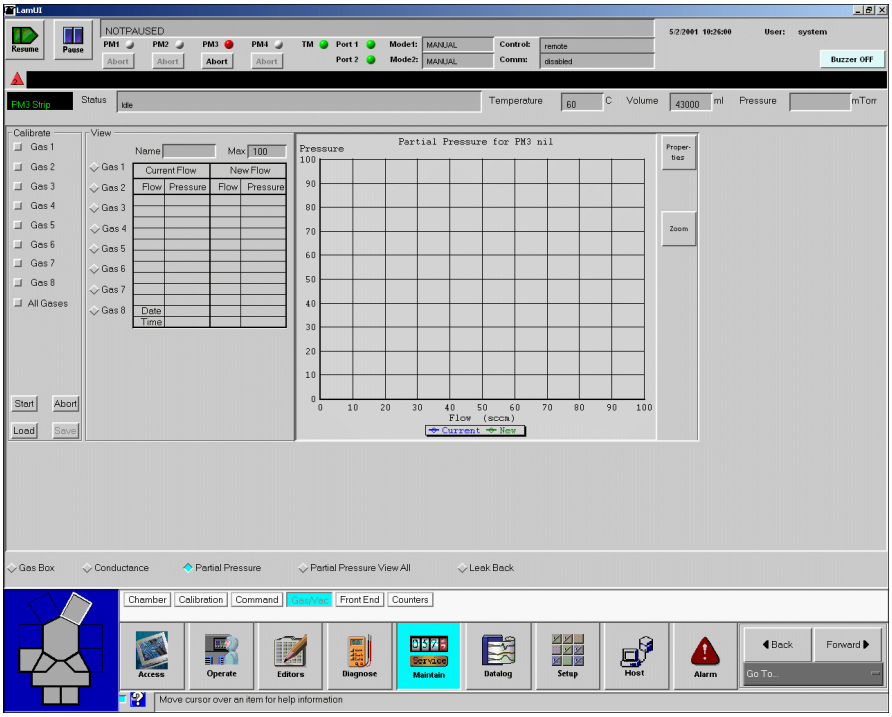
1 Set the UI to display the windows for the strip process module. Select the applicable PM on the station locator in the lower left screen. See Figure 3–1.

Figure 3–1. Maintain\Chamber Window



2 In the **Maintain\Gas/Vac\Partial Pressure** window, select the gas (or select all gases) that you wish to test in the partial pressure box at the left side. See Figure 3–2.

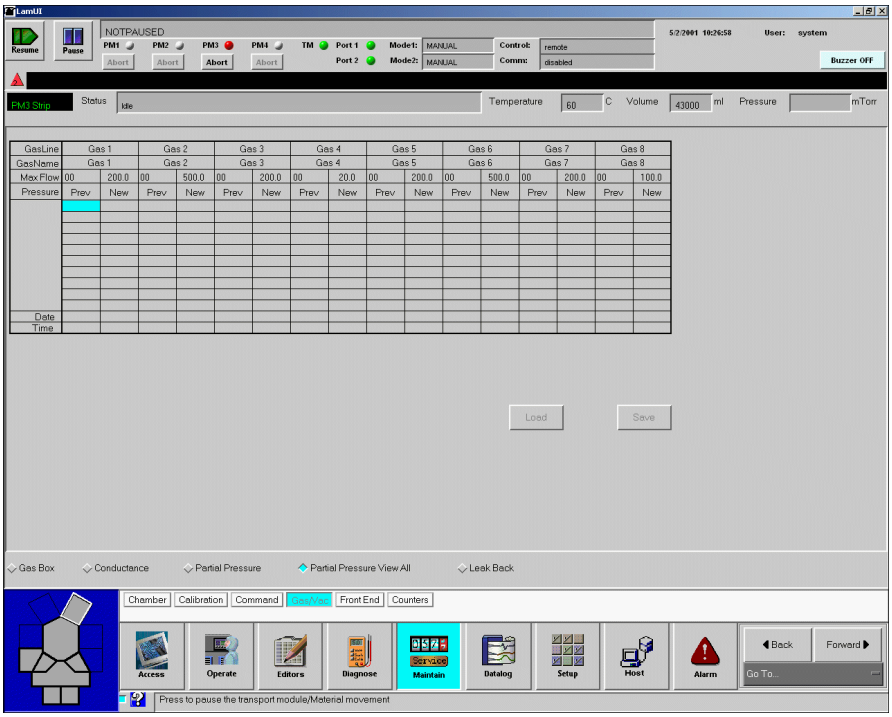
Figure 3–2. Maintain\Gas/Vac\Partial Pressure Window



3 Click the **Start** button to initiate the partial pressure test sequence in the **Maintain\Gas/Vac\Partial Pressure** window.

- Status displays done when the sequence has completed.
- After the test, you can view the results (along with the previous reading) for one selected gas at a time in the *View* table to the right of the partial pressure box.
- You can view the results for all the gases tested (with previous readings) in the **Maintain\Gas/Vac\Partial Pressure View All** window. See Figure 3–3.

Figure 3–3. Maintain\Gas/Vac\Partial Pressure View All Window



4 Click the **Abort** button to abort the sequence.

Initials _____ Date _____

Checking the Plasma

▶ **To check the plasma,**

1 Start the waferflow into each strip chamber using a recipe with the following parameters.

- 1 torr
- 2500 watts
- 3000 sccm O_2

- 300 sccm N_2
- 30 seconds
- 275 degress Celsius

2 Insure the plasma and pressure readings remain stable. Note the TCP tune capacitor position.

Initials _____ Date _____

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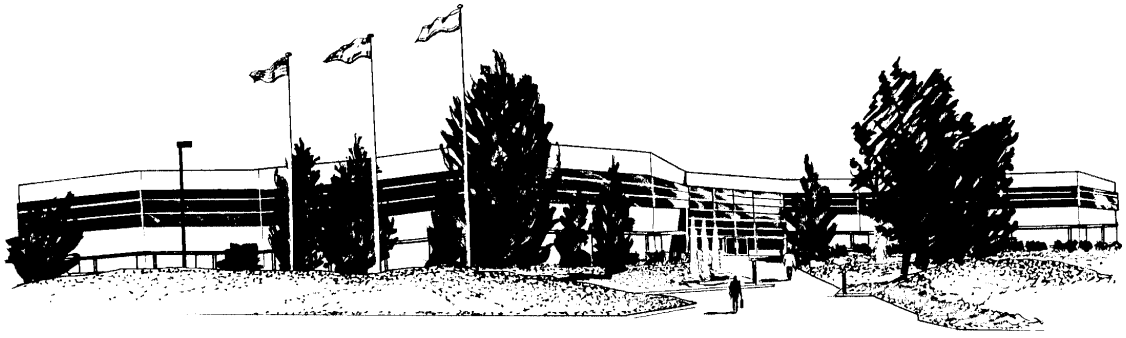

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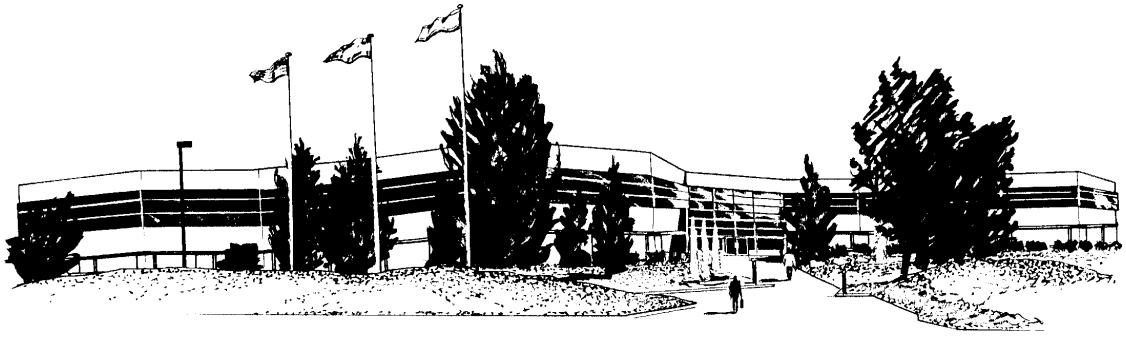

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