

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

Cascade Microtech Alessi
REL-6100/4800
Series Probe Stations User Guide



Cascade Microtech, Inc., 14255 SW Brigadoon Ct., Beaverton, Oregon 97005
Tel: (503) 626-8245 Fax: (503) 626-6023
Japan: 03-5478-6100; Europe: +44 1295-812829
Copyright © 1991, 1997 Cascade Microtech, Inc

Cascade Microtech Alessi REL-6100/4800 Series Probe Station Users Guide 109-952

List of Trademarks and Registered Trademarks

Cascade Microtech is a registered trademark of Cascade Microtech, Inc.
Microsoft is a registered trademark, and Win95 is a trademark, of Microsoft Corporation.

Copyright Notice

Copyright © 1997 Cascade Microtech, Inc. All rights reserved. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from Cascade Microtech, Inc.
Requests for permission to make copies of any part of this manual should be mailed or faxed to:
Cascade Microtech, Inc.
14255 SW Brigadoon Ct.
Beaverton, Oregon 97005 USA
Tel: (503) 626-8245
Fax: (503) 626-6023

Warranty

Cascade Microtech, Inc. (Cascade) warrants each product it sells to be free from defects in material and workmanship under normal use and service. Software and firmware is warranted to operate in accordance with its programmed instructions on appropriate Cascade products; it is not warranted to be error-free. During the warranty period, Cascade will, at its option, either repair or replace the product. For warranty service or repair, this product must be returned to a service facility designated by Cascade. Cascade assumes no risk for damage in transit. Buyer shall prepay shipping charges to Cascade and Cascade shall pay shipping charges to return the product to buyer. However, buyer shall pay all shipping charges, duties, and taxes for products returned to Cascade from another country. Refer to the product specifications information in the data sheet, product warranty list, or product manual for the warranty period for the product. The warranty begins on the date of shipment.
Limitation of Warranty
The foregoing warranty shall not apply to effects resulting from improper or inadequate maintenance by buyer, buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside the environmental specification for the product, or improper site preparation and maintenance.

Exclusive Remedies

The foregoing warranty is in lieu of all other warranties, express or implied, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose, which are hereby disclaimed. In no event will Cascade Microtech, Inc. be liable for consequential damages, even if Cascade Microtech, Inc. has been advised of the possibility of such damages.

Manual Updates

This manual is the combination of two previous manuals and was rewritten 4/97.

Declaration of Conformity

Manufacturer:
Cascade Microtech, Inc.
14255 SW Brigadoon Ct.
Beaverton, OR 97005 USA

Product: **Cascade Microtech Alessi REL-4800 Probe Station**

Serial No.: _____

Date of Shipment: _____

Standards:
This product has been assessed against the Machinery Directive[1] (89/392/EEC), annex1 (as amended) and complies with the Essential Health and Safety Requirements therein.

This Declaration of Conformity is based on the results of analysis, testing, and evaluation performed by Cascade Microtech and with the assistance of a body notified to the Member States and Commission of the European Communities.

Signature **Date**

Position _____

[1] As permitted by 93/465/EEC, 'Council Decision concerning the modules for the various phases of the conformity assessment procedures and the rules for the affixing and use of the CE conformity marking, which are intended to be used in the technical harmonization directives' dated 22 July 1993, "Where one or more of these directives allow the manufacturer, during a transitional period, to choose which arrangements to apply, the CE marking indicates conformity to the provisions only of those directives applied by the manufacturer."

Declaration of Conformity

Manufacturer:
Cascade Microtech, Inc.
14255 SW Brigadoon Ct.
Beaverton, OR 97005 USA

Product: **Cascade Microtech Alessi REL-6100 Probe Station**

Serial No.: _____

Date of Shipment: _____

Standards:

This product has been assessed against the Machinery Directive[1] (89/392/EEC), annex1 (as amended) and complies with the Essential Health and Safety Requirements therein. This product has also been assessed against the Low Voltage Directive (73/23/EEC) and complies with EN61010, the safety requirements for electrical equipment for measurement control and laboratory use.

This product has been assessed against the EMC Directive (89/336/EEC) and complies with EN55011 (CISPR 11, Class A), radiated and conducted emissions, and with immunity standard EN50082-1. This product also complies with EN60555-2, harmonic current and with EN60555-3, voltage fluctuation.

This Declaration of Conformity is based on the results of analysis, testing, and evaluation performed by Cascade Microtech and with the assistance of a body notified to the Member States and Commission of the European Communities.

Signature **Date**

Position _____

[1] As permitted by 93/465/EEC, 'Council Decision concerning the modules for the various phases of the conformity assessment procedures and the rules for the affixing and use of the CE conformity marking, which are intended to be used in the technical harmonization directives' dated 22 July 1993, "Where one or more of these directives allow the manufacturer, during a transitional period, to choose which arrangements to apply, the CE marking indicates conformity to the provisions only of those directives applied by the manufacturer."



Contents

Labels 1

Introduction 1
- Danger Labels 1
- Warning Labels 2
- Caution Labels 3
- Identifiers 3

Station Overview 5

Introduction 5
- Standard Hardware Features 5

Options 6
- Probe Stations 6
- Chucks 7
- Microscope Transports 7
- Controller *(REL-4800)* 7

Accessories 7
- Microscopes 7
- Micropositioners 8
- Other 8

REL-6100 8
- Galaxy Software 8

Safety 9

Safety Standards 9

Installing 11

Overview of Installation Procedure 11

Before You Install Your Station 12

Environmental Conditions 12

Lifting Requirements 12

Tools Needed 12

Unpack 13
- Unpacking Your Probe Station 13

Remove and Save Shipping Restraints 13
Connections 15
ECX-56 Expansion Box 15
Air and Vacuum 15
Chucks 16
Guarded High-Temp Thermal 17
Installing Chuck Bias 18
Attaching Ground Wires 18
Computer Requirements *(REL-6100 Series)* 19
MicroChamber 20
Introduction 20
Microscope Travel Precautions 21
Use of the Air Dryer 21
Removing the Insert Plate 21
Installing the Probe Card 22
Thermal Equipment 22
Installing the Microscope 23
Mitutoyo Finescope 23
Installing Micropositioners and Probes 26
Installing a Video Camera 26
Installing the Computer *(REL-6100 Series)* 26
Install the Computer and Cables 26
Control Electronics 27
REL-6100 Series 27
REL-4800 Series 27
Installing the ECX-56 Controller with Joystick 28
Using the Joystick to Initialize Channels 28

Operating **29**

Emergency Stop Button *(REL-6100 Series)* 29
To Stop Station Movement 29
To Restore Station Movement 29
Verifying Controls 29
Verifying Platen Height Z-axis Movement 29
Verifying X-Axis and Y-Axis Stage Movements 29
Verifying Theta Movement 30
Verifying Chuck Vacuum Controls 31
Verifying the Microscope and Video Adjustments 32
Adjustments 33
Adjusting the Pneumatic Platen 33
Adjusting the Microscope 34
Alignment 34
Aligning the Wafer 34

Aligning the Probes 35
Setting Contact Position 35
Initializing a Channel (*REL-6100 Series*) 35
To Initialize a Channel (Set Machine Zero) Using the Galaxy Software 36
ERJ-02 Joystick (*REL-6100 Series*) 36
Button and Knob overview 36
LED Indicators 37
Initializing Channels 38
Activating a Channel 38
Selecting Axis (X/Y, Z, theta) 39
Set Contact Location 40
Set Separate Location 40
Set Increment Distance 41
Move In Increments (Die Stepping) 41
Load and Unload DUTs Using the MicroChamber 41
Thermal Chuck 42
Testing the Thermal Chuck 42
Purging the MicroChamber with Dry Air 43
Guarded Thermal Chuck 45

Maintaining **47**

Introduction 47
Re-Planarizing the Probe Station 47
Standard Chuck 47
Microscope Transport 48
Preventive Maintenance Procedures 51
Cleaning the Probe Station 51
Adding Grease to the Lead Screws 52
Adjusting for Par Centering 52
Maintaining the Pneumatic System 53
Maintaining the Microscope 54
Maintaining the Probe Station Accessories 55

Troubleshooting **57**

Introduction 57
Symptoms and Solutions 57
Computer Does Not Turn On; Nothing Works 58
Stage Makes High-pitched Whine When Attempting to Move 58
Stage Does Not Move 58
Vacuum is Not Detected or DUT not Held on Chuck 59
Joystick Error Message on Monitor or Stage Wanders in Joystick Mode 59
Microscope Light is Not On 59

Thermal Station Symptoms and Solutions 60
Thermal Controller Shuts Down 60
Set and Actual Temperature Do Not Match 60
Frost or Moisture Appears in the MicroChamber 60
Frost or Moisture Outside the MicroChamber 61

Station Dimensions **63**

Dimensions 63

Service **65**

Introduction 65
RMA Number 65
Re-packing 65

Index **215**

Labels

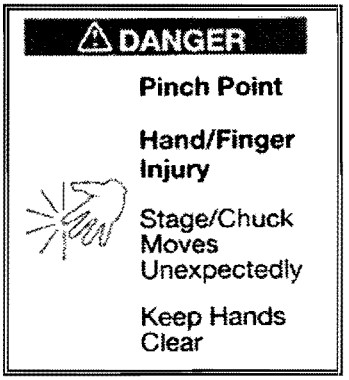
Introduction

The labels affixed to your probe station are **Danger**, **Warning**, **Caution** and other identifiers.

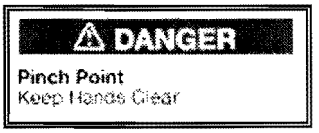
Danger Labels

Warn of immediate personal danger.









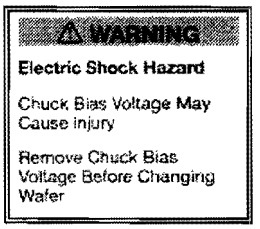
Warning Labels

Warn of a personal hazard.









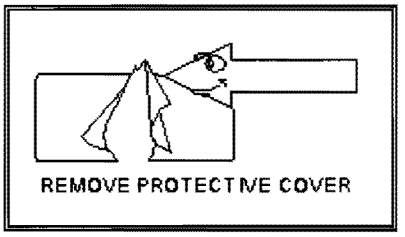
Caution Labels

Warn of possible station damage, or the loss of data.



Identifiers

Various other labels that refer to shipping restraints and parts identification.

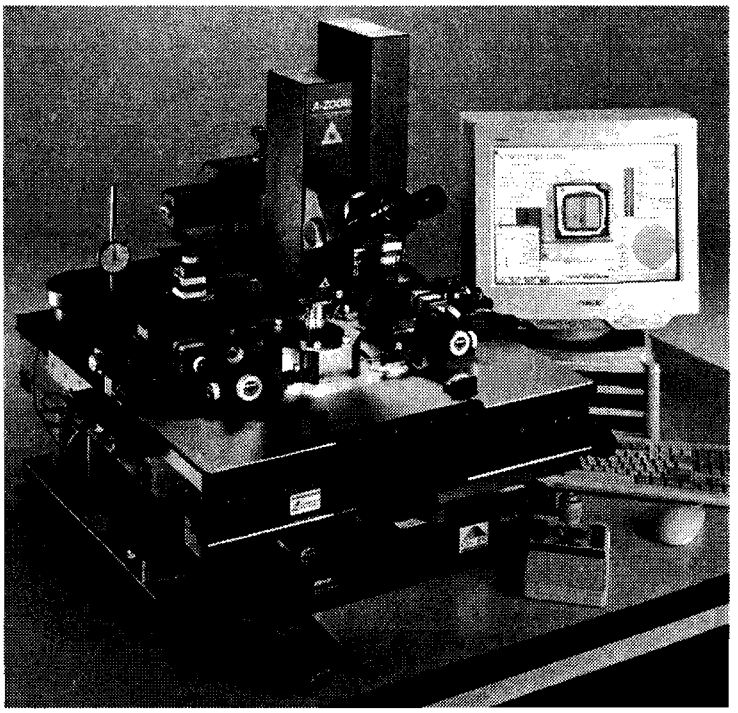


Station Overview

Introduction

Welcome to the *Cascade Microtech Inc. (CMI) Alessi REL-6100/4800 Probe Station User Guide*. This guide contains information about installing, verifying, operating, and maintaining your probe station.

- The Alessi REL- 4800 Series 8-inch Manual Probe Station is referred to in this manual as the *REL- 4800 Series manual probe station* or simply the *REL-4800 Series*
- The Alessi REL-6100 Series 8-inch Semiautomatic Probe Station is referred to in this manual as the *REL-6100 Series semiautomatic probe station* or simply the *REL-6100 Series*
- A member of either series is referred to as a *probe station*



REL-6100 Series with MicroChamber shown

Standard Hardware Features

- 8 in. (200 mm) x 8 in. (200 mm) stage (programmable with manual override on *REL-6100 Series)*

- Manual coaxial scope mount with 1 in. x 1 in. travel (25.4 mm x 25.4 mm)
- Tilt-back microscope mount
- An 8 in. (200 mm) chuck with ± 3/16 in. (5 mm) of vertical (Z-axis) travel and ± 7° theta movement (programmable on *REL-6100 Series).*
- Platen lift (Z) lever with 0.20 in.(5 mm) of travel
- Separate expansion box (ECX-56) for motor-control electronics *(REL-6100 Series)*

In addition to the standard hardware features, CMI offers a wide range of options and accessories to supplement successful probing. Your probe station may have some of the options and accessories itemized on the following pages.

Table 1: Model Features

MANUAL STATION	GUARDED CHUCK	STANDARD THERMAL CHUCK	HIGH TEMP THERMAL CHUCK	MICRO-CHAMBER	SEMIAUTOMATIC STATION
REL-4800					REL-6100
REL-482X		X			REL-612X
REL-482XHT			X		REL-612XHT
REL-483X	X	X			REL-613X
REL-483XHT	X		X		REL-613XHT
REL-484X	X				REL-614X
REL-485X	X			X	REL-615X
REL-486X		X		X	REL-616X
REL-487X	X	X		X	REL-617X

(X after the station model number refers to available chucks: 1 = *nickel,* 2 = *gold.* See the *Alessi Stations Configuration Guide* for further information).

Options

Your probe station may come configured with one or more of the following options. Refer to the Installation and Operating sections of this manual and/or to the specific *data sheet* provided for these options. Also, see the *Alessi Stations Configuration Guide* for additional information on the selection of probes and probe tips.

Probe Stations

- R48/F Fine pitch stage (*REL-4800 Series*)
- R48/J1 Motorized stage, 110V (*REL-4800 Series*)

- R48/J2 Motorized stage, 220V (*REL-4800 Series*)
- R48/M Microwave platen (*REL-4800*)
- R61/M Microwave platen (*REL-6100*)

Chucks

- R48/A Gold Chuck (*REL-4800*)
- R61/A Gold Chuck (*REL-6100*)

Microscope Transports

- R48/S2 Programmable scope transport, 2"
- R48/S4 Programmable scope transport, 4"
- R61/S2 Programmable scope transport, 2"
- R61/S4 Programmable scope transport, 4"
- RSZ-64 Programmable focus for Mitutoyo microscope (*REL-6100 Series*)

Controller *(REL-4800)*

- Optional ECX-56 controller for motorized drives controlling the optional programmable transport and the motorized micropositioners
- Up to 4 optional cards for MS1 motorized micropositioners and microscope x, y, z

Accessories

Your probe station may come configured with one or more of the following accessories. Refer to the Installation and Operating sections of this manual and/or to the specific *data sheet* provided for these accessories.

Microscopes

- Mitutoyo Finescope FS-60
- Mitutoyo FS-60/T Tilthead
- Mitutoyo FS-60/Y Tilthead for laser applications
- A-Zoom

Objectives

See the *Alessi Stations Configuration Guide* for further information.

Micropositioners

- MH2 & MH4
  See the *Alessi MH Series High-Resolution Micropositioners* Data Sheet
- MH5
  See the *Alessi MH5 Planarizable Microwave Micropositioners* Data Sheet
- MS1-44
  See the *Alessi MS Series Programmable Micropositioners* Data Sheet

Other

- Vibration Isolation Tables
- Thermal Controllers
- Laser Systems
- Light Tight Enclosures
- Air Dryers

REL-6100

This probe station is suited for semiautomatic step-and-repeat testing. As the station moves from die to die, your wafer map specifies which die are tested. Test results can be printed or saved to data files.

Galaxy Software

Use the Microsoft Windows-based Galaxy software to control your probe station. You can automatically test your wafers using the following software tools. For more information, see the *Cascade Microtech Alessi Galaxy User Guide*/online help and the *Cascade Microtech Alessi Universal Command Set (AUCS)*/online help.

Use Galaxy Software To

- Control station movement, focus (RSZ-64 required), and control MS1-44 micropositioner
- Monitor the station status
- Map the wafer
- Display live wafer video image
- Move a probe with the mouse (drag and drop) on MS1-44
- Semi-automatically align and planarize the chuck
- Control the optional thermal system
- Control the optional programmable micropositioners

Use Alessi Universal Command Set (AUCS) To

- Control the probe station remotely from a batch file

More Galaxy Software Features

- As a true MS Windows application, the Galaxy software integrates easily with other Windows applications
- Interfaces easily with virtual instrumentation software using Dynamic Link Data Exchange

Safety

The information in this guide enables you to operate the equipment safely and effectively. Any deviation from the recommended procedures or modification or use of the equipment for which it is not designed may create a hazardous operating situation. Cascade Microtech, Inc., disclaims any responsibility for consequences resulting from any such deviation, modification, or application.

In this guide, read and follow the instructions labeled **Warning** to prevent personal hazard or injury. Read and follow the instructions labeled **Caution** to prevent damage or destruction to equipment, or the loss of data. Read the sections labeled **Note** for important information.

Caution

Use anti-electrostatic discharge (ESD) precautions when you connect cables. ESD can damage components.

Warning

To avoid personal injury, ground the computer, probe station, and monitor with the provided power cords. Do not disable the grounded leads on the provided power cords. Keep hands, clothing, and jewelry clear of all moving parts.

Several probe station components weigh 23 kg (50 lb.) or more. Follow the lifting guidelines provided by your company.

For continued protection against risk of fire, replace a fuse on the probe station equipment only with a fuse of the specified type and current rating.

Safety Standards

The probe stations are designed and certified to comply with UL 3101-1 safety standard for laboratory equipment and with EN61010 international standard safety requirements for measurement, control, and laboratory use.

The stations are ETL listed and are CE marked.

Installing

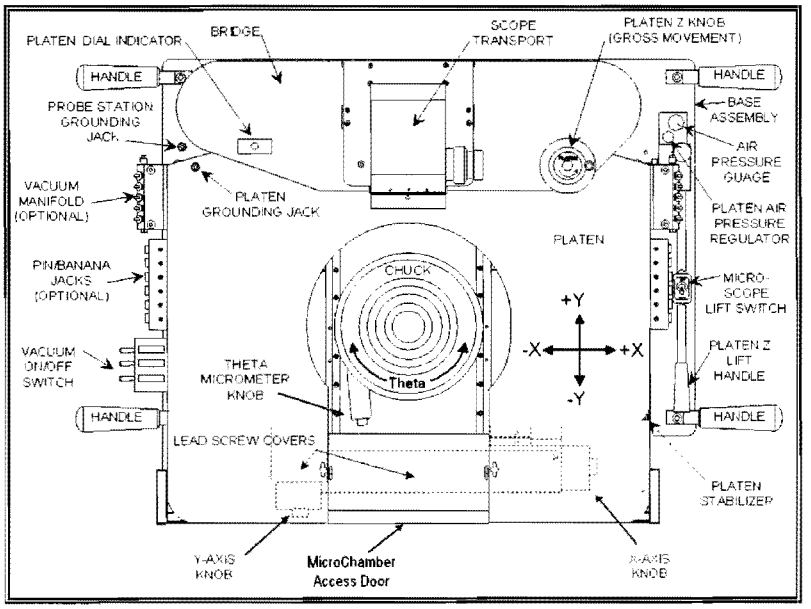
Overview of Installation Procedure

Install your probe station using the procedures in this chapter. You should also refer to these procedures if you are un-installing your probe station.

Note that the installation procedure has instructions for various options. Your probe station may not be equipped with all options.

Note

Some sections describe generic procedures which apply to both the REL-4800 and the REL-6100 Series probe stations. Sections which apply to a specific series number or option are so labeled (example: *REL-6100*)



MicroChamber shown

Figure 1
Station Nomenclature

Before You Install Your Station

Verify that your work area conforms to the site specifications described in the *Dimensions* chapter.

The Probe Station should be placed on a vibration isolation table in order to dampen vibrations that occur when probing at high magnification.

Place the station adjacent to, and within one meter of, your ECX -56 expansion box, if utilized in your setup.

Warning

The probe station can weigh over 118 kg (260 lb.) depending on the model or options. To prevent physical injury, refer to and follow the lifting guidelines provided by your company

Environmental Conditions

Your probe station works safely in the same environment that your PC requires. Use the station under the following environmental conditions:

- Indoors only
- Altitude up to 2000 m
- Temperature 5°C to 40°C
- Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
- Main supply voltage fluctuations not to exceed ± 10% of the nominal voltage

Lifting Requirements

You will need:

- 4 or 5 people to maneuver the probe station onto the table
- a forklift with a minimum 272 kg (600 lb.) lifting capacity

Tools Needed

You will need:

- A 9/16 in., open-end or socket wrench to remove the bolts on the shipping crate

We have supplied a set of hex wrenches for the probe station screws.

Unpack

Unpacking Your Probe Station

1. Your probe station can weigh over 118 kg (260 lb.) without accessories. Using a forklift, position the crate as close as possible to your work area.
2. Your probe station is bolted to a pallet, then a crate is bolted over the station. Unbolt the wooden top (6 bolts), and set it on the floor.
3. Unpack the crate and any optional equipment and then check the parts against the packing list.
4. Unbolt the crate (8 bolts on the sides) and lift them off the station. At this point, the probe station is still bolted to the bottom pallet.
5. Remove the probe station's plastic vapor barrier.
6. Unbolt 4 bolts (2 on each side) connecting the station to the wooden block.
7. Unbolt the four bolts holding the wood blocks to the bottom pallet.
8. Screw in the 4 lift handles (2 on each side). The front handles may not screw in all the way
9. Use the forklift (with lift straps around handles) to position the probe station next to, and at the same height as, your work bench.
10. Four people should lift and slide the probe station onto the work bench.
11. Once the station is positioned, remove the lift handles.

Remove and Save Shipping Restraints

Note

Remove the shipping restraint screws with a 9/64 in. hex wrench.

1. Locate shipping brackets by their tags and/or their red color. There are several. One is located on the microscope transport and two are located on the stage (see Figure 2).
2. Use a 9/64 in. hex wrench to remove the brackets and save them for later use, when you move the station.
3. Use a 1/4 in. hex wrench to remove the shipping bolt and washer that holds the microscope tilt plate, bridge, and platen.
4. Remove the plastic washers located between the tilt plate and bridge, and between the bridge and platen.

5. Remove the 4 lift handles after the probe station has been placed in its final position.
6. Unlock the two front platen stabilizers (see Figure 2).
7. Remove the clear chuck covering before you place a device on the chuck surface (not applicable to thermal chucks)

Caution

Save the shipping restraints and packing materials. If Cascade's customer service requests that you return the station, you **must** put the shipping restraints back into position. Failure to do so results in severe system damage and may void your warranty.

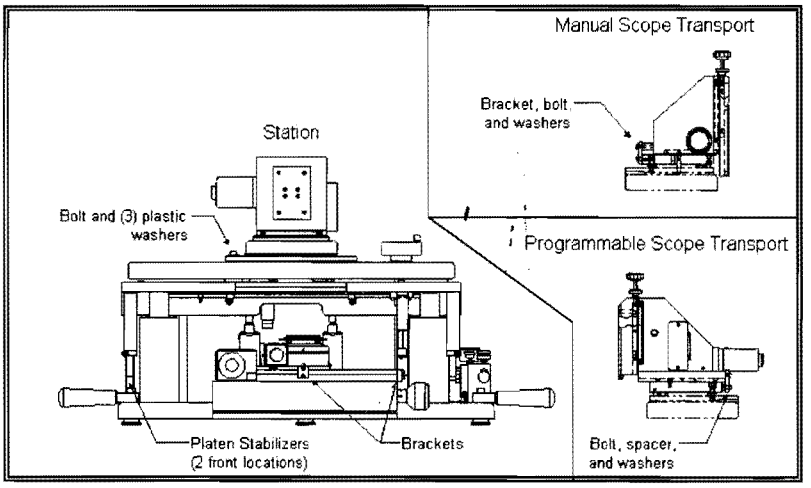


Figure 2
Shipping Bracket Locations

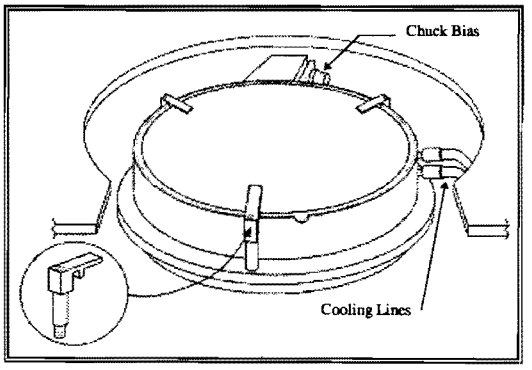


Figure 3
300° HT Guarded Thermal Chuck w/Shipping Restraints

ECX-56 Expansion Box

The expansion box comes standard with the REL-6100 Series and as an option with the REL-4800 Series. Refer to the *ECX-56 Expansion Box User Guide* for power, joystick, motor cables, and other connections. Place the expansion box adjacent to, and within one meter of your probe station.

Air and Vacuum

1. Provide air to the probe station by attaching a ¼ in. OD hose to the air intake, located on the rear of the probe station (see the figure below).
2. Provide vacuum to the probe station by attaching a ¼ in. OD hose to the vacuum intake, also located in the same area.

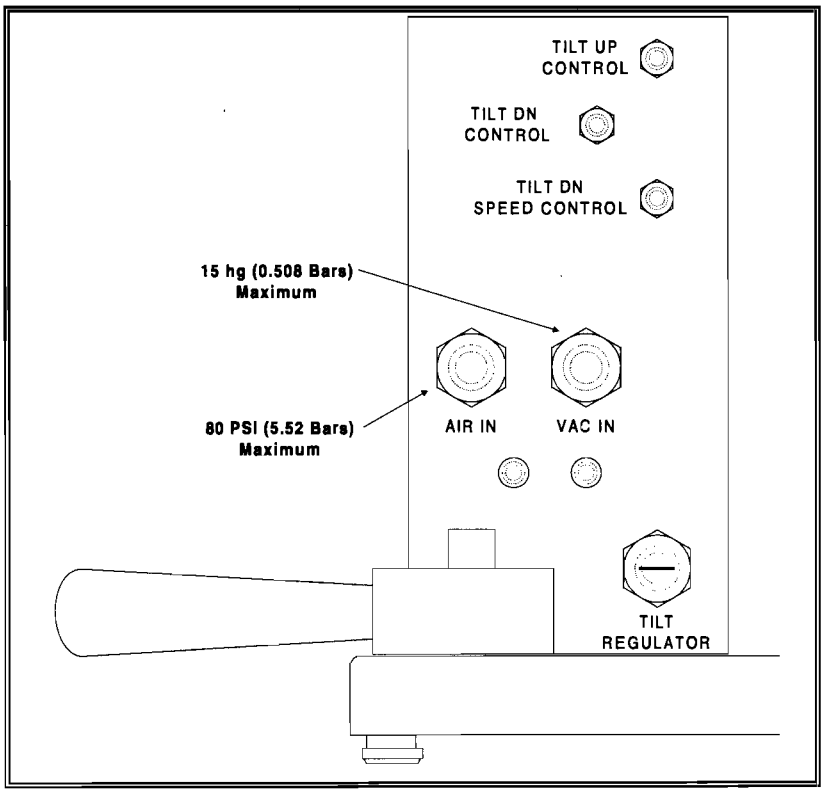


Figure 4
Air and Vacuum Connections

Chucks

Connect cables and hoses to the connection panel at rear of station based on your chuck configuration.

Guarded Chuck

The chuck structure guards and isolates the chuck from the rest of the probe station (see Figure 3). Two triax connections to the chuck are located on the back of the station.

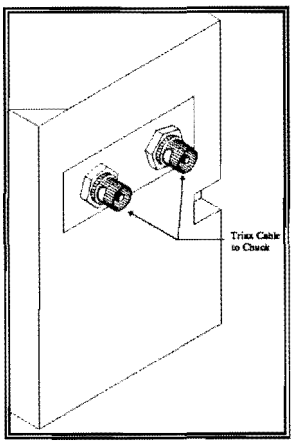


Figure 5
Guarded Connection Box

Thermal Guarded Chucks

The thermal probe station includes the thermal chuck with a chuck bias connection located at the left back of the station. The thermal chuck surface is electrically isolated from the rest of the probe station (see Figure 3).

Standard Thermal

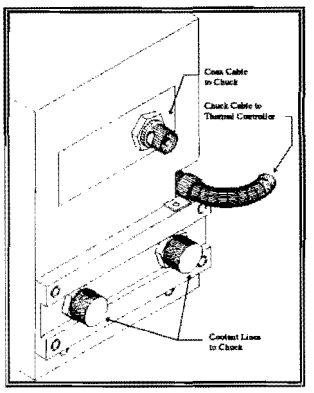


Figure 6
Standard Thermal Connection Box

Standard Guarded Thermal

The guarded standard thermal probe station includes a guarded thermal chuck with triax connections located at the back of the station.

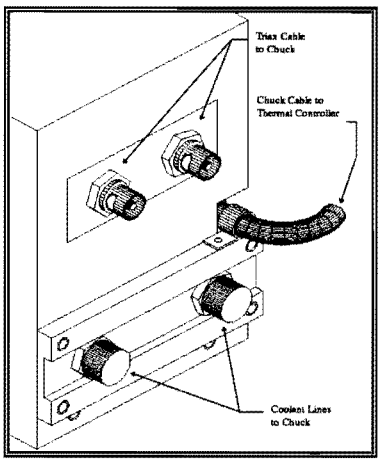


Figure 7
Standard Guarded Thermal Connection Box

Guarded High-Temp Thermal

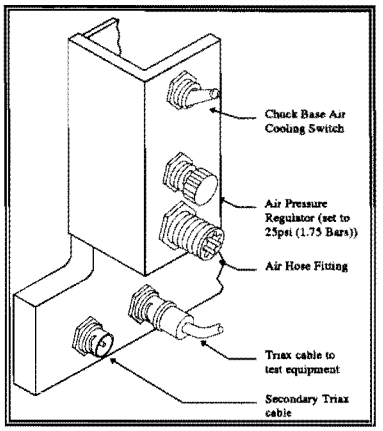


Figure 8
300° HT Chuck
Connection Bracket

Note

The HT non-guarded thermal chuck connection bracket will not have Triax cable connections.

Installing Chuck Bias

Electrical Isolation and Chuck Biasing

The chuck is composed of three layers: shield, guard, and surface (see Figure 9). This structure electrically isolates the surface from the rest of the station, enabling you to use guarded measurement techniques for accurate and rapid current measurements. Two triax connectors enable you to apply a bias voltage to the chuck's surface and a guard voltage to the chuck's guard layer.

The chuck-bias triax connectors are located on the back of the station.

- The outer shield of the triax connector makes an electrical connection with the MicroChamber and the shield-layer of the chuck.
- The middle shield of the connector makes a connection to the guard-layer of the chuck.
- The center connector makes a connection with the chuck surface.

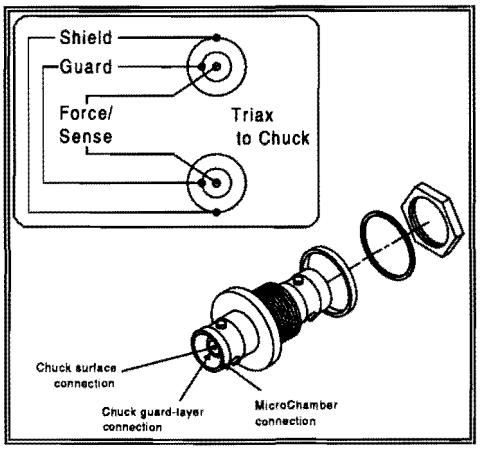


Figure 9
Chuck Triaxial Connections

Attaching Ground Wires

If your station is not already equipped with grounding wires, use Figure 10 as a guide for attaching a ground wire from the base to the platen.

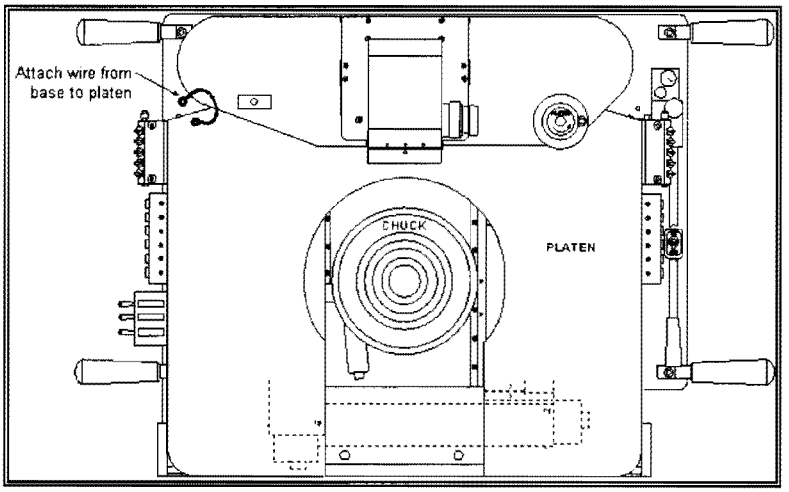


Figure 10
Grounding from Base to Platen, Top View

Note

When using the Light Tight Enclosure, it's necessary to ground the enclosure to the station to insure low noise measurements. Make the connection from the pin jack at the station base to the lug ring inside the enclosure. The lug ring is located at rear-lower-left on the mounting bolt.

Computer Requirements *(REL-6100 Series)*

Table 2: Computer Requirements

Processor	Pentium 100 or 133 MHz
Memory	8 MB (100 MHz), 16 MB (133 MHz)
Hard Drive	1.2 G, 25 MB free memory required
Screen	17" SVGA
Software	MS-DOS version 6.0 or later, Windows 3.1
Video card	2 MB Matrox Millennium
Free expansion slots	GPIB interface Pattern Recognition System (2 slots)

MicroChamber

Introduction

The MicroChamber™ is an enclosure that surrounds the chuck, providing a controlled environment for temperature, and shielding for wafer and probes from moisture, light and electrical noise.

The MicroChamber includes the top-hat, access door, walls, and platen insert plate (see Figure 11).

Features such as sliding metal plates located underneath the chuck move within the MicroChamber. Polymer seals in the MicroChamber's top hat also allow you to insert probes into the MicroChamber while keeping the seal intact. A disk attached to the microscope objective allows the microscope both vertical and horizontal movement without air or light leakage. The chamber surrounds only the chuck, so you can operate the station and view the DUT without opening the MicroChamber.

Access Door Lock

To protect you from hazardous voltages and temperature extremes on the chuck, the MicroChamber access-door has two 90° "quick connect" latches. The latches should be securely fastened when the MicroChamber access door is closed (see Figure 11).

Installing the MicroChamber Top Hat

1. Remove blank seals from positioner locations.
2. Screw in the four standoffs on the platen.
3. Insert the top-hat ring on top of the platen, over the standoffs.
   A. Raise the probes or the platen to avoid wafer contact.
   B. To support the probe, hold the probe in position with your finger.
4. Slide the slotted seals into the top hat ring and push over the probe.
5. Install the top-hat cover, which contains the sliding plate for the microscope objective.
6. Push down the screws to catch the standoffs and finger tighten.

Caution

To insure avoidance with the Top Hat, only one objective can be mounted at a time. Before lowering microscope, remove objectives not being used.

Microscope Travel Precautions

Caution

When using the Top Hat configuration, microscope travel is limited. Check to make sure the objective does not crash into the side of the Top Hat opening when moving the microscope in either the x or y directions or when tilting the microscope down.. With an A-Zoom microscope option, the microscope main body can interfere with the Top Hat cover screws. Be extremely careful moving the microscope in the z-direction.

Use of the Air Dryer

The air dryer unit dehumidifies the air used to purge the MicroChamber. This prevents frost from forming during cooling. Alternatively, you can use dry nitrogen or another inert gas to purge the MicroChamber.

When you first purge the MicroChamber at the end of installation, or when you haven't used it for several days, set the flow rate at 6 SCFM for 30 minutes to thoroughly dry out the MicroChamber. After the initial purge, you can reduce the purge time to 15 minutes each time you open and close the MicroChamber.

It's recommended that you run the thermal chuck up to 150° during initial purging to remove moisture from the chuck. This is especially important in low current systems.

After purging, you can set the operating temperature. Set the flow rate at 6 SCFM for temperatures below 41° C. For temperatures above 41° C, set the flow rate to 1 SCFM.

See the air dryer documentation for how to set it's controls.

Removing the Insert Plate

1. Open the MicroChamber Access Door.
2. Remove the (4) 8-32 screws in the platen's center disk (see Figure 11).
3. Remove the Insert Plate.

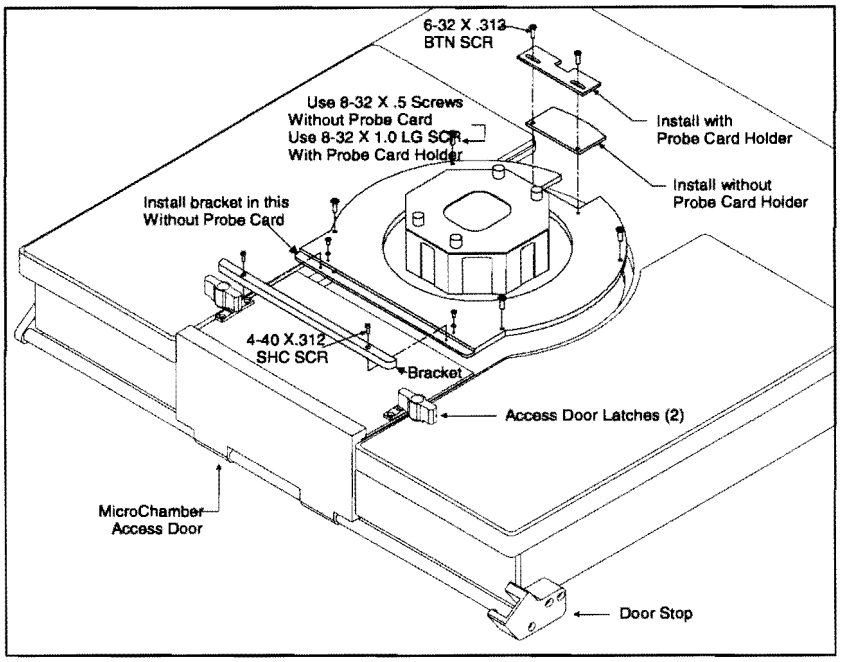


Figure 11
MicroChamber

Installing the Probe Card

Cable Exit

Feed the cables from the probe card through the foam rubber slot at the rear of the station.

Caution

When using a probe card, moving the platen to the bottom of it's travel will damage the probe card and probes if the chuck is in its up position. Use care when re-defining chuck position through software.

Top Hat limits microscope travel to ± 0.7 inches (17.78 mm).

Thermal Equipment

Connect chuck electrical cable and coolant lines, and fill coolant reservoir.

Refer to the Temptronic manual that came with your system. Because of the various configurations available, it's recommended that you consult CMI's technical support prior to installation.

Table 3: Thermal Chuck Accessories Kit:

Part Number	Description	Quantity Supplied
103-994	Wrench 5/8 in., Combination	1 ea.
103-993	Wrench, 9/16 in., Combination	1 set
103-782	Plastic Bottle	1 ea.
103-878	Fitting, 0.5in. Prestoloc APD	1 ea.
103-921	Cover, eyepiece	2 each
103-977	Hose, 1/2 in. OD	10 ft.

Installing the Microscope

Mitutoyo Finescope

1. Ensure that the 2 set screws located on the left side of the microscope's mounting plate are unscrewed back out of the way before mounting on the microscope transport.
2. Carefully slide the microscope unit onto the dovetail until it stops. Ensure that the gross adjusting knob is retracted to enable you to fully seat the microscope dovetail.
3. Tighten the 2 screws on the left side of the microscope mounting plate (see Figure 12).
4. Remove the protective covers located in the 2 eyepiece sockets in the microscope.

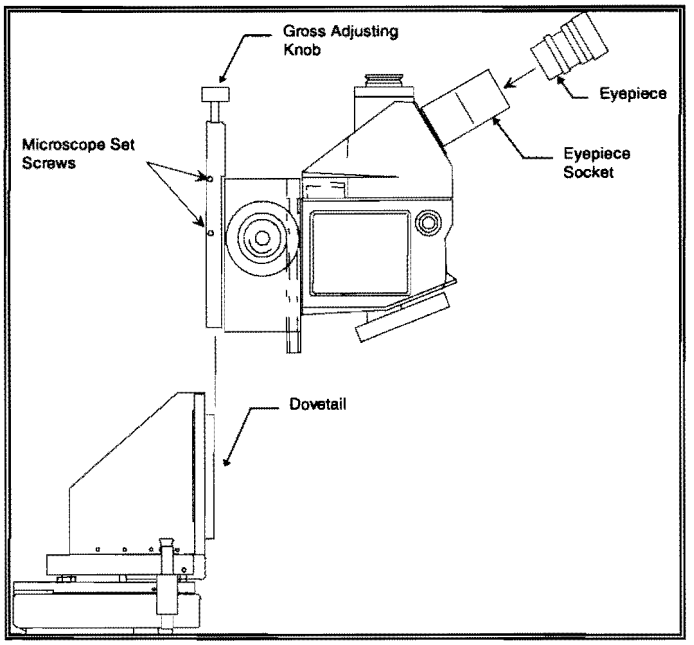


Figure 12
Installing the Microscope Head

5. Insert the 2 eyepieces into the eyepiece sockets. These eyepieces are normally 10x magnification.
6. Unscrew the protective caps located in the microscope objective turret.
7. Screw in the objective(s) until they are tightly in place (finger tight only). Each objective has a colored band that correlates to a colored dot located on the microscope objective turret (see Figure 13).

Notes

Only one objective should be mounted on the turret when the Top Hat is used.

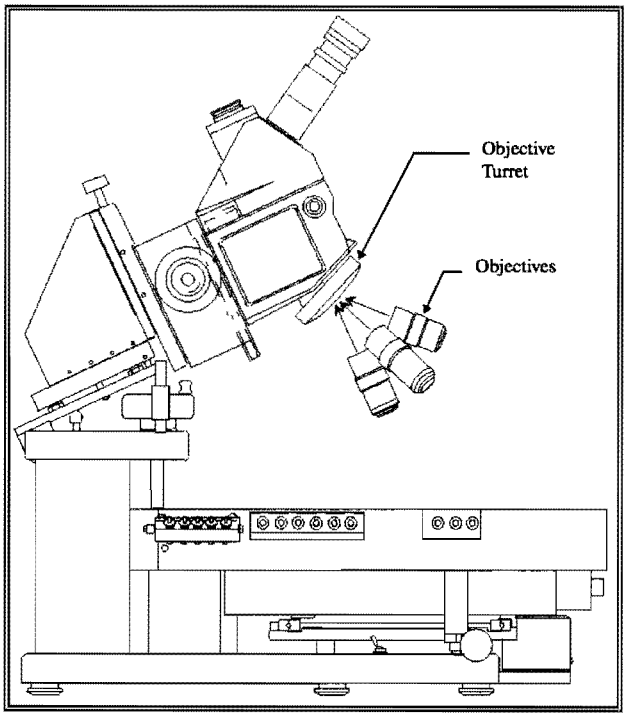


Figure 13
Installing the Microscope Objectives

Caution

Ensure that each objective is placed into its corresponding color coded slot, to insure that the same spot on the wafer is seen (Par-centered) when you change objectives. Do not touch the objectives lens or turn the turret using the objectives as hand-holds.

8. Place the small end of the fiber optic cable into the rear of the microscope assembly and tighten the thumb screw until the cable is held snugly in place.
9. Place the large end of the fiber optic light cable into the microscope light assembly.
10. Plug in the microscope light assembly into its corresponding AC voltage source (110 or 220 VAC).
11. Place the ON/OFF light switch of the microscope light assembly on a ferrous metal surface close to you. This switch controls the light intensity of the microscope.

Installing Micropositioners and Probes

Refer to the specific instruction sheets for these accessories.

Probe holders with vacuum mounts attach their hoses to the RAC-61 Vacuum Manifold located to the left and right of the platen.

Installing a Video Camera

The camera and monitor make it easier for you to probe wafers using micropositioners or probe cards.

1. Remove the camera dust cover located on top of the microscope assembly.
2. Place the camera adapter on top of the microscope assembly and tighten the thumb screw.
3. Place the camera on top of the camera adapter and tighten the thumb screw. The camera serial number should be facing the rear of the Probe Station (faces the front with the New Wave laser).
4. Connect red (+) / black (-) power supply connectors to the camera's ± terminals.
5. Connect one end of a coaxial cable to the VIDEO OUT connector of the camera.
6. Connect the other end of the coaxial cable to the monitor unit.
7. Connect the power cords of the camera power supply and the monitor unit to their AC connector (110 VAC only).

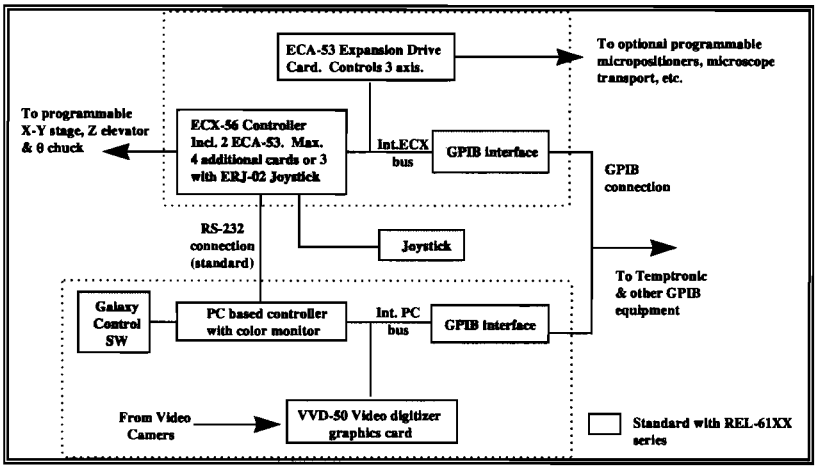
Installing the Computer (*REL-6100 Series*)

Install the Computer and Cables

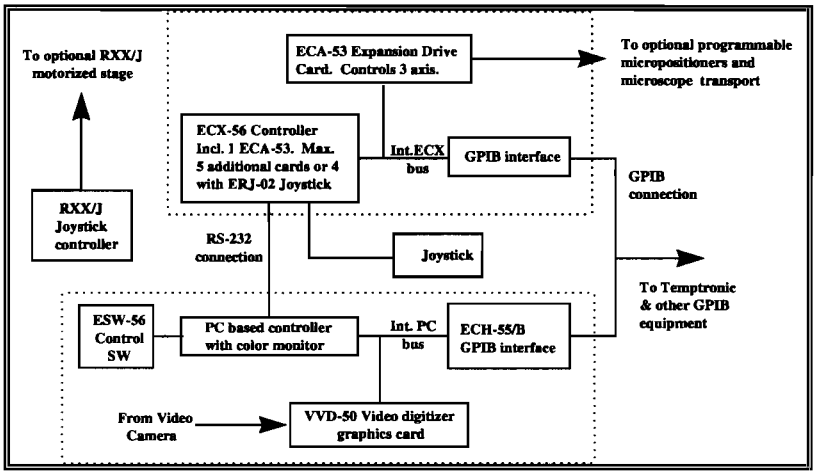
1. Unpack the computer, the keyboard, the mouse, and the video monitor.
3. Arrange the computer under your workbench with the keyboard, monitor, and mouse on the workbench next to the station.
3. Connect the RS-232 or optional IEEE-488 cable.

Control Electronics

REL-6100 Series



REL-4800 Series



Using the Joystick to Initialize Channels

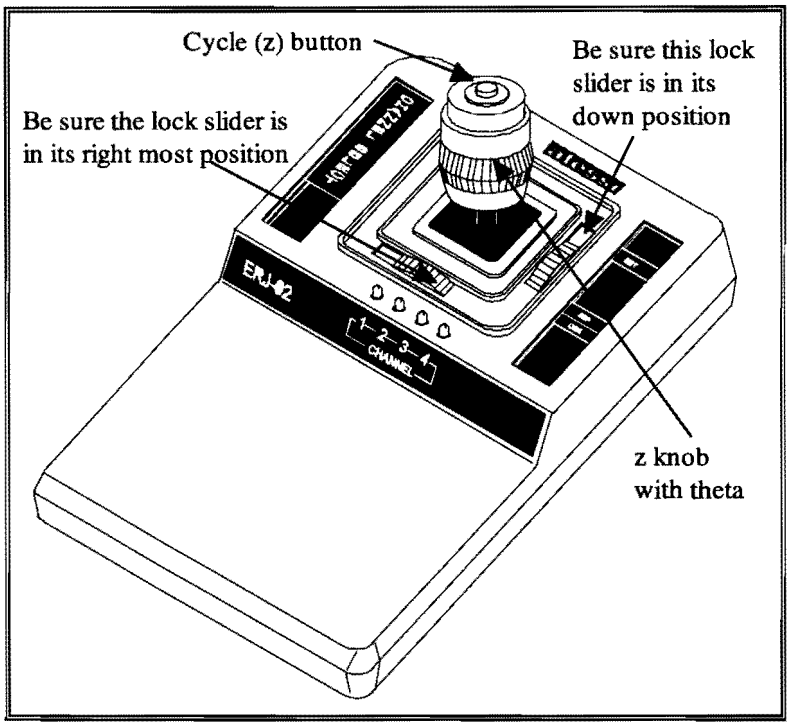


Figure 14
ERJ-02 Joystick

Connect the joystick to the rear of the ECX-56 expansion box. Use the joystick to initialize the probe station. For more information on using the Joystick, see the chapter *Operating*.

To Initialize a Channel (Set Machine Zero)

Caution

> You must initialize the system each time you start a probing session. Initialization clears channel information and resets the system to machine zero, insuring that moves are relative to machine zero. To stop initializing, move the joystick or toggle it's top button.

1. Press the set key.
2. Press the channel selector key.

Operating

Emergency Stop Button *(REL-6100 Series)*

Warning

> Be sure that the Emergency Stop button cable is connected to the ECX expansion box jack labeled **Emergency Stop**. This connection enables you to stop station and positioner movement by pressing the Emergency Stop button.

To Stop Station Movement

Press the red **Stop** button.

To Restore Station Movement

Twist the **Stop** button counterclockwise to release.

After releasing the emergency stop button, Cascade recommends that you cycle station power to reset it.

Verifying Controls

Verifying Platen Height Z-axis Movement

Adjust the z-lever friction after you install probes and accessories.

The z-lever is on the probe station's lower right side. To verify operation, raise and lower the z-lever. The platen moves up and down correspondingly. When operating correctly, the z-lever stays in the place where you released it.

Note

> Ensure that the platen z balance is correctly adjusted before proceeding to step 1. See page 35, *Adjusting the Pneumatic Platen*, on how to adjust the platen z balance.

1. Turn the platen gross movement knob and ensure that the platen lifts smoothly in its entire 2^2 of travel.
2. Lift the platen z (lift) handle and ensure that the platen lifts approximately .200 in., and raises smoothly.

Verifying X-Axis and Y-Axis Stage Movements

You'll find the x-axis and y-axis stage control knobs at the front of the probe station, near the base of the stage. Movement occurs within a 200mm x 200mm area, or within an area described by Figure 15 when a

MicroChamber is installed. To verify x-axis and y-axis movements, insure that the area around the stage is free of constraints and then follow these steps:

1. Turn the y-axis control clockwise. The stage should move forward.
2. Turn the y-axis control counterclockwise. The stage should move backward.
3. Turn the x-axis control clockwise. The stage should move to the right.
4. Turn x-axis control counterclockwise. The stage should move to the left.

If the stage still does not move, contact your Cascade representative.

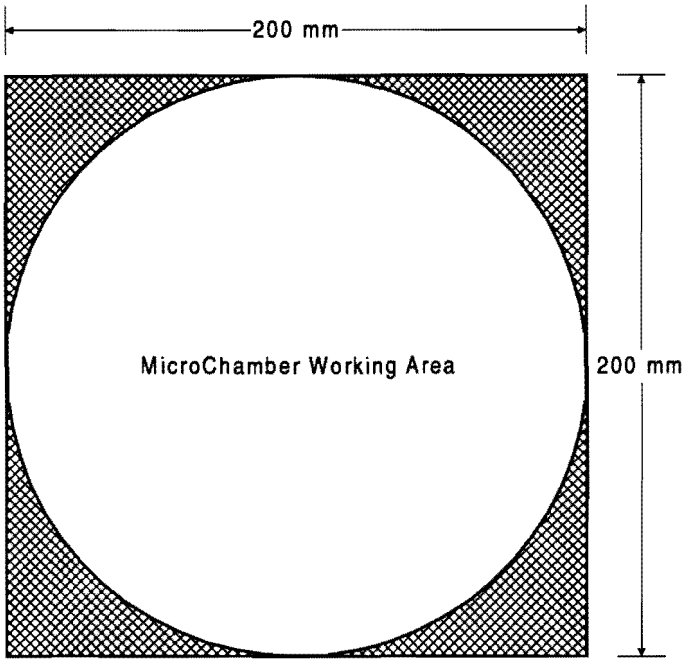


Figure 15
Stage Travel Area

Note

X/Y stage movement is restricted to a circular area (200 mm diameter) when a MicroChamber is installed. Otherwise, movement is within a 200mm x 200mm area. See the above figure.

Verifying Theta Movement

The theta control is on the right front of the stage. Follow these steps to verify operation of the theta control:

1. Turn the theta control clockwise. The chuck top should rotate counter-clockwise.
2. Turn the theta control counterclockwise. The chuck top should rotate clockwise.

If the chuck does not rotate as expected, make sure that it is not jammed by a stray piece of shipping material.

Verifying Chuck Vacuum Controls

Remove the plastic protector from the chuck's surface.

The chuck vacuum holds your DUT securely in place during stage movement and probing. On the *REL-6100 Series*, you can turn the vacuum off to load and unload DUTs using Galaxy software, or manually through the locations below.

Switch and Control Knob locations:

- Standard Chuck -- switch on station base (left side); control knob on the chuck
- Guarded or Thermal Chuck -- 3 switches at left of platen control suction on wafers (10, 75, ≥100 mm diameters)

Standard Chuck

Follow this procedure to verify the vacuum area controls:

1. Turn on the vacuum switch.
2. Place a small piece of paper in the chuck's center.
3. Using a flathead screwdriver, set the vacuum chuck selector on the chuck (see Figure 16) to the size of the wafer (3, 4, 5, 6, or 8 in.).
4. Turn off the vacuum switch.

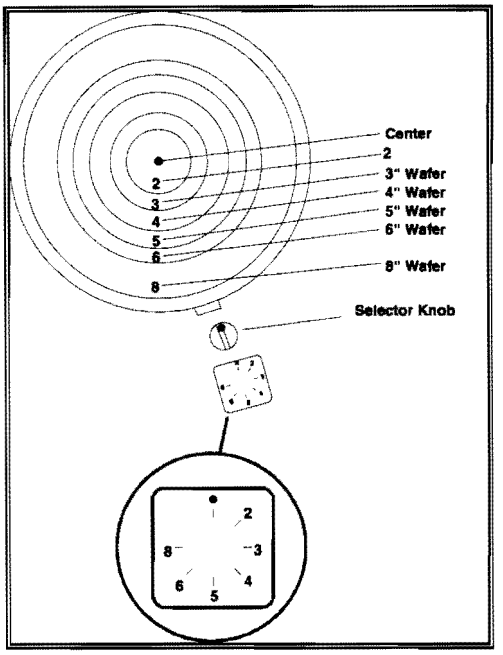


Figure 16
Chuck Vacuum Zones

If the paper does not hold down as expected, make sure:

- your vacuum source works properly
- the hose connects properly to both the vacuum source and to a tube fitting at the rear of the probe station

Guarded or Thermal Chuck

Follow directions for the Standard Chuck, excluding step 3, and make your adjustments through the vacuum control switches located at the left of the platen.

Verifying the Microscope and Video Adjustments

1. Lift up the microscope assembly by using the microscope tilt switch located on the station base, right side. Ensure that the microscope tilts back smoothly.
2. Use the microscope tilt switch again and ensure that the microscope comes down smoothly.
3. Ensure that the microscope transport and the stage assemblies are placed in their approximate center of travel.
4. Place the x-y stage in the approximate center of travel.
5. Focus the microscope on the chuck top using the 20X objective.

6. Move the x-y stage in the x and y axis, and check that the video on the monitor moves in the same direction. If it travels in the opposite direction, the camera is not properly placed on the adapter. Loosen the thumb screws on the camera and rotate it 180 degrees, then re-tighten.
7. Move the microscope assembly in the x and y axis and make sure that it travels smoothly.
8. Place the microscope in the center of travel and focus on the chuck top.
9. Move the stage assembly in the x and y axis and make sure that the microscope stays in focus throughout its travel. If it does not maintain focus, planarize the chuck (see *Maintaining*).

Adjustments

The following procedures will help you to set up the probe station to probe a wafer. Following these procedures will help prevent accidentally damaging the wafer, probes, probe holders, or probe cards.

Caution

If positioners are added to (or removed from) the platen, you must adjust the air pressure to the platen to compensate for the weight change.

The extra weight (or the weight loss) can cause the platen to lower (or raise) unexpectedly. This platen z change may cause you to accidentally damage the wafer, probes, and positioners.

By adjusting the air pressure, you ensure that the platen remains stationary relative to the chuck.

Check the air pressure monthly and when you change probes or positioners.

Adjusting the Pneumatic Platen

The platen is factory adjusted, however, adding accessories to the platen may require re-adjustment. See Figure 1 (*Installing*) for the following locations.

z refers to vertical chuck and platen movement along the z axis (up and down).

1. Identify the platen height gauge on the left, back corner of the probe station, on top of the bridge. Any up or down movement of the platen is reflected in this gauge.
2. Identify the z-lever (also called the lift lever) air pressure gauge on the right, back corner of the probe station. Use the regulator knob in front of this gauge to adjust the air pressure.
3. Check the z-lever air pressure by raising and lowering the z-lever. The platen moves up and down correspondingly. The platen should stay in place when you release the z lever. Watch

the platen height gauge to make sure that the platen does not move.

The more accessories that are installed on the platen, the greater the amount of air-pressure required to balance the platen.

4. Turn the regulator knob to adjust air pressure as needed. Ensure that the air pressure is appropriate for all z-lever heights.
5. Re-check the z-lever air pressure at all positions between fully up and down.

Adjusting the Microscope

1. Ensure that all objectives clear the chuck surface area. To adjust, loosen (2) set screws and use the gross z movement on top of the microscope transport assembly to get the desired clearance and still maintain focus with all the objectives. Re-tighten the set screws.
2. Tilt the microscope assembly by using the microscope tilt switch.
3. Prepare to load the wafer by moving the stage assembly to the center of travel in the X axis and all the way forward in the Y axis.

Alignment

Aligning the Wafer

1. You may wish to tighten the outside thumb screw on the platen z lever to lock it in place.
2. Place a wafer on the chuck and carefully center the wafer. Try to visually align the wafer as well as possible in order to simplify the alignment of the wafer.
3. Turn the vacuum switch to the ON position.
4. Ensure that all probes or probe cards are out of the way when the platen z handle is in the contact (down) position.
5. Move the stage to its approximate center of travel.
6. Focus on the wafer and find a street and/or corner of a die.
7. Use the Galaxy software to align the wafer *(REL-6100 Series)*. Choose **Align** from the **Run** menu. Click on the **2-POINT ALIGN** button. Then, follow instructions on your screen. The instructions will ask you to manually move to two points on the same street. These two points are used to align the chuck.

--OR--

On the *REL-4800 Series*, move the stage in X axis and ensure that the wafer is traveling in a straight line. If the wafer is skewed, align the wafer by using the theta manual override. Continue moving the stage in the X axis and adjusting the theta manual override until the wafer is aligned.

8. Move the stage back to the center of travel and find a corner of a die.
9. Bring the probes or probe card into focus, being careful not to scrub the wafer. If the probes or probe card are too high, use the Gross Platen z knob and carefully bring the probes or probe card into focus.

Aligning the Probes

1. If using probes, use the probes z axis knobs to bring the probes into contact with the wafer. If a probe card is being used, align the probe card to the wafer and then bring the platen down into the contact position.

Caution

Raise the platen lift (z) lever manually before the stage is moved in the X or Y axis. This lever lifts the platen 0.2 in. from the surface of the wafer. This should be enough probe clearance to move the stage from die to die. If this does not provide enough clearance, use the gross platen z knob to provide enough clearance.

Setting Contact Position

1. Put the z handle fully down.
2. *REL-6100 Series* -- Move the chuck to contact position through software, focus on the wafer, and then bring probes into contact with the wafer.

   REL-4800 Series-- Bring the probes into contact with the wafer by using the x, y, and z knobs on the micropositioners.

Initializing a Channel (*REL-6100 Series*)

Warning

Do not initialize unless the motors have moved since when the ECX-56 controller was turned off, as you may damage system components.

Initialization clears channel information and resets the system to machine zero, insuring that moves are relative to machine zero. You can initialize a channel either by using the Galaxy software, or by using the joystick. For information on how to use the joystick, see the next section on using the ERJ-02 joystick.

To Initialize a Channel (Set Machine Zero) Using the Galaxy Software

1. Choose Machine from the Set menu, then choose Initialize Channel from the Machine menu.
2. Follow the instructions in the dialog boxes.

For more information about initializing, see the *Cascade Microtech Alessi Galaxy Software User Guide* or online help.

ERJ-02 Joystick (*REL-6100 Series*)

You use the joystick as you would use the mouse-plus-Galaxy-software to control station moves.

The ERJ-02 controls up to four channels in X, Y and Z (plus theta if DUT is used).

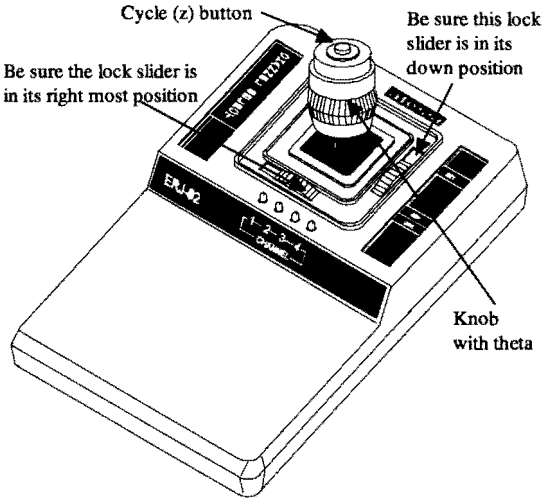


Figure 17
Joystick

Caution

Be sure that the locking sliders are in the positions indicated in the above figure. If they are not, the z knob will fall to one side, causing the stage to drift. This movement can cause your probes to crash.

Button and Knob Overview

The Knob is used for X/Y, Z and theta motion. See **Selecting Axis** for instructions on changing which axis the knob controls.

Channel Select

The channel select button is used to change which channel the knob controls. The channel LEDs indicate which channel is currently active. See **Activate a Channel** for information on changing the channel.

Channel LEDs

The channel LEDs indicate which channel is controlled by the knob. See **Activate a Channel** for information on changing the channel. See **LED Indicators** for a description of how the LEDs blink to indicate certain operational modes.

Set Button

The set button is used in conjunction with other buttons for "setting" certain parameters of stage motion. It can be used to **Set Contact Location, Set Separate Location,** or **Move in Increment** mode.

Locking Sliders

The locking sliders must always be in the locked position (see diagram). They serve no purpose other than to hold the knob in the upright position.

Cycle Z Button

This button selects which axis is controlled by the knob. See **Selecting Axis.**

Con and Sep

The Con(tact) and Sep(arate) buttons are used for moving the chuck to the contact and separate positions. See **Set Contact Location.**

LED Indicators

Channel Indicators

There are four channel LEDs which indicate which channel is active according to the following chart. Pressing the Channel Select button will cause the channel to change. If the channel indicator blinks, it means the theta stage is active. Twisting the knob will cause the DUT to rotate. See **Selecting Axis.**

Channel Selector LED

If the channel selector button blinks it means the Z axis is active. Twisting the knob will cause the channel to move in Z. See **Selecting Axis.**

Con and Sep LED

When the Con LED is on solid, it means the Z axis is at the contact position. When the Sep LED is on solid, it means the Z axis is at or beyond the separate position. When neither of the Con or Sep LEDs are on, it means the Z axis is somewhere in between the contact and separate positions. When the Con or Sep LEDs are blinking very quickly, it means at least one channel has not yet been initialized. See **Initializing a Channel**.

Set LED

When the Set LED is blinking, it means the set mode is active. The next button pressed while in set mode will have some effect on the motion parameters for the joystick. For example, pressing the Con button will load the current Z position as the contact position, see **Setting Contact.** Pressing the Sep button will load the current Z position as the separate position, see **Setting Separate.**

Initializing Channels

Initializing a channel causes the prober to find the center of travel for that channel. The center then becomes the home position.

Caution

> Before initializing a channel, ensure that the probes and wafer will not crash.

If either of the Con or Sep buttons are blinking very quickly, it means at least one channel has not been initialized. Perform the following steps on all channels to clear the fast blinking before using the probing station.

1. Press the channel select key until the channel to be initialized is active (Channel LED is on).
2. Press and hold the set key, then press the channel select button. The channel will begin initializing. Release both buttons.

To interrupt the initialization process, simply move the joystick. Doing so leaves the channel in an uninitialized state. When the initialization is finished, all four channel LEDs will blink for about 1/4 of a second.

Activating a Channel

After all channels have been initialized, the channel select button can be used to change which channel is controlled by the knob. The following table shows which LED indicates which channel.

Table 4: LED Assignments

LED	Channel
1	DUT, or Scope, or Probe 1
2	Scope
3	Probe1
4	Probe2

Note

If either the channel select LED or the channel LED is blinking, then the knob is in Z or theta mode. Pressing the channel select button will have no effect. Press the Cycle Z button until no LEDs are blinking and then the channel select button can be pressed to change the channel (See Selecting Axis).

Selecting Axis (X/Y, Z, theta)

After a channel has been selected, then the Cycle Z button on top of the knob can be used to select which axis is controlled by the knob.

- When a channel is first selected and no LEDs are blinking, the knob controls the X/Y axis. Moving the Knob will cause the X/Y stage to move. The more the knob is deflected, the faster the stage will move.
- Pressing the Cycle Z button once will cause the channel select LED to blink. This means that the knob controls Z axis. Twisting the knob causes the Z axis to move. The more the knob is twisted, the faster the stage will move. Pushing the knob in X or Y will have no effect.

Note

The Z axis has protections built in so it will not move beyond the contact position. If the Z axis reaches the contact position it will stop moving and the channel LEDs will blink simultaneously. This is to protect the probes and wafer from being damaged. Releasing the knob will make the channel LEDs stop blinking. To move the Z axis beyond the contact position the Set mode must be activated, see **Set Contact Location**.

- If the current channel is the DUT, pressing the Cycle Z button again will cause the Channel LED to blink. This means the knob controls theta rotation. Twisting the knob causes the theta stage to rotate. **Pushing the knob is X or Y will also cause the X/Y stage to move.**
- Pressing the Cycle Z button again will set the mode back to X/Y (no LEDs blinking).

Set Contact Location

The contact location is the stored Z position for a channel that is moved to make the probes contact the wafer. Set the contact position for the DUT first and then for the probes.

1. Press the channel select key to select the channel to be set.
2. Press the Cycle Z button to activate the Z axis. The channel select button will begin blinking.
3. Press the Set key. The set key will begin blinking indicating the set mode is active.
4. At this point, the normal protections for the Z axis are disabled. i.e., the Z axis will be allowed to move its full range of motion.
5. Twist the knob to move the Z axis to the desired contact position.
6. Press the Con button. This stores the current Z position as the contact position and deactivates the set mode.
7. Press the Sep button. The Z axis will move to the separate position.
8. Press the Con button and the Z axis will return the to contact position that was just loaded.

Caution

Set the DUT contact first before using your probes. Otherwise, you may severely damage your wafer and probes.

Set Separate Location

The separate location is the stored Z position for a channel that is to be moved to make the probes out of contact with the wafer. The Z axis will move to the separate position before any X/Y or theta moves occur.

The default separate position (100 microns above contact) is adequate for most applications. The separate position is relative to the contact position so loading a new contact position will change the separate position as well. i.e., it's usually not necessary to set the separate position.

1. Press the channel select key to select the channel to be set.
2. Press the Cycle Z button to activate the Z axis. The channel select button will begin blinking.
3. Twist the knob to move the Z axis to the desired separate position. The separate position must always be further away from the wafer than the contact position.
4. Press the Set button. The set button will begin blinking indicating the set mode is active. Note that when the set mode is

active, the protections for driving the Z axis into the wafer are temporarily disabled.

5. Press the Sep button. This stores the current Z position as the separate position and deactivates the set mode.
6. Press the Con button. The Z axis will move the contact position.
7. Press the Sep button and the Z axis will return to the separate position that was just loaded.

Set Increment Distance

Increment moves are used to move a whole die location at a time. Setting the increment involves loading the same corner on two adjacent die so the prober knows the distance between rows and columns.

If the prober is connected to a PC with Galaxy software then it is usually easier to set the increment in the Galaxy software (Wafer Map).

1. Select the DUT or Scope channel.
2. Move to a corner of a die.
3. Press the Set key to activate the set mode. The set button will blink.
4. Press the Cycle Z button (top of knob). The set button blinks faster. This saves the current position in X and Y.
5. Move to the same corner of the next die. Move a row and column (kitty-corner).
6. Press the Cycle Z button again. The distance between the two corners is computed and stored. The Set button now stops blinking.

Move In Increments (Die Stepping)

Die stepping is used to move the stage one complete row or column. This requires the die size to be loaded first (Set Increment Distance or Galaxy wafer map).

1. Press and hold the Set button.
2. Deflect the knob. The amount of deflection does not matter as the stage will move either one row or one column.

Load and Unload DUTs Using the MicroChamber

Warning

> Chuck bias voltages can be dangerous and chuck temperature extremes can cause serious injury. Before opening the MicroChamber access door, make sure no voltage is being applied to the chuck, and the chuck is not at a temperature extreme.

Before loading and unloading DUTs, take the following precautions:

- Set the power source to zero volts before changing the wafer.
- Make sure that the chuck is close to room temperature.

Caution

Avoid touching the chuck. Chuck surface contaminants can interfere with electrical contact between the chuck and DUT, and create noise in your measurements.

To Load a Wafer

1. Raise the z-lever and move the chuck to the front of center.
2. Open the MicroChamber access door.
3. Turn off chuck vacuum.
4. Use wafer tweezers to place the wafer in the chuck center, aligning it visually.
5. Turn on chuck vacuum.
6. Send the chuck to center and close the MicroChamber access door.

To Unload a Wafer, Follow Steps 1-4 Above, Then

1. Use wafer tweezers to remove the wafer.
2. Close the MicroChamber access door.

To Probe Without the MicroChamber Top (for Thick DUTs or Wide Probe Separation)

1. Remove the screws in the platen's insert plate (see Figure 11).
2. Lift the plate out.

Thermal Chuck

Testing the Thermal Chuck

Note

If the system has not been purged for several days, you should purge the system for 30 minutes. For subsequent purges, 15 minutes should be sufficient.

After the initial purge (6-7 SCFM) you can reduce the purge flow rate as low as 0.5 or 1 SCFM. Chuck temperature transitions occur faster at lower purge rates. Never operate the system with a purge flow rate less than 3 SCFM at temperatures below 41° C.

For temperatures above 41° C, use a purge flow rate of 1 SCFM to minimize thermal coupling between the chuck, the probes, and the cables.

Purging the MicroChamber with Dry Air

1. Close and secure the access door to the MicroChamber.
2. Lower the microscope to the down position so that the microscope objective is inserted in the microscope seal (for Finescope, and A-Zoom microscopes only).
3. Make sure that the Top Hat is sealed against the MicroChamber.
4. Make sure compressed-air is connected and flowing to the air dryer.
5. Power up the air dryer.
6. Adjust the air-flow control (counterclockwise increases air flow) until it is set to at least 6 standard cubic feet per minute (SCFM).
7. Allow the dry air to purge for at least 30 minutes.

Using the Temptronic Controller and Filling the Coolant Reservoir (TP3000/TPO3200)

1. Turn on the Temptronic controller.
2. Power up the station.
3. Fill the coolant reservoir. See the Temptronic manual.
4. Set T1 and T2 on the Temptronic controller to the desired temperatures (between -55° C and +200° C). See the section "Local Operation" (*Temptronic ThermoChuck Operator's Manual)* for how to set temperatures.
5. Wait until the Temptronic controller verifies that the specified temperatures are reached.
6. Ensure that frost does not form on the chuck at any temperature. Check different temperatures to ensure that frost will not form regardless of the temperature.
7. Inspect the coolant lines and fittings for leaks.

If frost forms, see the chapter *Troubleshooting*.

Thermal Controller and Cooler/Circulator

The thermal controller and cooler/circulator maintain the desired test temperature of the thermal chuck. The cooler/circulator pumps coolant fluid through the chuck to chill it, and the heating is controlled through the power cable.

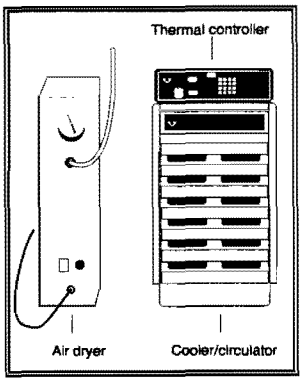


Figure 18
TPO3000 Thermal Controller, Cooler/Circulator, and Air dryer

Guarded Thermal Chuck

Tips for Using the Low-Noise, Guarded Thermal Chuck

Table 5: Tips

When	Do this
After installation and before first use. OR Before use, if station has not been used for several days.	Install the triax shorting plug (P/N 104-740) onto one of the chuck triax connectors; keep the shorting plug installed for at least 1 hour. **Note:** We recommend that you install the shorting plug whenever the station is not in use to prevent charges from building up in the chuck. We also recommend that you install the shorting plug when you are not measuring substrate current or biasing the chuck.
After installation and before first use. OR Before use, if the station has not been used for several days.	Turn on dry air with flow rate set to 6 CFM and set chuck temperature to 150°C; keep air flow on and chuck hot for at least 1 hour to dry out all moisture from MicroChamber and chuck.
Before wafer unload and load.	Set the chuck temperature to 41°C to prevent frost formation on the chuck when the MicroChamber door is open. Internal surfaces and hoses drop to -50°C if the chuck temperature is programmed to be less than 40°C, or if the chuck is more than 10°C warmer than the setpoint temperature.
Before setting temperature below 40°C.	Turn on dry air flow to 2 - 3 CFM and allow MicroChamber to purge for 10 - 15 minutes.
During measurements.	Make sure that the wafer is on the chuck and vacuum is turned on. Sufficient vacuum is required. Insufficient vacuum can increase chuck noise.
During measurements.	Ground the chuck with the shorting plug. OR Connect the chuck to a voltage source to prevent slight charge accumulation.

When	Do this
During measurements.	For temperatures above 40°C, dry air flow is not required. OR For temperatures below 40°C, turn on dry air flow to 3 - 6 CFM. OR If you will be transitioning between temperatures above and below 40°C, turn on dry air flow to 3 - 6 CFM.
When station is not in use.	We recommend that you install the shorting plug whenever the station is not in use to prevent charges from building up in the chuck.

Maintaining

Introduction

Your probe station is designed and built for long, trouble-free service. In order to achieve peak operation, prolong your probe-station's life, and avoid unscheduled downtime, follow the preventive maintenance procedures in this chapter.

This chapter explains how to maintain the probe station only. Refer to the documentation for your probes, positioners, and other equipment or components for how to maintain those accessories.

Re-Planarizing the Probe Station

Note

> The following procedures are done at the factory to ensure that the probe station maintains its flatness throughout the travel of the stage and the microscope. Under normal circumstances, you will not have to planarize the probe station.

If the station is planarized properly, you can maintain focus throughout travel across the wafer. Apply this procedure if you find yourself refocusing the microscope when the stage or the microscope is moved in the X or Y axis.

Begin by first planarizing the chuck, then the microscope transport.

Standard Chuck

The chuck is planarized to the microscope by the 3 planarization screws that are located on the side of the vacuum chuck.

1. Move the microscope to its approximate center of travel by using the X and Y axis controls. Leave the microscope in this position for the rest of this procedure.
2. Move the stage to Position A and focus the microscope using the focus knobs. This is the location of the stationary planarization screw. Refer to the Figure 19.

Note

Planarizing the Guarded Thermal Chuck requires a slightly different procedure. Contact CMI's Customer Service.

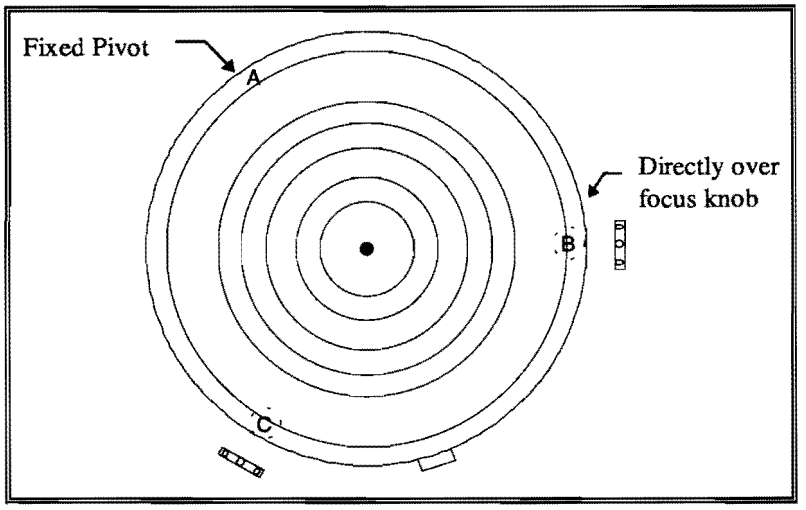


Figure 19.
Chuck Planarization

Note

Do not use the focus knobs on the microscope to focus on the chuck at position b and c.

3. Move the stage to Position B. the planarization screw is located on the side of the chuck at this position. Using a 5/64 in. hex wrench or smaller, turn the planarization screw until the surface of the chunk is in focus.
4. Move the stage to Position C. The planarization screw is located on the side of the chuck at this position. Using a 5/64 in. hex wrench or smaller, turn the planarization screw until the surface of the chuck is in focus.
5. Move the stage back to Position A. If the chuck is not in focus, use the focus knob to focus on the chuck. Continue with Steps 2-5 until the chuck remains in focus at the 3 planarization areas.

Microscope Transport

You will need both a 9/16 in. open end wrench and a 5/32 in. hex wrench. There is (1) planarization screw at the rear of the microscope and 2 in front (see Figures 20-22). The planarization screws are held in place by the planarization locking screws. Loosen the locking screws before you turn the planarization screws.

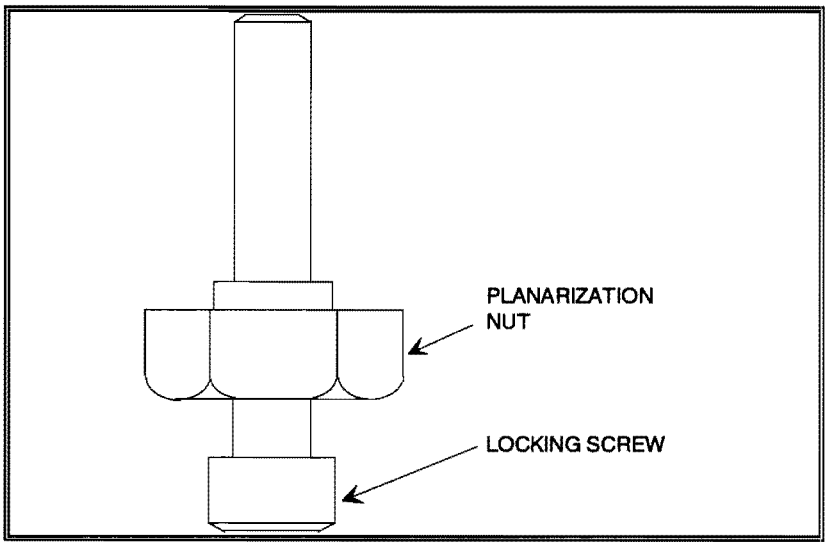


Figure 20
Microscope Planarization Screw Assembly

Caution

Ensure that the platen stabilizers (thumb screws) on the front of the platen are unlocked.

1. Place the stage in the approximate center of its travel in the X and Y axis and center the chuck theta in its center of travel. Do not move the stage during the microscope planarization process.
3. Lower the platen to its lowest position by using the platen knob located on top of the bridge.
4. The X axis is planarized first. Move the microscope to position A. Focus the microscope on the chuck surface using the focus knob. The Y axis remains stationary during the planarization of the X axis.

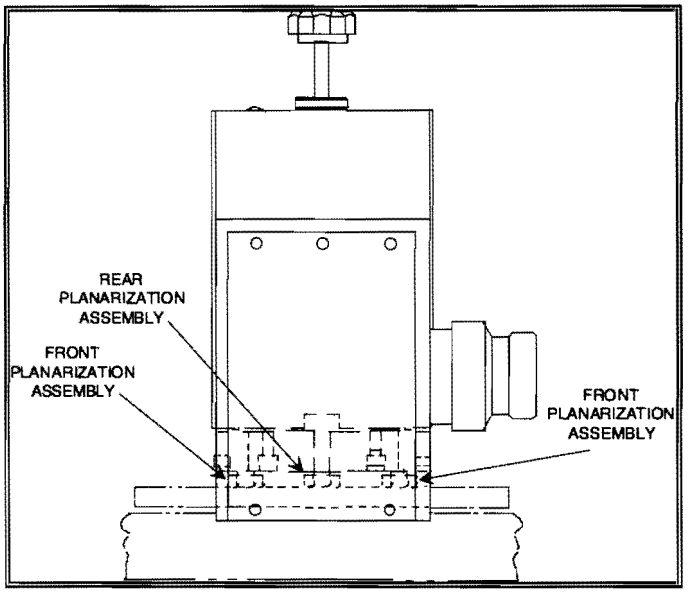


Figure 21
Microscope Planarization Screws

5. Move the microscope in the X positive direction to Position B. If the microscope is not in focus, loosen the locking nut by using a 5/32 in. hex wrench. the locking screw is accessible from under the bridge assembly. If the microscope is in focus, the X axis is already planarized and does not have to be adjusted.
6. Using the 9/16 in. open end wrench, turn the planarization screw located between the RST head and the microscope lift, until the microscope comes into focus.

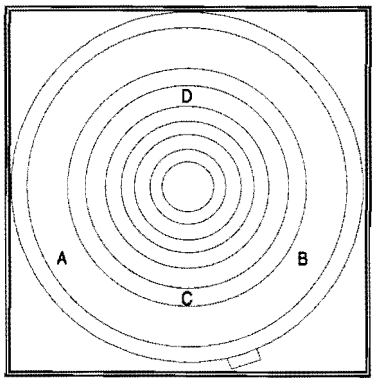


Figure 22
Microscope Planarization Locations

7. Tighten the holding screw.
8. Move the microscope back to Position A and ensure that the microscope is in focus. If the microscope is not in focus, use the focusing knob until the microscope is in focus.
9. Repeat Steps 5-8 until the microscope remains in focus during the entire travel in the X axis.
10. Place the microscope transport in the approximate center of travel in the X axis. The X axis will remain stationary during the planarization of the Y axis.
11. Move the Y axis all the way forward to position C, as shown in the figure on the previous page. Ensure that the microscope is in focus. If the microscope is not in focus, focus the microscope using the focus knob.
12. Move the microscope Y axis all the way to the rear of its travel, Position D. If the microscope is not in focus, loosen the locking nut.
13. Bring the microscope into focus by turning the planarization screw and tightening the locking nut.
14. Repeat Steps 11-14 until the microscope remains in focus throughout the entire travel of its Y axis.

Preventive Maintenance Procedures

Perform the following procedures at the prescribed intervals.

Cleaning the Probe Station

Clean the probe station monthly, or more often if your process creates a lot of dirt and debris. If your probe station includes modules, such as the thermal unit, that are not manufactured by Cascade, refer to the manufacturer's documentation for maintenance procedures. To maintain your Cascade probes and positioners, refer to the user guides for those accessories.

Warning

Isopropyl alcohol (IPA) is toxic and flammable. To avoid personal injury, read and follow the instructions on the Material Safety Data Sheet.

Caution

Dust or debris can interfere with probe-to-tip contact and affect your measurement accuracy. You can damage permanently-lubricated parts of the probe station by using IPA or other solvents. Do not use IPA, or any other chemical, on the lead screws, bearings, sliding plates in the MicroChamber, or the surfaces that they contact.

- Use a small vacuum cleaner, such as a printer vacuum, to remove dust and debris from the interior of the probe station and hard-to-reach areas. Avoid knocking debris into crevices or spaces between moving parts.
- Blow dry air or nitrogen over the station surface to remove dust and large chunks of debris
- Vacuum the interior of the MicroChamber
- Wipe the chuck with a soft, lint-free cloth, lightly dampened with IPA
- Wipe the outer metallic surfaces of the probe station with a soft, lint-free cloth, lightly dampened with IPA. (Do not wipe the labels with IPA, use mild soap and water)

Adding Grease to the Lead Screws

Grease is provided in the accessories kit that came with your station. Lightly apply grease to the lead screws at 50 hour intervals.

1. Remove the lead screw covers on both the x and y stage controls (see Figure 1).
2. Run the stage to the lower right corner and apply a small amount of grease in front of the drive nut (red ring on lead screw).
3. Run the stage to the upper left corner and repeat the above step.
4. Run the stage back and forth over it's entire travel to insure that the grease has covered the lead screws.
5. Replace the lead screw covers.

Adjusting for Par Centering

Par centering the microscope objectives allows you to change objectives without changing the field of view. This procedure is done at the factory, but may require re-adjusting.

Caution

Par centering may be skewed if you use the objectives to move the microscope turret. Do not use the objectives to move the turret.

Note

You must have a cross-hairs reticle, or a software cross-hairs tool on your computer to perform this procedure. The following procedure assumes that you're using a reticle.

1. Place a cross-hairs reticle into one of the microscope eyepiece holders.
2. The microscope turret has (4) objective holders. One of the holders is not adjustable; place the highest objective in that holder. Place the other objectives in their color-coded holders.

3. Adjust the tube lens control to 1X.
4. Using the highest objective, focus on a spot on a wafer. This spot is very important for accurate par centering.
5. Rotate the microscope turret to the lowest objective. Do not use the objectives to move the turret.
6. Focus the microscope. The cross hairs reticle should be on the same spot as when using the highest objective. If the cross hair is skewed, use the 1.5mm hex wrench to slightly loosen the (3) objective holder screws.
7. Use the hex wrench to tighten the (2) adjusting screws until the cross hairs are on the same spot (± 40 microns) as they were in step 5.
8. Tighten the objective holder screws.
9. Go to the next highest objective. If the cross hairs are skewed, repeat steps 6 through 8.
10. Repeat steps 6 through 8 for the last objective.
11. Starting with the lowest objective and working up to the highest, check to see if the cross hairs focus on the same position. If the objectives are still skewed, continue until par-centering is achieved..

Maintaining the Pneumatic System

The pneumatic system consists of air and vacuum.

Verifying Vacuum Pressure

The vacuum connector is located on the rear of the probe stations. The vacuum gauge located on the front of the station. Occasionally, check that vacuum is at 15 Hg pressure.

Verifying Air Pressure

The air supply should be clean dry air, or nitrogen, from a regulated line or bottle with pressure of at least 80 lbs. and not exceeding 90 PSI. The main pressure gauge located on the right rear corner of the probe station should be monitored periodically and kept at approximately 60 PSI and should never exceed 80 PSI.

Use the system air regulator knob located on the rear of the probe station (next to the pressure gage) to ensure that the air pressure is kept within the safe limits.

Maintaining the Microscope

Inspect the microscope assembly monthly. If there is a problem, please contact the nearest Mitutoyo office or dealer.

Daily Maintenance

1. Clean the lens with a lens brush, or wipe it gently with gauze, to remove dust.
2. Remove fingerprints and oil from the lens. Lightly dampen a lens tissue or gauze square with pure ethanol or methanol and use it to wipe the lens clean.
3. Wipe the metal parts of the microscope with a silicon cloth.

Caution

You can damage the microscope by using IPA or other solvents. Do not use IPA, or any other chemical, on the metal.

4. When the microscope is not in use, cover it with the vinyl cover. Store the objectives and the eyepieces in the case with a desiccant. Be sure to place the dust covers on the microscope turret and the eyepiece holders.

Changing The Fuse

Caution

The microscope lamp fuse is located on the rear of the light box. You must replace the fuse with another of the same type, typically a 250V 2A Slow Blow fuse. If you replace the fuse with a regular 2A fuse, the fuse will blow as soon as power is applied.

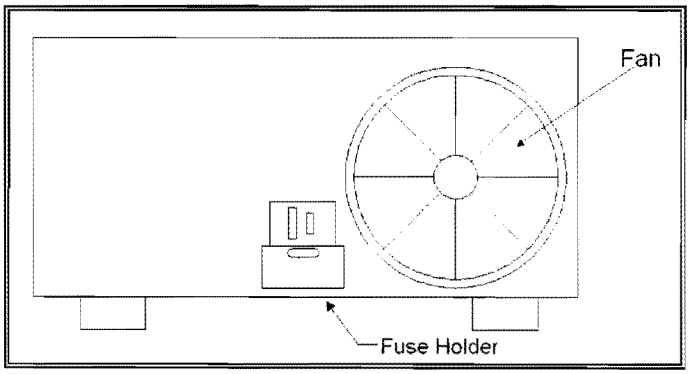


Figure 23
VMS-60 Fuse Holder

1. Turn the power off on the light source box.
2. Unplug the AC power cord.

3. Loosen the screw with your fingers and remove the fiber optic cable from the front of the light box.
4. The fuse holder is located on the rear of the light box (see Figure 23). Use a small screwdriver and gently pry out from the small slot located on top of the fuse holder.
5. Replace the fuse.
6. Press the fuse holder back into the slot and ensure that it is seated properly.
7. Re-install the fiber optic cable and re-tighten the screw.
8. Connect the AC power cord.

Replacing The Microscope Lamp

Warning

> The lamp may be hot. Be sure to let a lamp cool before replacing it. Replace the lamp with a 150W, 21V lamp. If you place the ON/OFF switch in the maximum position, you will considerably shorten the life span of your microscope lamp.

1. Turn the power off on the light source box.
2. Unplug the power cord.
3. Remove the fiber optic cable from the front of the light box by loosening the 2 hex screws with a 5/64 hex wrench.
4. The lamp holder is located on the bottom of the light source.
5. Unscrew the large screw on the lamp plate cover.
6. Replace the lamp.
7. Close the lamp plate cover and screw in the large screw.

Maintaining the Probe Station Accessories

If your probe station includes modules, such as the thermal unit, that are not manufactured by Cascade Microtech, refer to the manufacturer's documentation for maintenance procedures. To maintain your Cascade probes and positioners, refer to the user guides for those accessories.

Troubleshooting

Introduction

If you do not resolve the failure after following the steps in this section, contact Cascade customer service at (503) 626-8245.

This section covers common probe-station problems with diagnostic and repair actions that you can follow. This section does not cover invasive troubleshooting or component-level repair. Attempting to troubleshoot beyond the instructions in this section may cause further damage to your probe station or related equipment and may also void your warranty.

Symptoms and Solutions

Find the symptom that most closely matches your problem, and check everything listed in the table.

This section shows how to resolve the following symptoms:

- Computer does not turn on; nothing works *(REL-6100)*.
- x-y stage makes high-pitched whine when attempting to move *(REL-6100)*.
- x-y stage or z stage does not move.
- Vacuum is not detected by the sensor or the DUT is not held on chuck.
- Joystick error message on monitor or stage wanders in joystick mode *(REL-6100)*.
- Microscope light is not on.

The following section shows how to resolve problems with thermal stations:

- Thermal controller shuts down.
- Set/actual temperature do not match.
- Frost or moisture appears in the MicroChamber

Computer Does Not Turn On; Nothing Works

Area to check	Check this	Refer to
Computer	Re-seat all boards.	*Installing*
	Battery on motherboard OK?	
	Power line voltage switch correct for lab?	*Installing*
	Plugged in and turned on?	*Installing*
	Boots as stand-alone computer?	
Cables	Installed correctly?	*Installing*
	Installed in correct slots at both ends?	*Installing*
	No bent pins on connectors?	

Stage Makes High-pitched Whine When Attempting to Move

Caution

Turn power OFF, before inserting your hands into the stage area.

Area to check	Check this	Refer to
x-y stage or z stage	Shipping restraint removed?	*Installing*
MicroChamber	Shipping restraints removed?	*Installing*

Stage Does Not Move

Area to check	Check this	Refer to
Probe station	Shipping restraints removed?	*Installing*
	Fuses OK?	
	Plugged in and turned on?	*Installing*

Vacuum is Not Detected or DUT not Held on Chuck

Area to check	Check this	Refer to
Vacuum supply	Turned on?	
	At least 400 mm (15 in.) of Hg?	
	Connected to VAC IN on probe station?	*Installing*
Your DUT	Flat on the chuck?	
	Centered on the chuck?	
	Center vacuum size set to not larger than your DUT?	*Operating*

Joystick Error Message on Monitor or Stage Wanders in Joystick Mode

Area to check	Check this	Refer to
Joystick tension	Set to return the joystick to center? Reset, then reinitialize.	*Operating*
Joystick cable	Connected to ECX-56 Controller? Reconnect, then reinitialize.	*Installing*

Microscope Light is Not On

Area to check	Check this	Refer to
Power for light	Plugged into wall outlet?	*Installing*
Light bulb	OK?	Microscope documentation
Microscope	Aperture shutter slide open?	Microscope documentation
Top-hat cover	Shutter open?	*Operating*

Thermal Station Symptoms and Solutions

Thermal Controller Shuts Down

Area to check	Check this	Refer to
Thermal controller and cooler	Adequate airflow around units to prevent overheating?	Thermal unit documentation
Thermal equipment power source	Source provides 115 V @ 20 A or 230 V @ 10 A	*Installing*

Set and Actual Temperature Do Not Match

Area to check	Check this	Refer to
Thermal equipment cables	All cables properly connected?	*Installing*
Air dryer	Air flow rate set properly after initial purge?	*Operating*, Use of Air dryer
Thermal controller and cooler	Adequate airflow around units to prevent overheating?	Thermal unit documentation

Frost or Moisture Appears in the MicroChamber

Area to check	Check this	Refer to
MicroChamber	All seals intact (includes top-hat, access door, sliding plates)?	*Installing, Operating*
	Coolant line connections intact?	*Installing*
Air dryer	Power on?	Air dryer documentation
	Dry air at air dryer input (check air filters for excess water)?	Air dryer documentation
	Air dryer output blowing into MicroChamber?	*Installing*
	MicroChamber purged at 6 SCFM for 15 minutes (30 minutes initially) before chilling chuck?	*Operating*

Frost or Moisture Outside the MicroChamber

Area to check	Check this	Refer to
Room	Room humidity. If operating in a high-humidity environment, then use a fan to direct air flow across and around the MicroChamber.	

Station Dimensions

Dimensions

Dimensions shown are for both standard and MicroChambered versions.

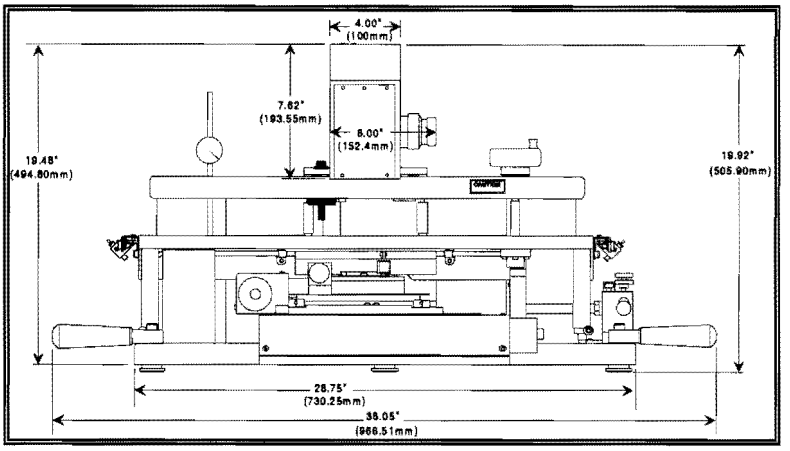
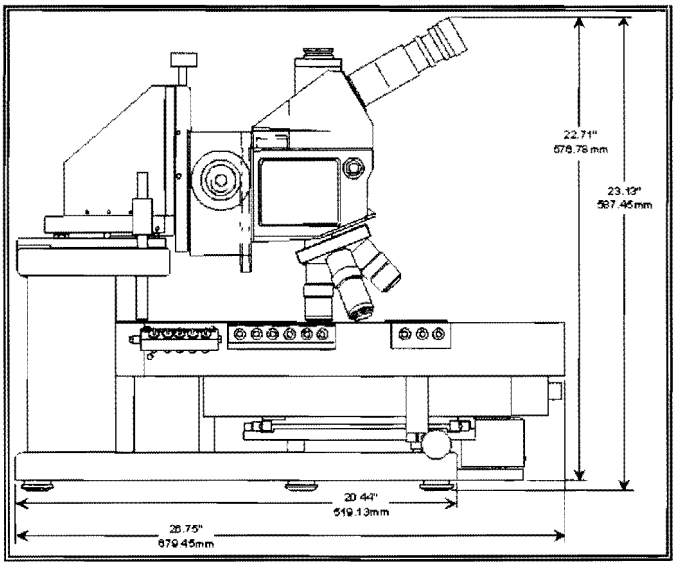


Figure 24
Front Dimensions



MicroChamber shown

Figure 25
Side Dimensions

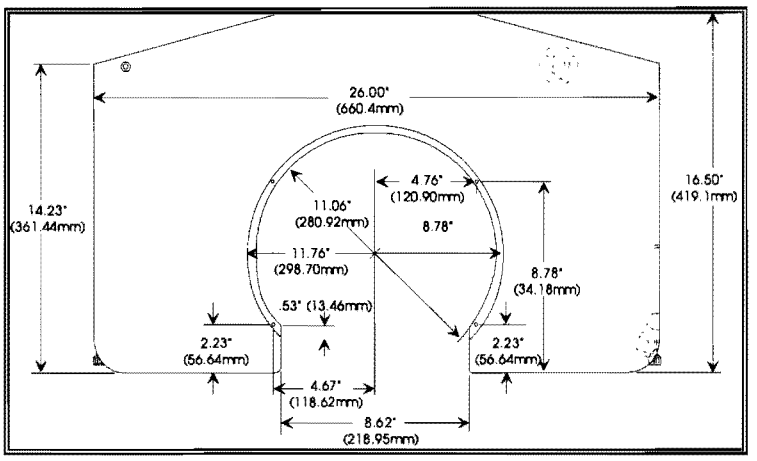


Figure 26
Standard Platen Dimensions

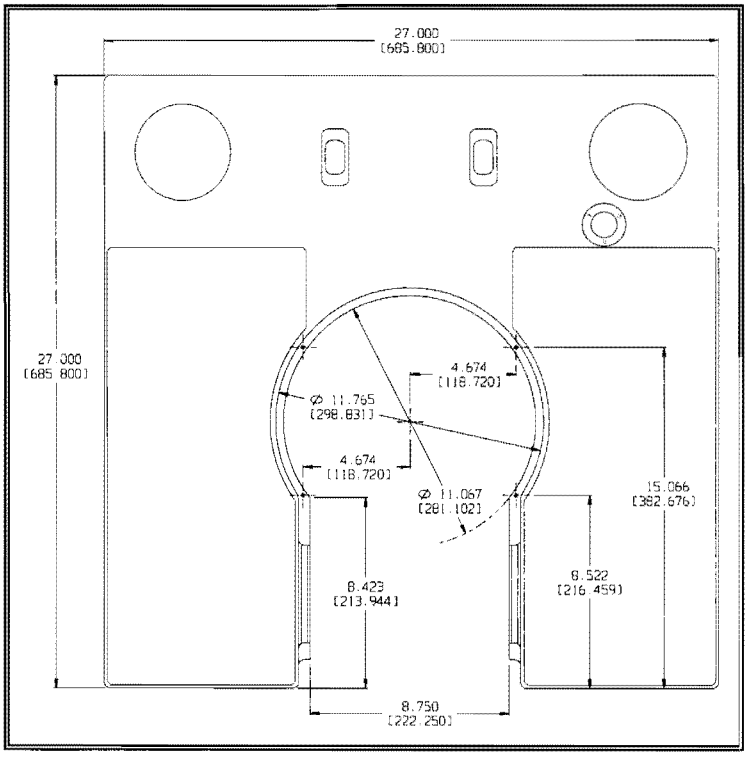


Figure 27
MicroChamber Platen Dimensions

Service

Introduction

This section explains what to do when your Cascade customer service representative requests that you return the probe station for service.

Probe station repairs carry a 90-day warranty, or the balance of your original probe station warranty, whichever is greater.

RMA Number

Before shipping a probe station to Cascade, obtain a Return Material Authorization number (RMA #). Contact your nearest Cascade sales office or Cascade customer service at (503) 626-8245.

Write the following information on a tag and attach it to the probe station:

- Owner's name and address
- RMA number
- Probe station model number
- Probe station serial number (back left of probe station)
- Description of the service required or failure indications

Re-packing

Always use the original packing materials. Otherwise, you void your warranty. If you cannot locate the shipping materials or hardware, contact your Cascade representative.

To pack probes and accessories, see specific product documentation.

To disconnect and disassemble the probe station, and attach the shipping restraints, reverse the steps in the *Installing* section of this manual.

Index

A

air 15
Air Dryer 21
air pressure
  verify *53*
air pressure to pneumatic platen 33
air pressure to positioners 33
Aligning the Wafer 34
altitude *12*

B

balance 29

C

caution
  platen stabilizers 49
Chuck Bias 18
chuck layers 18
chuck vacuum 31
Chuck Vacuum Zones 32
Computer Requirements 19
conditions
  environmental *12*
contact location 40
Contact Position 35

D

Die stepping 41

E

ECX expansion box 29
ECX expansion box. 12
ECX-56 12, 15, 28
ECX-56 Controller with Joystick 28
ECX-56 Expansion Box 15, 28
Electrical Isolation 18
Emergency Stop button 29
environmental conditions *12*
expansion box 12, 15, 28

F

flow rate 21
fuse
  microscope lamp 54
fuse, microscope
  change *54*

G

Ground Wires 18
Guarded Chuck 16
Guarded High-Temp Thermal Chuck 17
Guarded Thermal Chuck 45, 48

H

humidity *12*

I

Increment Distance 41
Initialize a Channel 28
Installation Procedure 11

J

Joystick 36

L

lamp
  microscope *55*

Lead Screws 52
Lifting Requirements 12
Light Tight Enclosure 19
Load a Wafer 42
loading and unloading DUTs 42
loading the wafer 34

M

maintenance
  accessories *55*
MicroChamber 20
microscope
  adjusting *34*
  maintain *54*
  par center *52*
  tilt switch *34*
microscope travel 21

P

Par Centering 52
Planarizing the Probe Station 47
platen stabilizers
  caution 49
platen z balance 29
pneumatic system
  maintain *53*
probe card 22
Probe Without the MicroChamber 42
probes
  align *35*
purging 21, 43
purging MicroChamber 21

R

RAC-61 Vacuum Manifold 26

S

safety
  environmental conditions *12*
separate location 40
shield-layer 18
Standard Chuck 47
Standard Guarded Thermal Chuck 17
Standard Thermal Chuck 16

T

temperature *12*
Temptronic controller 43
Thermal Guarded Chuck 16
tilt switch *34*
Top Hat 20
Troubleshooting 57

U

Unload a Wafer 42

V

vacuum 15, 31
vacuum pressure
  verify *53*
Video card 19
voltage fluctuation *12*

W

wafer
  chuck selector knob *31*
  contact *35*
weight 13

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP