OPERATION MANUAL

Model 800, The “MBA” Mask Aligner Standard/Motor-Z

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MBA- MODEL 800 MASK ALIGNER

Definitions of the following symbols and words are to be understood before working with this manual and the equipment. They are as follows:

"**Caution**" - Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

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

"**Danger**" - Indicates an eminently hazardous situation which, if not avoided, will result in death or serious injury.

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SECTION 1:
PURPOSE, SCOPE AND REVISION HISTORY

PURPOSE. To provide instructions on how to receive/ship, install, handle, use, trouble-shoot and maintain the 800MBA MASK ALIGNER hereinafter referred to as the EQUIPMENT.

SCOPE. To give the user of this document a complete understanding of the EQUIPMENT.

OBJECTIVE. To provide as much information as possible about the Equipment and to ensure that few, if any, questions will be raised relative to its operation and functionality over the short and long-term.

REVISION HISTORY.

Purpose	Rev Level	Release Date
New Release ECO 10238	A	1/21/09
Update for encoder functionality, ECO 10357	B	6/9/09
Change Company Logo & Text Colors, ECO 10826	C	6/30/11
Added buttons for mask and wafer separation and gap cal count ECO10893	D	9/26/11

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WARNING!

The high intensity energy produced by the included Light Source Subsystems employing mercury arc lamps can cause serious eye or skin damage. Personnel working with this equipment **must wear eye protection with suitable filtration to block ultraviolet and infrared radiation,** and **avoid directly exposing skin for extended periods**. OAI will not be responsible for injuries arising from incorrect or unprotected work with the Light Source Subsystem included with this Mask Aligner. The lightsource should not be adjusted or serviced by personnel lacking specific training. Before installing or operating this equipment, **please read Section 3** of the included Light Source Manual, on safety. Due to the high voltage to start mercury arc lamps, the light source power supply starter circuit may create RF noise during the start up cycle. This might possibly have an effect on sensitive electronic equipment in the immediate area. Noise may also be created in the power supply AC input line during the start up cycle. To eliminate this potential problem, it is recommended to start the power supply and lamp before turning on any sensitive electronics in the immediate area. If this is not possible, it is also recommended to place the power supply and cabling at a distance from any sensitive electronics that are not adequately shielded.

Before installing or operating this equipment, be sure to read Section 4, SAFETY PRECAUTIONS

SECTION 2:
INTRODUCTION

This manual is intended to provide instructions and recommendations for the proper use and maintenance of the EQUIPMENT.

2.1 GENERAL DESCRIPTION

The System consists of a System Console, Alignment Subsystem, and Exposure Subsystem. Movement of the align optics and light source are automated. All other functions are currently manual. Optional items are:

- Automated movement of the alignment stage for loading position and the alignment position.
- Automated leveling of the chuck
- Automated three-point leveling system where precision spacers are inserted between the chuck and the mask during the leveling process.

The EQUIPMENT is designed to align substrates to masks and to subsequently expose the substrate material using collimated UV light. This EQUIPMENT is intended for a variety of UV exposure related applications including Front Side Alignment & Exposure, and Back Side Alignment & Exposure. Exposure may be proximity or contact.

2.2 GETTING HELP

Assistance in answering questions relating to the operation of the EQUIPMENT can be obtained by calling OAI's customer support at 1 (408) 232-0600 between the hours of 8:00 A.M. and 5:00 P.M., Pacific Standard Time. Outside normal business hours, or at any other time, written questions may be Faxed to 1 (408) 433-9904 to the attention of the Optical Products Group Customer Support.

SECTION 3:
RECEIVING AND UNPACKING THE EQUIPMENT

Normal receiving inspection procedures should be followed prior to unpacking the EQUIPMENT including the inspection of the Shock Warning label on the front of the crate.

Then, use a copy of these guidelines when ready to unpack and prepare the Equipment for installation. Be sure to follow all safety precautions used during the handling of packaging and related materials.

3.1 CHECK SHOCK WARNING LABEL

The color of the liquid capsule on the Shock Warning Label affixed to the side of the EQUIPMENT crate (shown in Figure 3-1) should be clear; if it's **red**, the shipment should be inspected for physical damage. If damage is found, reject the shipment per whatever process is used for unacceptable shipments.

Figure 3-1. Warning label, straps and clips on front of crated EQUIPMENT.

3.2 OPEN CRATE AND UNPACK EQUIPMENT

CAUTION! WEAR SAFETY GLASSES AND GLOVES AS PROTECTION FROM CUTS OR DAMAGE TO EYES WHEN CUTTING STRAPS AND REMOVING CLIPS!

1) If the shipment is accepted, cut and remove any straps securing the crate to the pallet (shown in Figure 3-1).

2) Remove any bolts along the bottom of the front of the crate.

3) If clips are used on the crate, use one hand loosely cupped over each clip to prevent damage to the eyes, pop off the clips around the edges of the front of the crate (shown in Figure 3-1). Use either the claw side of a hammer or a screwdriver to loosen same.

4) Remove the front of the crate and set it aside.

5) Remove any bolts from the bottom of the sides and back of the crate.

6) Lift the remaining three sides of the crate from the pallet and set it aside.

7) The pallet should contain several boxes. Remove the boxes and set them aside.

Note: Some of the boxes are very heavy. Use proper lifting techniques when handling this unit. The main unit weighs in excess of 600 pounds and should only be moved with a fork lift.

SECTION 4:
SAFETY PRECAUTIONS

There are several major hazards to personnel:

- Ultraviolet light or non-ionizing radiation exposure
- Lamp explosion
- Electrical shock
- Ozone Poisoning
- UV Burn Hazard
- Heat Burn Hazard
- Possible mercury exposure from light source breakage

There is also a hazard to the equipment:

- Risk of damage to the light source during handling and shipping

4.1 HAZARDS TO PERSONNEL

Personnel using the UV LIGHT SOURCE should be aware of the hazards that stem from the UV LIGHT SOURCE. This section of the manual describes precautions that help avoid personal injury while using the equipment. Also, be sure to read **Section 10** entitled, SYSTEM INTERLOCKS.

4.1.1 UV BURN HAZARD

Prolonged exposure to diffused reflection from the output beam, illuminated surfaces in the beam, exposures of even a few seconds to the direct output beam or to the lamp itself, can cause ultraviolet skin burns or burns to the outer layers of the eye. Prolonged skin exposure can cause burns similar to severe sunburn.

WARNING!

WHEN IN THE VACINITY OF A LIGHT SOURCE WITH ITS COVER REMOVED, ALWAYS WEAR UV FILTERED GLASSES TO PROTECT EYES AND LIMIT EXPOSURE TIME TO UV RADIATION.

4.1.2 HEAT BURN HAZARD

When the UV lamp is on, the lamp heat sink and other metal pieces near the lamp get very hot. The heat sink and other metal pieces are located inside the lamp main housing to protect the operator from burns. The outside of the lamp main housing is safe to touch. If the main lamp housing needs to be opened for service and the lamp is on, the system that the light source is mounted on should be powered down and locked out. Then the exhaust should be left on for 15 minutes to cool down the inside of the lamp housing before opening it for service.

4.1.3 HAZARDS DUE TO LAMP EXPLOSION

During operation, the light source is subjected to very high internal pressure; thus there is always the possibility of a lamp exploding due to internal strains or physical abuse. A lamp explosion can also be caused by contamination of the quartz envelope. Handle the lamps only by the metal end caps. **Do not touch** the quartz with bare hands. A lamp explosion inside the closed light source housing can damage its internal components such as its reflector, light sensor, etc.

The lamp contains mercury. Any vapor released by an exploded lamp will be drawn out the UV LIGHT SOURCE exhaust and poses no danger to the operator; however, a minute amount of liquid mercury will be contained within the light source housing.

Follow the procedures below in the event of a lamp explosion:

1) Clear the area of personnel.

2) Notify the tool owner that mercury is in the facility exhaust.

3) Ensure that the UV LIGHT SOURCE exhaust system is working. Give it thirty minutes of run time to clear out the vapors and for the light source housing to cool to room temperature.

4) If the exhaust system is **NOT** working, put a full face respirator on prior to opening the light's containment area.

5) Put an extra pair of gloves on over the existing pair.

6) Using an "ear syringe", clean out the remaining liquid mercury.

7) Clean up broken glass and debris using a vacuum with a disposable filter attachment.

8) Wipe down the inside of the light source housing using alcohol and cleanroom wipes (or equivalent).

9) After clean-up, dispose of the “ear syringe”, wipes, vacuum filter and outer pair of gloves in a container marked as mercury contaminated waste.

4.1.4 HAZARDS DUE TO ELECTRICAL SHOCK

Before changing the lamp, working on the light source, or performing any system maintenance requiring access to AC electrical power, turn off the power at the FACILITY AC POWER circuit breaker. After the power has been turned off, verify that the output voltage is zero.

4.1.5 HAZARDS DUE TO OZONE

Do not operate the system without proper room ventilation as some Deep UV lamps produce significant levels of ozone.

4.1.6 HAZARDS DUE TO MERCURY EXPOSURE FROM LIGHT SOURCE BREAKAGE

During operation, the light source is subjected to 20 to 30 atmospheres of pressure so the possibility exists of a lamp exploding due to internal strains or physical abuse. A lamp explosion inside the closed light source housing can damage its internal components such as the reflector, light sensor, etc.

The lamp contains mercury. Any vapor released by an exploded lamp will be drawn out the UV LIGHT SOURCE exhaust and poses no danger to the operator. However, a minute amount of liquid mercury will be contained within the light source housing.

Follow the procedures below in the event of a lamp breakage:

1) Clear the area of personnel.
2) Notify the tool owner that mercury is in the facility exhaust.

3) Ensure that the UV LIGHT SOURCE exhaust system is working, then give it thirty minutes of run time to clear out the vapors and for the light source housing to cool to room temperature.

4) If the exhaust system is **NOT** working, put a full face respirator on prior to opening the light's containment area.

5) Put an extra pair of gloves on over the existing pair.

6) Using an "ear syringe", clean out the remaining liquid mercury.

7) Clean up broken glass and debris using a vacuum with a disposable filter attachment.

8) Wipe down the inside of the light source housing using alcohol and cleanroom wipes (or equivalent).

9) After clean-up, dispose of the "ear syringe", wipes, vacuum filter and outer pair of gloves in a container marked as mercury contaminated waste.

SECTION 5:
ITEMS SUPPLIED BY THE FACILITY

- Electrical Power: 120V, 1P, 60Hz, 20A
- CDA: 60 PSI
- N2: 15PSI
- VACUUM: 25in Hg
- Exhaust: For Exhaust requirements, see for the LIGHT SOURCE, See Section 12 System Specifications and Drawings.

SECTION 6:
SYSTEM SETUP

6.1 PLACEMENT

CAUTION: The Mask Aligner should be moved using a forklift. The UV Power supply is also quite heavy and should be lifted by at least two (2) people. Place the Mask Aligner System in a suitable location with adequate clearance (36-inches front to back and 30-inches shoulder clearance) in front of all electrical enclosures or where electrical work is to be performed. The System weighs approximately 700 pounds and should be placed on a table suitable for this weight.

6.2 LIGHT SOURCE

Remove the access panels from the the UV Light Source. These panels are held in place by panel mounting screws. After removing the cover plates, remove all of the packing material from inside the light source.

USE GLOVES to avoid damaging the coating on any reflective surfaces

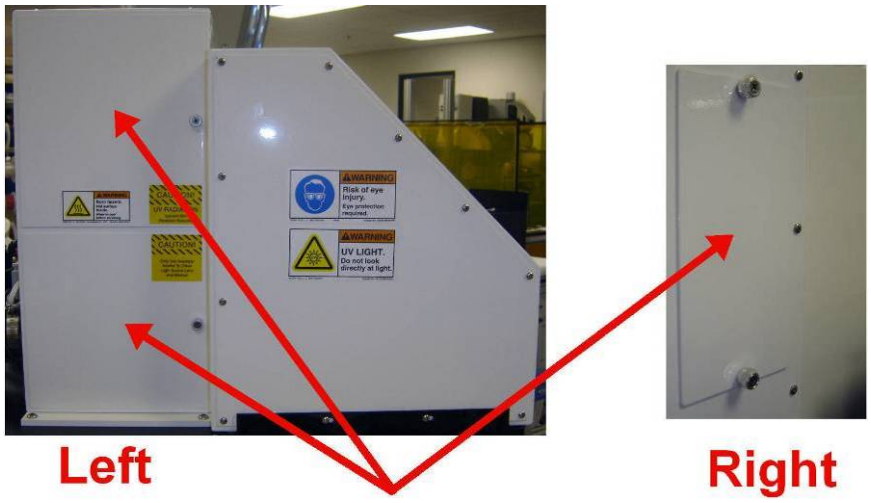


Figure 6-1. Removable Light Source Panels

Refer to the Light Source manual for further setup procedures of the Light Source

6.3 SYSTEM CONSOLE.

Unpack any wrapping and remove any foam protective pieces that may be present.

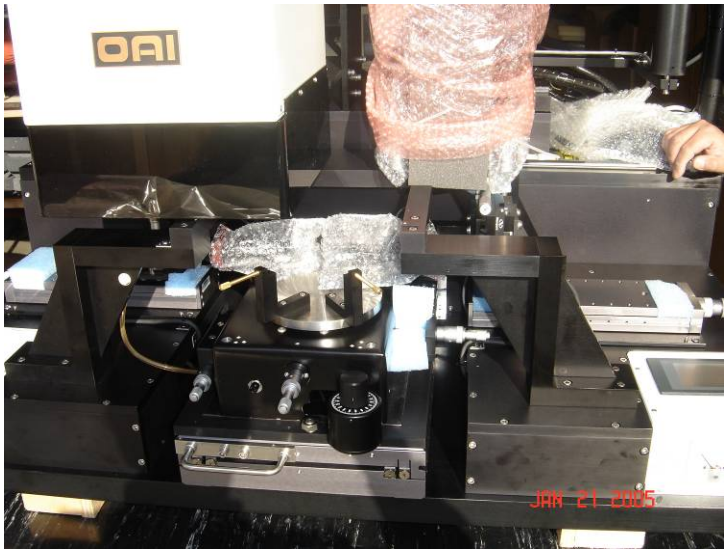


Figure 6-2 Wrapping and packing materials

There are two shipping brackets on the back of the Mask Aligner that are used to prevent the Light Source/Alignment Optics Transport Assembly from moving during shipment. (Remove these).

Figure 6-3. Light Source/Alignment Optics Transport Assembly Shipping Brackets

The Alignment Optics X/Y mount stage is secured with pins that are screwed into the plates. (Figure 6-4). *Do not move the stage until these pins have been placed back in the positions indicated in the next step*.

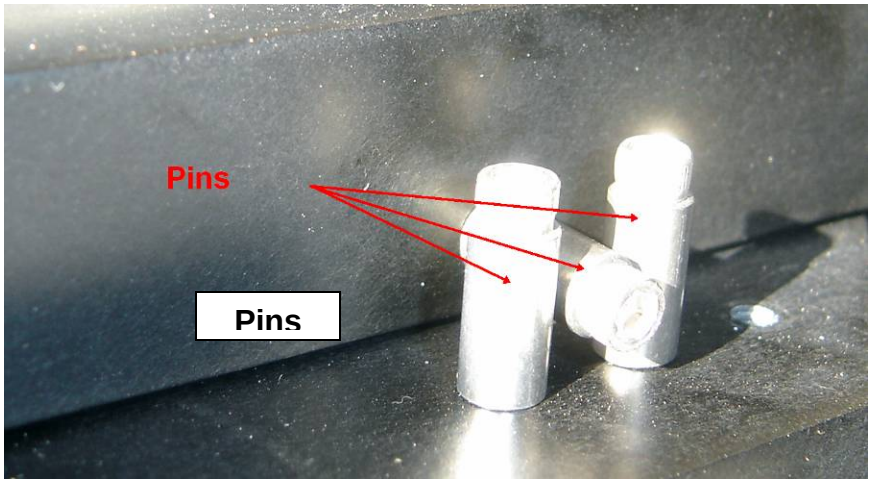


Figure 6-4. Pins securing the Optics Mount Stage X/Y

Place one pin into one of the 3 holes at each end of each axis. (Figure 6-5) These pins are used as stop pins to prevent you from moving the optics beyond permissible travel limits and damaging the bearings. Any one of the holes on each end of each axis is permissible.

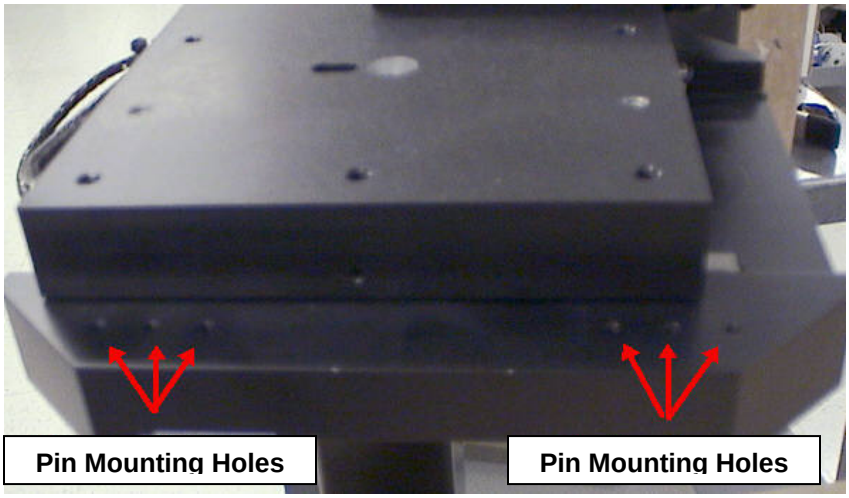


Figure 6-5. Holes to mount limit pins in.

A tie wrap is used to secure the Alignment Stage against movement. (Figure 6-6) It is difficult to see, however it is located at the back of the Alignment Stage. Remove this plastic tie wrap.

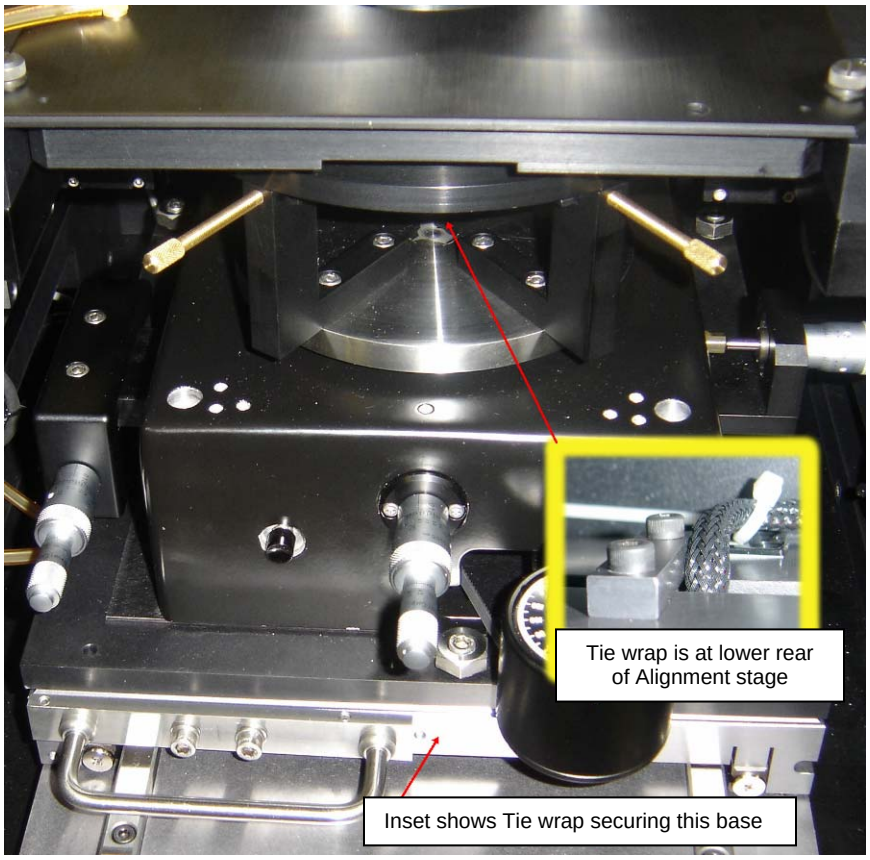


Figure 6-6. Alignment stage tie wrap.

6.4 CABLE CONNECTIONS.

6.4.1 Electrical

All cables are keyed to prevent errors in connections. Find the corresponding receptacles on the back of the Aligner & Power supply and plug in. Plug the power into the AC power strip and plug the AC power strip into the wall.

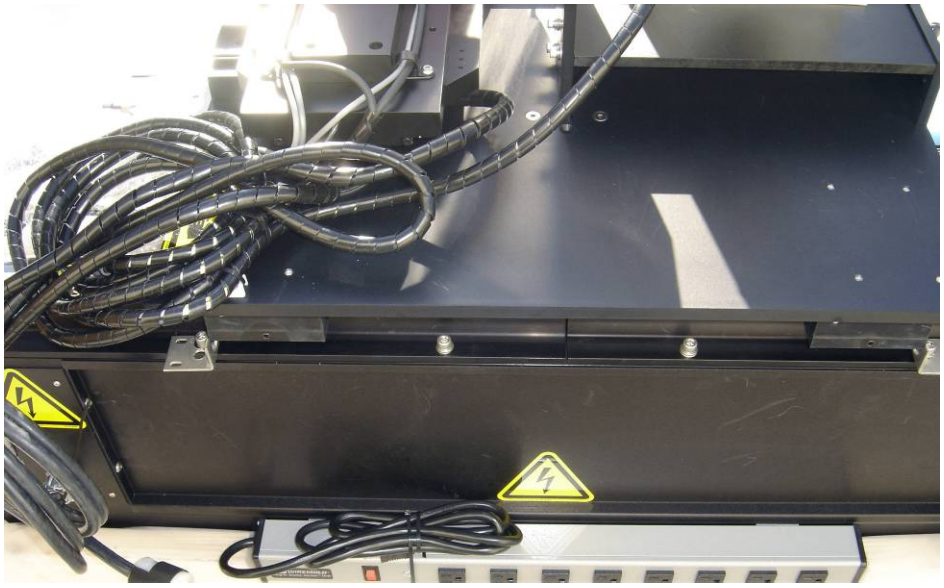


Figure 6-7. Electrical Cables.

6.4.2 Pneumatic

Connect the CDA, Vacuum, and N2 lines to the inlets at the back of the Mask Aligner.

Figure 6-8. Pneumatic Connections

SECTION 7:
SYSTEM OPERATION

7.1 THEORY OF OPERATION

The 800MBA Mask Aligners will perform top side alignment in the normal manner. This is done by placing the substrate underneath the mask and aligning the substrate target to the mask target. Backside alignment is performed differently. First, the mask targets are positioned on the monitor and then crosshairs generated by a special Digital Video Pattern Generator (DVPG) are aligned to the mask targets. The wafer is then placed on the Chuck and the wafer is moved into position underneath the mask. The targets on the backside of the wafer are then aligned to the crosshairs on the monitor.

Figure 7-1 Digital Video Pattern Generator

7.2 DIGITAL VIDEO PATTERN GENERATOR (DVPG)

7.2.1 Description

There are two DVPG units of the mask aligner system. Each unit integrates one topside and one bottom side camera. The DVPG is a fully integrated camera switcher, split screen and adjustable digital video radical generator that allows simultaneous feeding of two cameras on a video or computer monitor. The DVPG creates adjustable reticles on each live video image independently. The DVPG creates six different reticle patterns (single crosshair, fixed in center single crosshair, dual crosshair, box, single crosshair with two sizable circles and no reticles). The created reticles can be set to two different line types (solid and dashed). The lines can be black or white. For normal operation a single crosshair is used.

7.2.2 Changing From Lockout (Hold) Mode

Upon initial start up, the DVPG is defaulted to the "HOLD" or lockout mode. This is indicated on the monitor in the upper left corner. When the "HOLD" is present, all keyboard functions are locked out. To remove the unit from the lockout mode, press and hold the "LOCK" button until the indicator in the top left corner of the monitor

change from "HOLD" to "1". Keyboard function is now restored to the unit.

7.2.3 Setting The Reticle Type

The unit has six choices of reticle types to be displayed for each camera. Each time the "MODE" button (located on the top left of each individual camera control) is pressed, you change to a new type of reticle. Repeated pressing allows the user to toggle through the six reticle types. The six reticle types are as follows:

Single Crosshair
Dual Crosshair
Box
Crosshair with Two Sizable Centered Circles
Fixed in the Center Single Crosshair
No Reticles

7.2.4 Setting The Reticle Line Style

There are two choices of line styles to be displayed (solid and dashed). The Line Style is selected by pressing the "SOLID/DASH" button for each desired camera (located on the top right of each individual camera control).

7.2.5 Reticle Movement

LINES – Pressing the arrow buttons on the keyboard in the desired direction will relocate the displayed reticle. The buttons can be pressed a single time to the move the reticle a small amount or pressed and held to move the reticle a large distance rapidly. Use the up and down buttons to move horizontal lines.

** Use the left and right buttons to move vertical lines.

CIRCLES - The first circle is sized using the up and down buttons. The second circle is sized using the left and right buttons.

7.2.6 Selecting The Camera

There is one DVPG for control of the left cameras and one DVPG for control of the right to cameras.

- To select the topside camera, press the "1 Only" button on the appropriate DVPG unit.
- To select the bottom side camera, press the "2 Only" but then on the appropriate DVPG unit.

7.3 TOP SIDE ALIGNMENT OPTICS POSITIONING

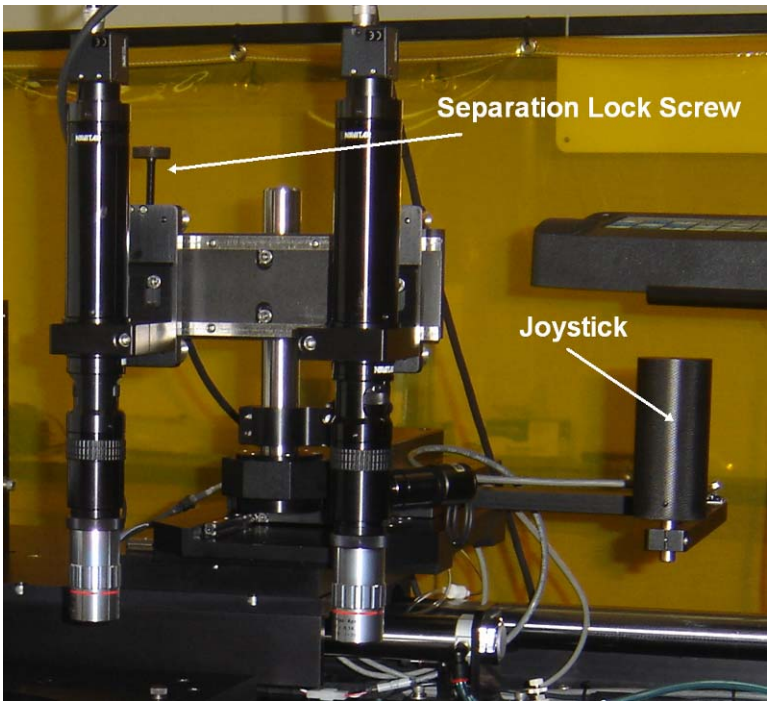


Figure 7-2 Positioning Controls for Top Side Alignment Optics

7.3.1 X/Y Positioning

The alignment optics may be moved in the X or Y axis by using the joystick handle. The entire surface of the wafer and chuck can be viewed by moving the alignment optics using this joystick. Both alignment optics move at the same time.

7.3.2 Separation Of Cameras

The Cameras may be moved in the X-axis independently. This is done by loosening the lock screw for the associated camera and sliding the camera left or right. After the camera is positioned properly, the lock screw is tightened to prevent further movement of the camera.

7.3.3 Theta Adjustment Of The Cameras

Theta adjustment of the cameras eliminates the need for any Theta adjustment of the mask. The Theta adjustment is performed by turning a micrometer. The micrometer is located close to the camera separation lock screws.

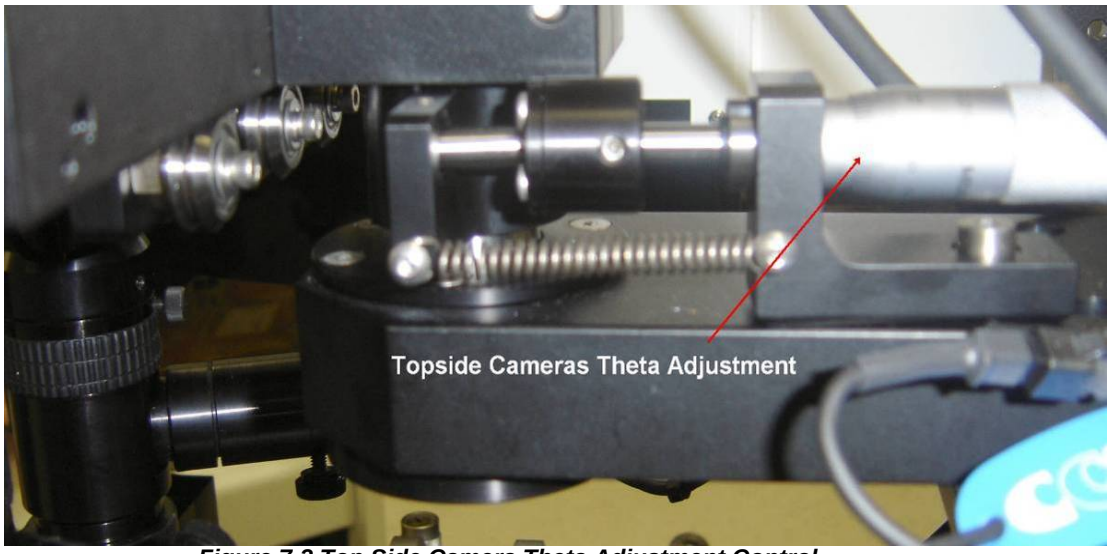


Figure 7-3 Top Side Camera Theta Adjustment Control

7.4 CAMERA ILLUMINATION CONTROLS

The controls for camera illumination are located at the left front of the mask aligner. There is a toggle switch for selecting either the top or the bottom side cameras. There are two control levers. One controls the illumination for the left camera and the other controls elimination for the right camera.

Figure 7-4 camera elimination controls

7.5 BOTTOM SIDE ALIGNMENT OPTICS POSITIONING

Each of the bottom side cameras is independently controllable in the X, Y, and Z- axis. Differential micrometers are used. The locations of these micrometers are shown in the picture below. The picture shown is the right alignment optics. The bottom left alignment optics are similar.

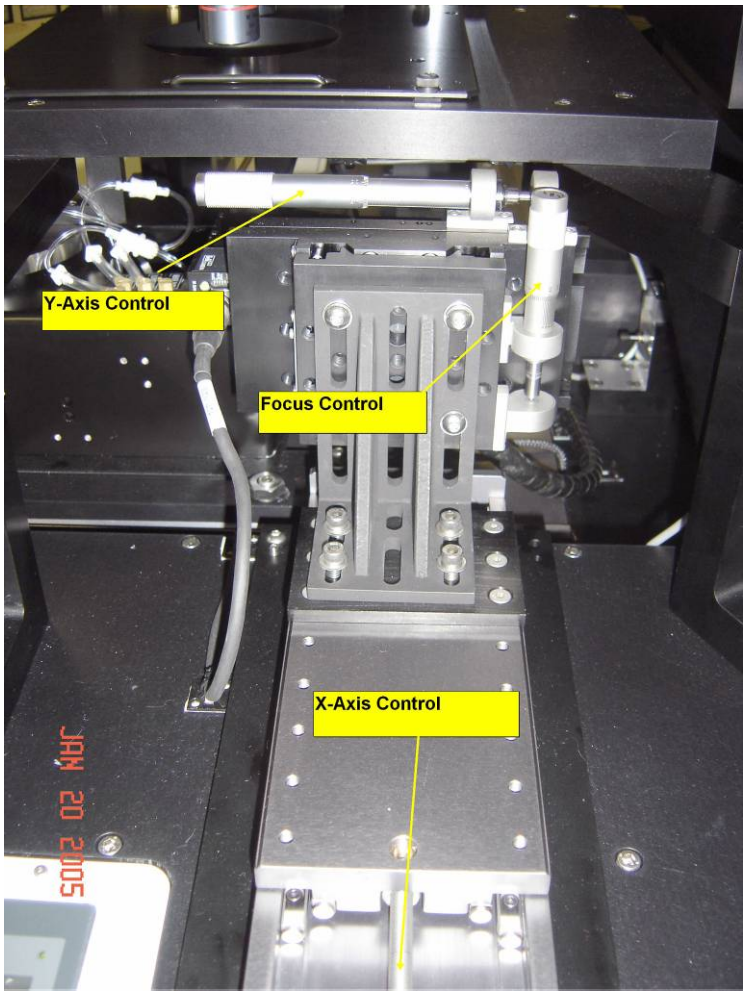


Figure 7-5 Bottom Side Alignment Optics Positioning Controls

7.6 ALIGNMENT STAGE AND WAFER CHUCK POSITIONING

7.6.1 Alignment Stage

The alignment stage is manually pulled out for the loading of the wafer onto the chuck. It is manually pushed in for alignment and exposure. An optional auto positioning feature is available. The picture below shows the alignment stage in the out position.

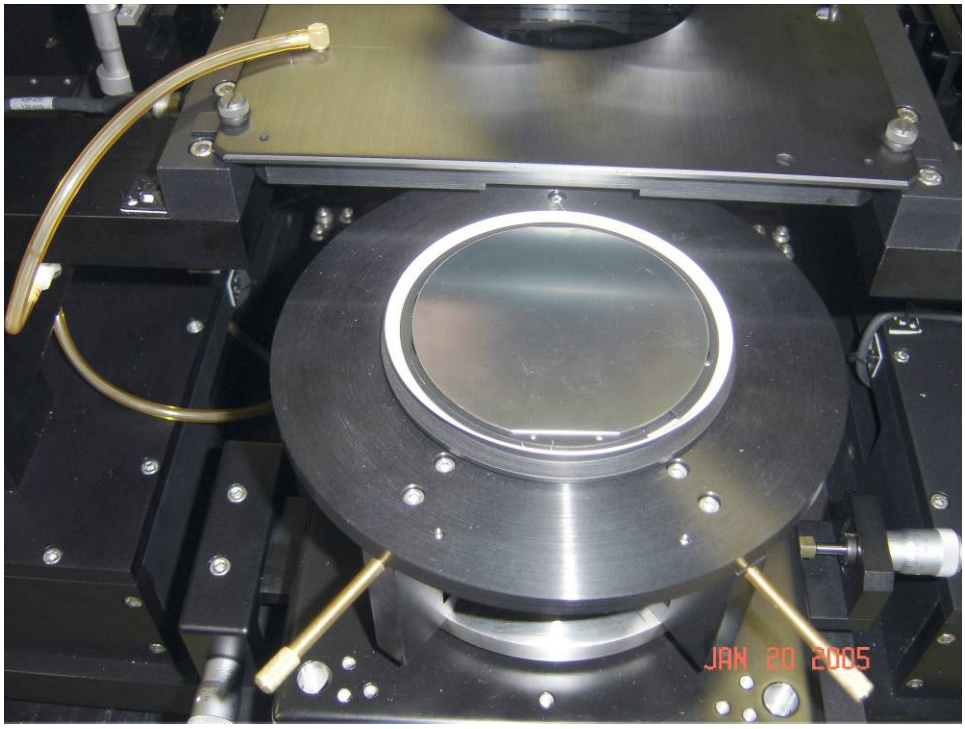


Figure 7-6 Online Bin Stage in the out Position

7.7 WAFER CHUCK X, Y, THETA, AND Z-AXIS POSITIONING CONTROLS

7.7.1 Standard System

The controls for the positioning of the wafer chuck on a standard system are shown in the picture below. The button on the front of the alignment stage is pressed when moving the chuck up into position against the mask during a leveling process. Pressing the button floats the chuck so it will easily level to the mask. Turning the z-axis knob until the clutch slips (indicated by a vibration felt through the z-axis knob) will ensure that the substrate is planar to the mask. The substrate should be moved away from the mask before any x,y, or theta motion of the chuck is initiated.

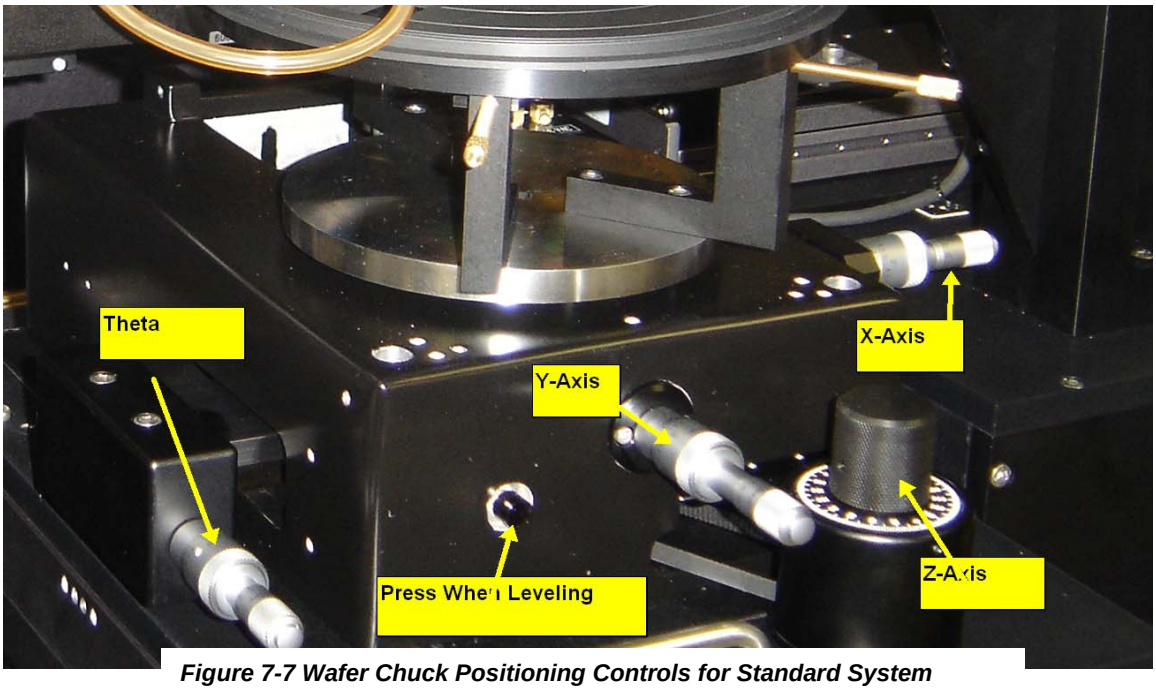


Figure 7-7 Wafer Chuck Positioning Controls for Standard System

7.7.2 Gap Setting and Calibration (Auto-Level option)

In the auto-z system configuration, once the “level” button is pressed on the LCD, the chuck will move up automatically to planarize the substrate surface with the mask. It will then automatically move to the alignment gap. This gap is set in the Additional Settings window of the Process Settings screen (see figure 7-18a). In practice, there may be as much as 100um of overdrive as the chuck forces up the mask before the z-axis clutch slips. This overdrive will cause the actual gap to be smaller than the gap that is entered into the process window. For most applications where the gap is for alignment purposes, a quick trial and error adjustment of the gap setting will ensure that the substrate is clear of the mask after planarization is accomplished.

The simplest way to calibrate the gap between the wafer and mask is to determine when the mask and wafer are at a zero-gap condition, and then press the ZERO GAP button. When the ZERO GAP button is pressed, the gap readout will automatically read 0 microns, and the GAP CALIBRATION COUNT will display the number of encoder counts the chuck z-axis has moved down from the position it was at after completing the planarization portion of the leveling routine. To determine if the wafer and mask are in a zero-gap condition:

1) Load a wafer on the chuck, enable substrate vac, and level the wafer against the mask.
2) After the leveling routine is complete, the wafer is at the user determined alignment gap. Press the CAL GAP button bring up the screen shown in Figure 7-7a.
3) Set the jog size to 4um and jog up, bringing the wafer and chuck into contact with each other. As the mask and wafer come into contact with each other and then are pressed harder and harder together, a slight shift will be noticed on the monitor between the wafer features and the mask features. This is undesirable as it indicates that too much force is present between the mask and wafer. Jog the wafer back down and back up to the highest z-location that doesn't exhibit this lateral shifting. Note: The jog size can be set to any value between 3 and 3000 um.
4) Press the ZERO GAP button to train the aligner gap calibration routine. The aligner now knows how far to move down after planarization to achieve this "soft-contact" position.
5) To further refine this position, exit the Cal Gap screen and in the Run Screen, press the UNLOAD button.
6) After the chuck is down and at its home position, press the LEVEL button to planarize the wafer and mask.
7) After the Leveling routine completes, press the CONTACT button to move the wafer into contact with the mask. Now press the HARD CONTACT button several times, turning on and off the hard contact process feature. There will likely be a very small shift in the wafer location when the hard contact is enabled due to the force of the nitrogen pushing on the back side of the wafer. However, if the wafer is in contact with the mask, the wafer will return to its previous position on the monitor when hard contact is disabled.
8) If it is determined that the wafer is not touching the mask in soft contact (by noticing that the wafer "walks" across the monitor when hard contact is cycled on and off) then the gap calibration must be adjusted.
9) To adjust the gap calibration, go back into the Gap Cal screen shown in figure 7-7a and adjust the GAP CALIBRATION COUNT by pressing on this button and changing the value. To bring the wafer closer to the mask, adjust the count down by 1 count.
10) Repeat steps 5 through 8 as needed. When the proper gap calibration count has been determined, record the number for future use. This number should be appropriate for the current wafer size and mask size and thickness. (note that wafer thickness will have no bearing on the gap

calibration count, but mask thickness will due to its effect on mask deflection).

Note that for different wafer and mask size/thickness combinations, the gap calibration count determined from the above procedure for one combination will serve as a good starting point for another combination as the gap calibration count is likely to be adjusted by only 1 or 2 counts from combination to combination.

To implement a previous calibration for a given mask size/thickness and wafer size combination, the user only needs to place the wafer on the chuck, enable substrate vac, and level the chuck. Then go to the Gap Cal screen and enter the desired Gap Calibration Count. As long as the clutch current is maintained, the gap will be calibrated.

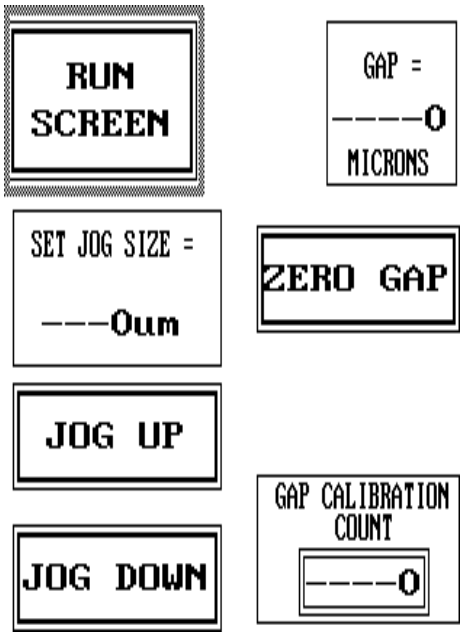


Figure 7-7a Gap Calibration Screen

7.8 N2 PURGE & CONTACT VACUUM, AND HARD CONTACT ADJUSTMENTS

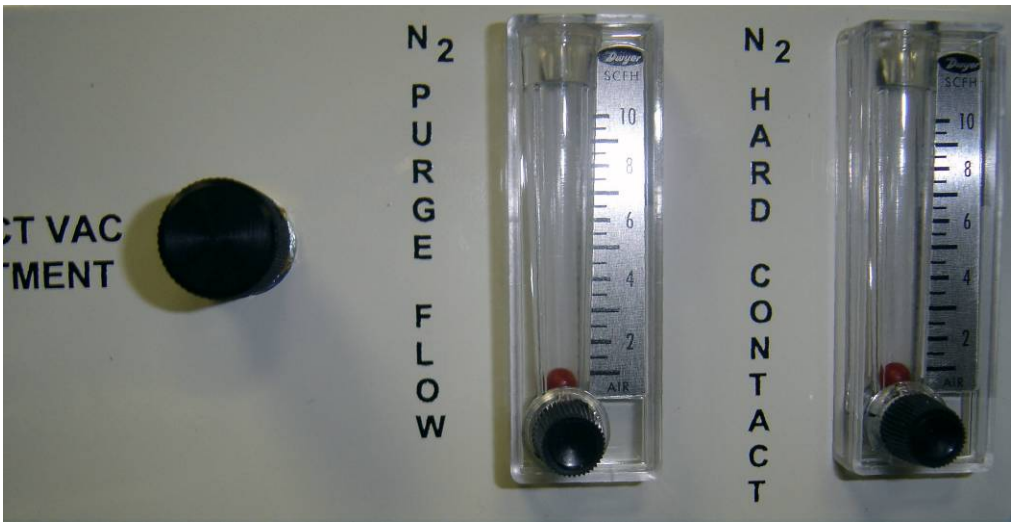


Figure 7-8 Contact Vacuum & N2 Pneumatic Controls

When exposing a substrate, the operator has the option of utilizing a gap exposure, a soft contact exposure, a hard contact exposure, or a vacuum contact exposure. During and after a gap exposure, the flow of nitrogen across the surface of the substrate is regulated using the N2 Purge Flow regulator. The N2 Hard Contact flow regulator controls the flow of nitrogen underneath the substrate such that the substrate is forced hard against the mask. The vacuum achieved during a contact vacuum exposure is regulated by the combination of the Contact Vac Adjustment valve and the N2 Purge Flow valve.

7.9 LCD TOUCH SCREEN SYSTEM CONTROLLER

The LCD touch screen controller is located at the front right side of the mask aligner. This unit provides a method to control the mask aligner exposure set up, vacuum solenoids, and various expose sequences. This screen is the primary interface to the functions of the mask aligner.

Through the use of this screen you may:

- Turn the mask vacuum on and off
- Set the exposure time
- Set the exposure mode (hard, vacuum, proximity)
- Level the chuck on systems with the auto level option
- Display the alignment gap on systems with the encoder option

7.9.1 Main Menu Screen

7.9.1.1 Main Menu for Standard Systems - This screen is used to select all of the sub screens wherein settings or controls are located.

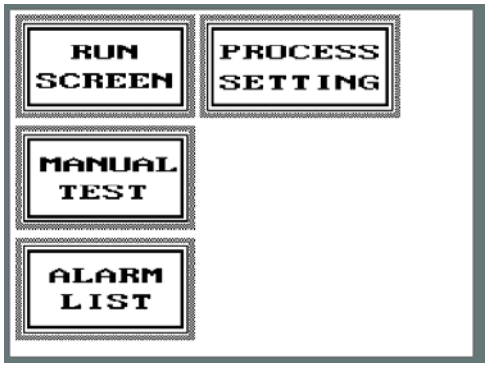


Figure 7-9 Main Menu for Standard Systems

7.9.1.2 Main Menu for Systems with Auto Level - This screen is used to select all of the sub screens wherein settings or controls are located.

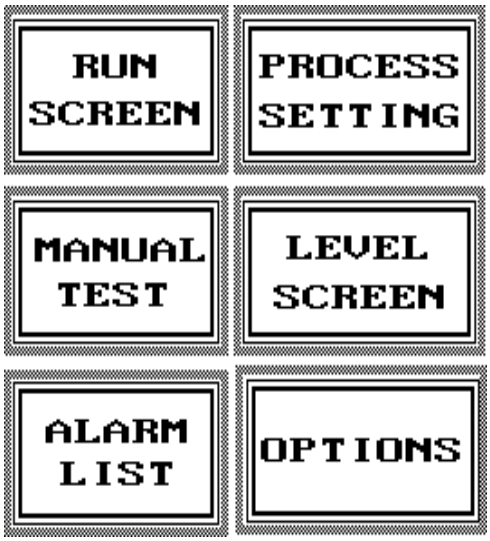


Figure 7-10 Main Menu for Systems with Auto Level

7.9.2 Start Up and Leveling Screen (Only on Systems with Auto Level)

This screen is the screen that controls the initiation of the system and the leveling of the chuck. This screen is used to:

- *Return to the Main Menu*
- *Display the Processing Mode*
- *Display the Exposure Time*
- *Turn the Substrate Vacuum on and off*
- *Initiate or Level (as shown in the first figure below this button is labeled "INITIATE" and is used to start the initiation process when the system is first turned on. As shown in the second figure below this button is labeled "LEVEL" and is used to start the auto leveling of the chuck.)*
- *Go to the alignment gap without first leveling the substrate to the mask. The first wafer processed when the system is initiated must be leveled. This feature requires that the z-encoder option be installed.*
- *Set the motor speed during the leveling process. Speed range is 325 to 3150.*

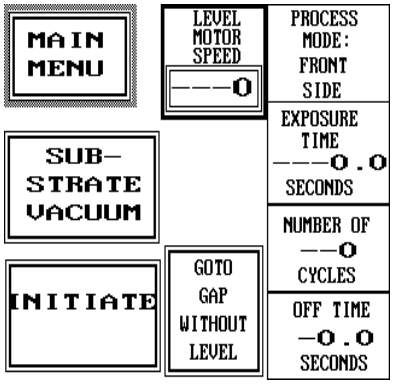


Figure 7-11 Startup Screen for Systems with Auto Level (GOTO GAP WITHOUT LEVEL REQUIRES Z-ENCODER OPTION)

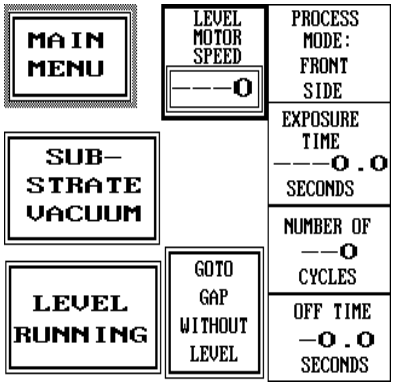


Figure 7-12 Level Screen for Systems with Auto Level (GOTO GAP WITHOUT LEVEL REQUIRES Z-ENCODER OPTION)

7.9.3 Running Screen

7.9.3.1 Running Screen for Standard Systems - This is the screen that controls the actual running of the mask aligner during alignment and exposure. This screen is used to:

- *Return to the Main Menu*
- *Display the Processing Mode*
- *Display the Exposure Time*
- *Turn the Substrate Vacuum on and off*
- *Turn the Hard Contact Mode on and off*
- *Turn the Contact Vacuum on and off*
- *Cycle (moves the transport stage to position the optics over the mask & wafer, or position the light source over the mask & wafer and perform an exposure)*

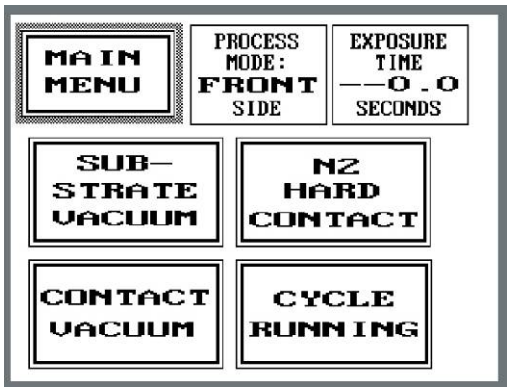


Figure 7-13 Running Screen for Standard Systems

7.9.3.2 Running Screen for Systems with Auto Level - This is the screen that controls the actual running of the mask aligner during alignment and exposure. This screen is used to:

- *Return to the Main Menu*
- *Unload the Substrate before Exposing*
- *Display the Exposure Time*
- Move the chuck up and down between the gap position and the contact position. As this is done, the display on the corresponding button on the LCD panel will change accordingly. In the figure shown the button is currently set to "move to contact position".
- *Turn the Hard Contact Mode on and off*
- *Turn the Contact Vacuum on and off*
- *Cycle (moves the transport stage to position the optics over the mask & wafer, or position the light source over the mask & wafer and perform an exposure)*
- *Additionally, in the case of a system with an encoder, the user can calibrate the gap readout, which should be as described in Section 7.7.2, and the user can fill the chuck with monomer liquid if utilizing the system CLIPP (contact liquid photo-polymer) process capability.*

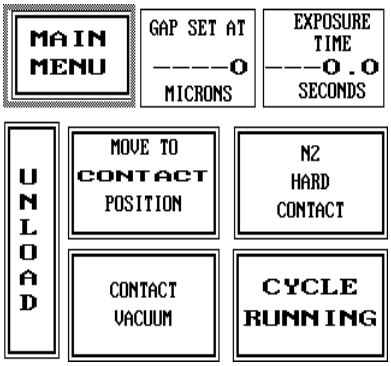


Figure 7-14 Running Screen for Systems with Auto Level

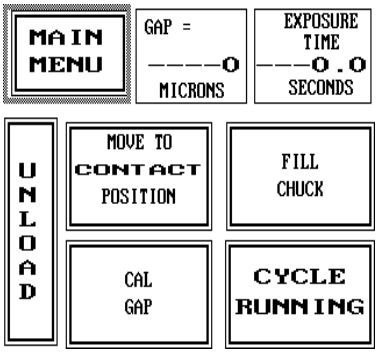


Figure 7-14a Running Screen for Systems with Auto Level and Gap Display

7.9.4 Alarm List Screen

not currently used.

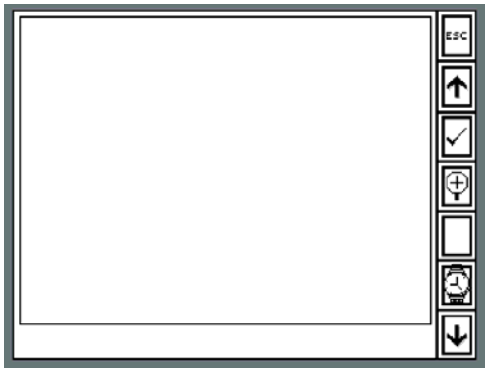


Figure 7-15 Alarm List Screen

7.9.5 Manual Test Screen

The manual test screening provides for manual control of three items. These items are:

- Move the transport stage back and forth between the expose and the alignment position. As this is done, the display on the corresponding button on the LCD panel will change accordingly. The button is currently, in the figure shown, set to "move to expose position".
- Open and close the light source lamp shutter.
- Turn the mask vacuum on and off.
- In the case of a system with a CLIPP capability, an Unload button is available here to bring the chuck away from the mask after mask vacuum is disabled.

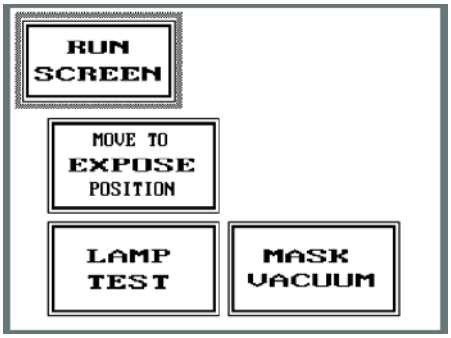


Figure 7-16 Manual Test Screen for Standard and Auto-Z

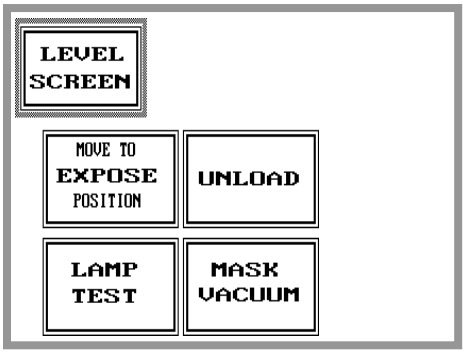


Figure 7-16a Manual Test Screen for Auto-Z with Gap Display

7.9.6 Process Setting Screen

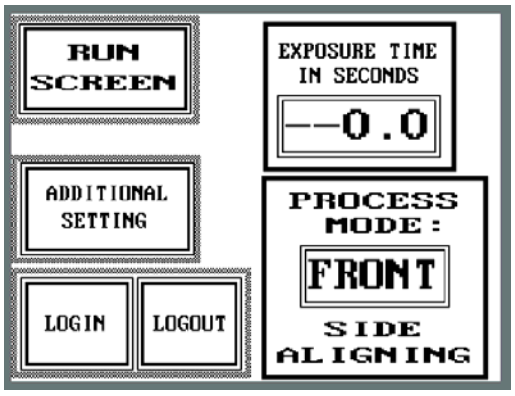


Figure 7-17 Process Setting Screen Standard

The process setting screen is used for setting up your process. The process settings will be used to select the process mode and to select the exposure time.

- Pressing the exposure time button will cause a keypad screen to be displayed. Use this keypad display to enter the actual exposure time desired from 0.1 to 3276 seconds.

- Pressing the process mode button will toggle the process mode to front or back side alignment, IR back side alignment, Nano-Imprint (a nano-imprint tooling module is sold separately), or CLIPP (contact liquid photo-polymer

process, also sold separately, and requires encoder option to be installed). The speed that the chuck uses to approach the mask after the chuck has been filled during the CLIPP process can be adjusted between 71 and 710. This option is useful for eliminating bubbles that form between the monomer and the mask.

- The exposure can also be performed multiple times on a single substrate without releveling the substrate to the mask by setting the number of cycles and the off time, which will close the shutter in between cycles.

- Pressing the additional setting button will bring up the additional setting screen

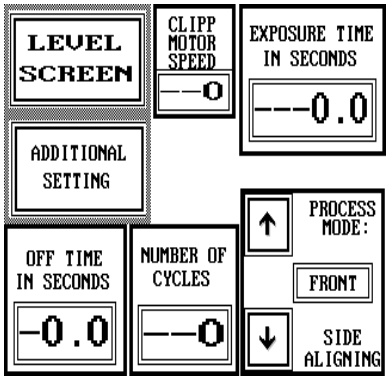


Figure 7-17a Process Setting Screen Auto-z

7.9.7 Additional Settings Screen

On standard systems the additional setting screen allows you to set the date, time, and backlight display settings. Alarm functions are not currently supported.

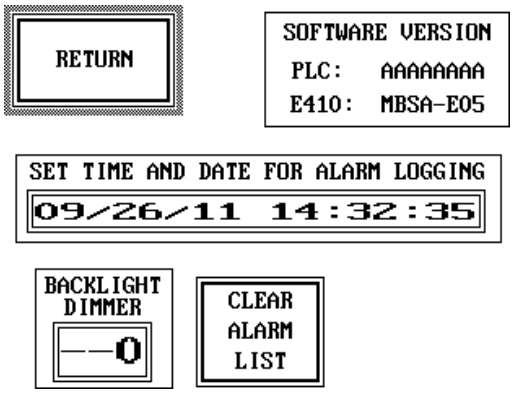


Figure 7-18 Additional Setting Screen Standard

On systems with auto level and gap display the additional setting screen allows you to go to the Set Time & Date screenn and adjust the backlight display settings. Also the desired gap is set here, as well as a delay between process leveling and moving the chuck to the gap, which is useful if a longer time is

required to achieve mask/wafer planarization for a certain substrate. Alarm functions are not currently supported.

The MASK CHUCK SEPARATION TIME button controls the time allotted to the z-motion of the chuck during the unload process. After a wafer has been exposed, or when the UNLOAD button is pressed, the chuck will move down at a slow speed for the specified time before speeding up to complete the move down to its home position for wafer unloading. This is to allow the seal between the chuck and the mask to be gently broken so that the chuck and wafer are not temporarily held up against the mask while the axis continues to move down. Note: The mask chuck separation time can be set to any value between 2 and 20 seconds.

The WAFER SEPARATION DISTANCE button controls the distance that the chuck moves at a slow speed when separating from the mask to go to the alignment gap. This is to allow gentle separation of the wafer and mask so as not to pull photoresist off of the wafer and also to allow the chuck to maintain planarity with the mask. Thinner masks that deflect more during the leveling process will require larger separation distances as they will continue to remain in contact with the wafer longer as the chuck moves down and away from the mask. Note: The wafer separation distance can be set to any value between 119 and 499 microns.

The WAFER SEPARATION DELAY button controls the delay between motor steps while the wafer is moving down from the mask to go to the alignment gap. During this slow move (of a distance specified by the WAFER SEPARATION DISTANCE), the motor step size is constant but the step delay can be increased to effectively slow down the move. Note: The wafer separation delay time can be set to any value between 10 and 1000 milliseconds.

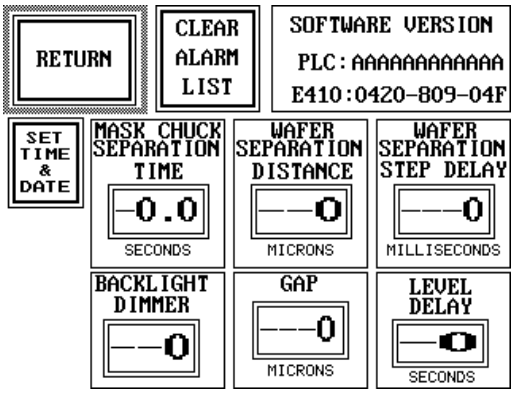


Figure 7-18a Additional Setting Screen for systems with Auto Level and Gap Display

7.9.8 Set Time & Date Screen

The set time & date screen (Figure 7-19) allows the user to set the time and date for systems with auto level and gap display.

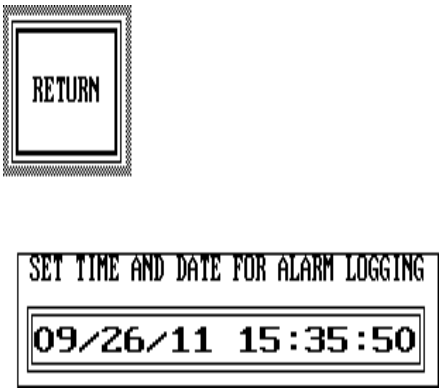


Figure 7-19 Set Time & Date Screen for systems with Auto Level and Gap Display

7.9.9 Options Screen

The options screen (Figure 7-20) allows the user to tell the software whether or not an encoder is installed on the system. **If the system is not equipped with an encoder, setting the system for encoder use will cause eratic system behavior and may damage system components.**

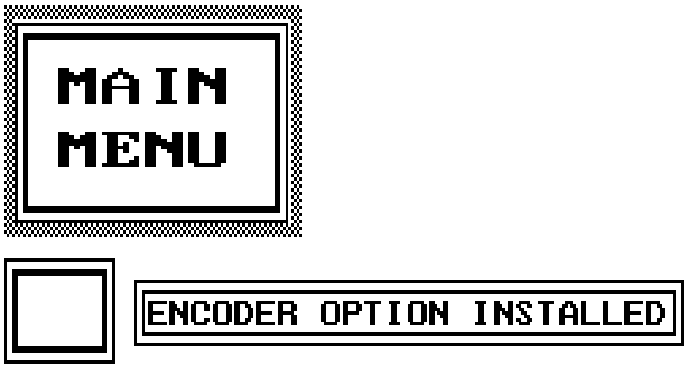


Figure 7-20 Options Screen

SECTION 8:
CALIBRATION OF ALIGNMENT OPTICS

The accuracy of backside alignment is highly dependent on the verticle calibration of the back side alignment optics. There are three points for each backside camera that need to be aligned. *A special mask is provided with the system and should be used when performing the calibration procedure.*

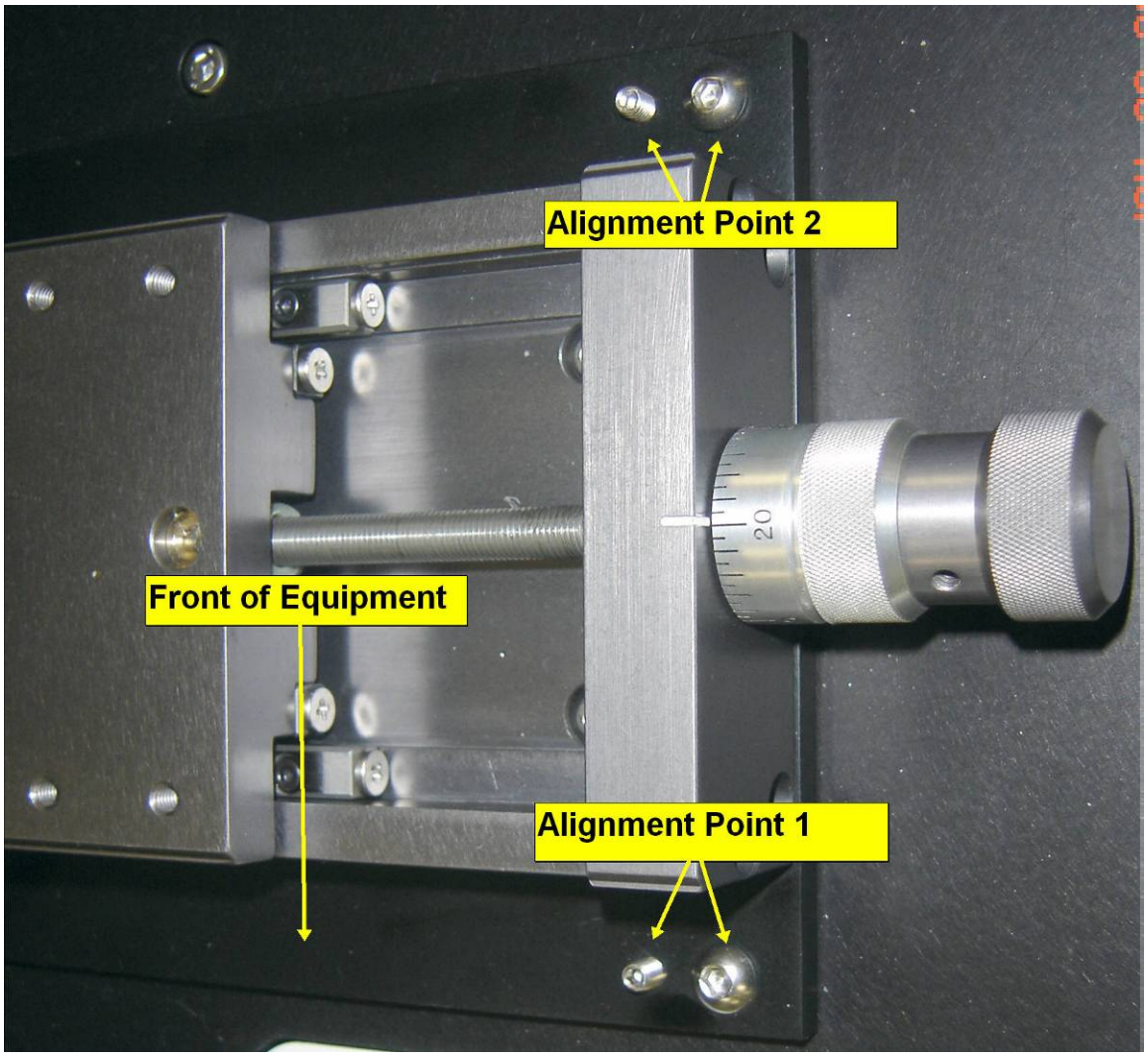


Figure 8.1 Adjustment point 1 & 2 (Right Side)….Left Side is identical

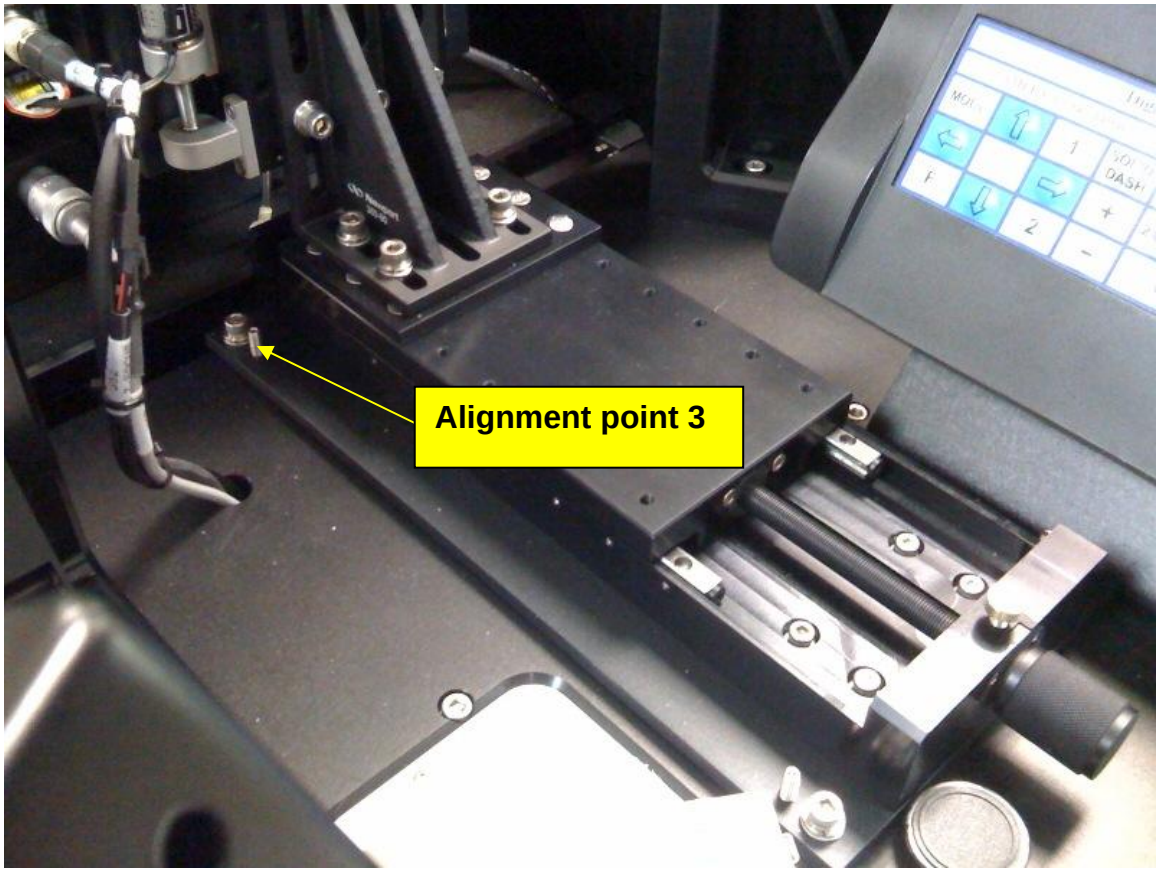


Figure 8.2 Adjustment point 3

8.1 PROCEDURE FOR OPTICS ALIGNMENT:

8.1.1 Tools Required:

- A mask with a large clear area to be able to see through to the OAI mirror mask tool.
- OAI mirror mask tool
- Allen wrenches

8.1.2 Purpose

The purpose of the alignment procedure is to align the focus axes of the bottom optics so they are perpendicular to the bottom surface of the mask. This will eliminate any misalignment caused by changing the focus position of the bottom optics from the mask to the bottom side of the wafer.

8.1.3 Location Of Adjustments

The leveling plate is the base plate on which the bottom optics XYZ assembly is mounted. It has 3 groups of screws, located at 3 of the 4 corners of the plate. Each group consists of a button head or socket head cap screw, and a socket set screw. We'll call them Set 1, Set 2, and Set 3.

Set 1 is located towards the front of the machine and away from the tooling.
Set 2 is nearest the tooling
Set 3 is farthest from the front of the machine.

8.1.4 Step by Step Procedure

Step 1 - Locate Set 1, and turn the socket set screw so that the base plate is spaced from the machine by about 3mm. This will provide enough room for adjusting the plane of the base plate using the other sets of screws. Lock down Set 1 by tightening the cap screw. Loosen the cap screws of Set 2 and Set 3 by several millimeters.

Step 2 - Install your clear mask into the system, and place the OAI mirror mask tool on top of the clear mask, facing down in a location that can be seen by the bottom optic.

Step 3 - Use the bottom optic to focus on the "real" alignment target at the center of the mirror mask tool. Align the alignment target with the cross hairs on the video monitor by using the X and Y micrometers on the bottom optic.

Now, turn the Z-micrometer on the bottom optic (or use the optic focus joystick if your system is so equipped) so that the focus position moves higher. Keep going until the "mirrored" alignment target comes into focus on the monitor. Using screw Set 2, move the "mirrored" alignment target towards the cross hair using the socket set screw. Continue moving it in that direction until it touches the outside edge of the monitor. Turn the optic z-micrometer so that the optic moves down to focus on the "real" alignment target.

Using the X and Y micrometers, align the "real" alignment target with the cross hairs.

Refocus on the "mirrored" alignment target.
Check to see if it is still aligned with the cross hairs.
If it isn't aligned, repeat step 3 until it is aligned.

Step 4 - Repeat steps 1, 2, and 3 for the other bottom optic.

SECTION 9:
ALIGNMENT OF THE TOOLING MODULE

Note: The Alignment Optics must be calibrated before this adjustment. See the previous section for the procedure.

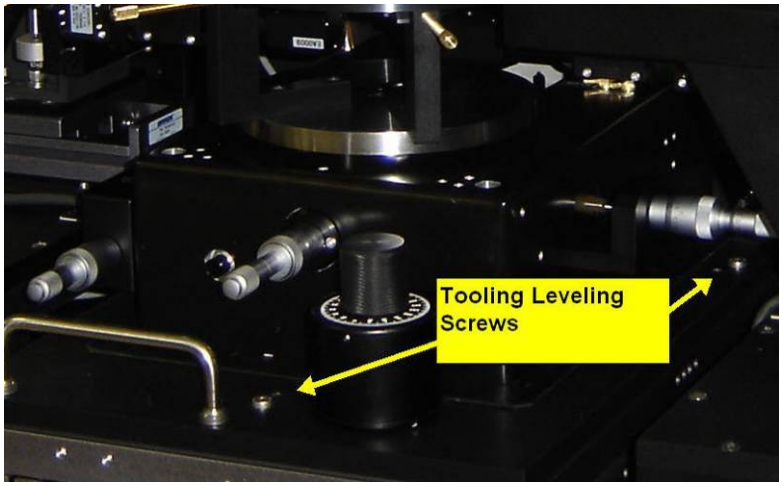


Figure 9.1 Tooling adjustment points

9.1 PROCEDURE FOR TOOLING LEVELING

9.1.1 Tools Required:

- A wafer with a target on which the alignment optics can be focused
- Allen wrenches

9.1.2 Purpose

The purpose of the alignment procedure is to align the Z-axis of the wafer chuck to the focus axis of the top alignment optics. This prevents shifting of the chuck in the X/Y axis relative to a fixed point on the alignment optics as the z-axis moves up and down. The procedure will ensure accurate alignment is maintained when moving the chuck from the align gap to the exposure height.

9.1.3 Location Of Adjustments

There are three adjustment points on the alignment tooling module that are used to ensure the wafer chuck is perpendicular to the alignment optics.

One point is in the middle at the front and the others are at the back on the sides.

The adjustments at each point consist of two screws. One screw raises and lowers the tooling at that point, and the other screw locks the setting down. (see figure 9-1)

9.1.4 Setup

1) Carefully remove the mask holder insert from the machine.
2) Place a wafer on the chuck, and if and auto-z system, move to gap.
3) Move the wafer chuck down several mm using the gap knob or the unload button if an auto-z system.
4) Focus the bottom optic as best as possible on a wafer target.

9.1.5 Alignment

Step 1: Align to the Crosshair on the Monitor.

Step 2 : Move the wafer chuck up several millimeters using the Chuck Z-Axis adjustment or the Level Chuck button if an auto-z system.

Step 3 : Focus the bottom optic on the wafer at the new chuck height.

Step 4: The wafer target should not move in the X or Y axis while the previous step is being performed. If it does, adjust one of the 3 leveling points accordingly.

Step 5: Move the chuck down several mm using the gap knob.

Step 6: Repeat the procedure again until there is no longer a shift in the wafer target as the wafer chuck moves up and down.

SECTION 10:
SYSTEM INTERLOCKS

10.1 UV LIGHT SOURCE INTERLOCKS

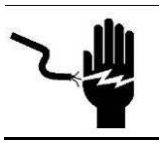
There are 3 interlocks on the UV LIGHT SOURCE. One is for personal safety and the other two are for equipment safety.

WARNING!

The light emanating from the light source is a hazard to vision. **DO NOT LOOK INTO THE OUTPUT BEAM of the UV Lamp** or reflection of the beam. Permanent damage to the retina of the eye and subsequent blindness can result.

Prolonged exposure to diffused reflection from the output beam, illuminated surfaces in the beam, exposures of even a few seconds to the direct output beam or to the lamp itself, can cause ultraviolet skin burns or burns to the outer layers of the eye. Prolonged skin exposure can cause burns similar to severe sunburn.

WHEN IN THE VACINITY OF A LIGHT SOURCE WITH ITS COVER REMOVED, ALWAYS WEAR UV FILTERED GLASSES TO PROTECT EYES AND LIMIT EXPOSURE TIME TO UV RADIATION.



Dangerous voltage is present on the ends of the UV Lamp when the lamp is lighted or being started.

10.1.1 The Personal Safety Interlock

Removes power from the UV power supply. Pull the interlock out to perform maintenance functions that require the UV POWER SUPPLY to be turned on.

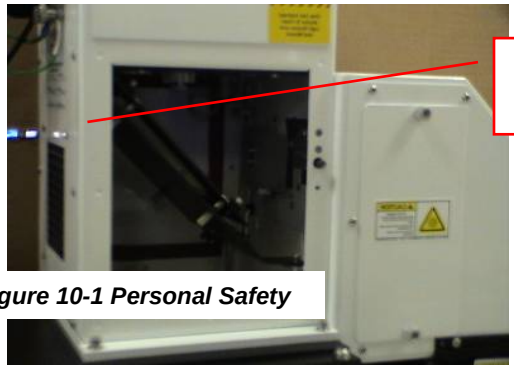


Figure 10-1 Personal Safety

10.1.2 The Overheat System Interlock

Removes power from the UV power supply if the mirror is not in place at approximately a 45-degree angle and locked into position. The interlock is designed to prevent the UV lamp from burning the bottom of the UV LIGHT SOURCE.

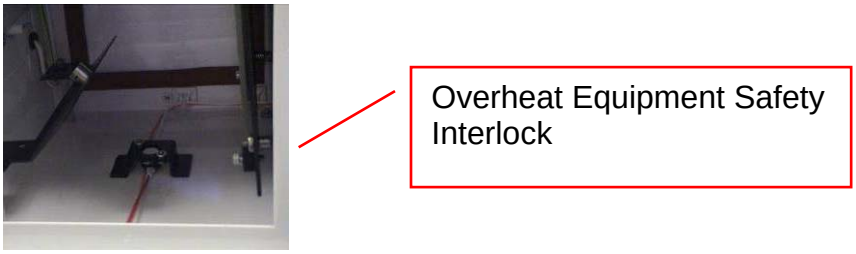


Figure 10-2 Overheat System Safety Interlock

10.1.3 The Air-flow System Safety Interlock

For UV Light Sources without an exhaust fan, the air-flow interlock removes power from the UV power supply if insufficient exhaust air-flow is detected.

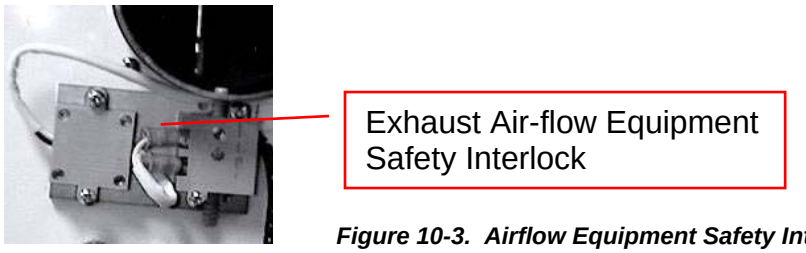


Figure 10-3. Airflow Equipment Safety Interlock

SECTION 11:
HAZARDOUS MATERIALS USED WITH THE SYSTEM

11.1 ISOPROPYL ALCOHOL

Isopropyl alcohol is used to clean parts during maintenance activities. Isopropyl alcohol and the wipes used with the isopropyl alcohol are considered hazardous waste. As hazardous waste the isopropyl alcohol and the wipes should not be thrown into the garbage or flushed down the sewer. Instead, the wipes that are soaked in isopropyl alcohol should be placed in a chemical waste container and sent to a RCRA approved incinerator or to a RCRA approved waste facility. Check the local and state disposal regulations because some local and state regulations differ from federal disposal regulations.

Isopropyl alcohol is a clear, colorless, flammable liquid with an odor of rubbing alcohol. Relatively low toxicity by all exposure routes. Inhalation of vapor can cause eye and respiratory tract irritation. Exposure to extremely high concentrations (>1000ppm) can cause intoxication, dizziness, headache, anesthesia and coma. Avoid skin and eye contact. Use solvent resistant gloves, and safety glasses when using small quantities (e.g., squirt bottle amounts). Keep away from ignition sources, such as flame, spark, and heat. Both ACGIH TLV and OSHA PEL values are 200ppm. ACGIH also cites the STEL as 500ppm.

- The chemical is used to clean the UV lamp if fingerprints or oil are on the surface. The amount used is less than 10ml.

- The chemical is used to clean the UV lamp housing as needed. The amount is less than 10ml.

11.2 MERCURY

Mercury is contained in the mercury UV lamps and the mercury-xenon UV lamps that are used in the light source. Mercury is a regulated solid waste that should not be thrown in to the garbage but should be recycled according to local, state, or federal laws.

OAI recycles the mercury by sending the old UV lamps to Advance Radiation Corporation (408-727-9200) or to North State Environmental (650-588-2839). The used UV lamps are considered "Hazardous Waste" and do require a manifest recorded through the California Department of Toxic Substance Control or similar state agency outside of California, but only for quantities in excess of 10 pounds of waste mercury or 24 lamps. Otherwise, no special paperwork is required for shipment of used lamps. It is suggested that used or damaged lamps be double wrapped in a Ziplock bag then packaged in a corrugated box. Also broken mercury lamps and mercury contaminated wipes should be double wrapped in a Ziplock bag then packaged in a corrugated box and shipped to the same location as the lamps.

The UV lamps will have to be replaced about every 1000 hours. The weight of the mercury in each of the different sizes of lamps is shown below.

Lamp Wattage	Weight of Mercury in Ounces
200	0.0002
350	0.0002
500	0.00035
1000	0.00189
2000	0.00315

SECTION 12:
DRAWINGS / SCHEMATICS

Drawing Description	Drawing #	Rev	Pgs
SCHEM ELEC SYS MAIN CFG 120V MDL 800MBA	0420-127-01*	F	2
SCHEM ELEC SYS MAIN CFG 220V MDL 800MBA	0420-127-02*	F	2
SCHEM ELEC SYS MAIN MTR-Z 120V MDL800MBA	0420-127-07*	D	2
SCHEM SYSTEM ELEC MTR Z 240V MDL800MBA	0420-127-08*	D	2
SCHEM PNEU PNL MDL 800MBA	0420-128-01	F	1
DIAG INCON 2 TOP&BOT CAMR 800MBA	0420-129-01*	D	1
DIAG INCON 2 TOP CAMR 800MBA	0420-129-03*	B	1
DIAG WIRING IR LAMP OPTION MDL 800MBA	0420-133-01*	B	1
SCHEM Z-FOCUS MTRZD BACKSIDE MDL800	0420-134-01*	D	1

* = *Depends on System Type Purchased*

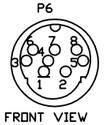
Revisions

REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	8966	NEW RELEASE	M.M.	M.M.	11/11/04
B	9036	MADE REDLINE CHANGES	M.M.	M.M.	4/19/05
C	9220	CHANGED R3,R4 TO 10K	M.M.	M.M.	11/16/05
D	9647	ADDED NOTE 5	MZ	M.M.	4/3/07
E	10076	MADE TOOL WIRE - 18GA	M.M.	M.M.	05/07/08
F	10136	CHANGE J26 & J27	M.M.	M.M.	07/29/08

TO FRONT PANEL
J11B
18 BLK/WHT
18 ORG
P11A
J11A
18 BLK/WHT
18 ORG
PS1
Z MOTION CLUTCH POWER SUPPLY
4(-) 2(+)
2 5
N
L
18BLK
F2
1/2A
TGND2
18GRN/YEL
TO FRONT PANEL
TO J3-6
18GRN/YEL
TO FRONT PANEL
J4B
BLK
BLK/WHT
BLU/WHT
ORG/BLK
ORG
BLU
RED/WHT
RED
SCRND 24G
P4A
J4A
22BRN
22BLU
22ORG
22GRN
22BLU
22RED
22RED
J25
24VEL
24BLU
RED B
24BLU
24VEL
24YEL
BLK
24YEL
3CDN 22G
10 FT.
RS-232
J24
BLK
RED
WHT
TOUCH SCREEN
RS-422/485
P5
J23
18GRN/YEL
22BRN
22RED
P22
J22
22BRN
18GRN/YEL
22RED
SHLD
BLK
WHT
BLK
RED
MICROSCOPE X&Y TO OPTICS
J16
22BLU
22ORG/RED
22WHT/GRN
L/S @ EXPOSE
J9
2100-1065-01
BLU
BLK
BRN
18 IN. LONG
P7
J7
MICROSCOPE @ ALIGN
J10
2100-1065-01
BLU
BLK
BRN
18 IN. LONG
P8
J8
22BRN
22RED/WHT
22RED/WHT
22BRN
22WHT/BLU
22ORG/RED
TO V3
TO V2
TO PNEUMATICS SHEET 2
TB5
TB6
22BRN
22BRN
22BRN
22BRN
22RED/WHT
22RED/WHT
22RED/WHT
TB4
TB3
22BRN
22BRN
22RED
22RED
18GRN/YEL
18BRN
18RED
18RED
TO J14-1
18RED
2PAIRS 24G
905398-0002
WHT
BLK
RED
BLK
P6
22BRN
22ORG/RED
18GRN/YEL
FXIN-24MT
PLC1
22WHT/BLU
22WHT/YEL
22BLU
22WHT/ORG
22WHT/GRY
TO V6
TO V5
TO V4
TO V9
22WHT/ORG
J26
22BRN
TO TB7-6
TO V8
TO PNEUMATICS SHEET 2
22ORG/VID
TO V7
TO V10
22WHT/VID
22WHT/VID
J27
22BRN
TO TB7-3
18RED
18RED
22WHT/BLU
18RED
18BRN
TO TB7-1
N
18BLK
18 LT BLU
18 LT BLU
18 LT BLU
N
N
F1
3.15A
18BLK
18BLK
18BLK
18GRN/YEL
18BRN
18RED
TB1
TB2
PS2
SET FOR 115V
AS-150-24
V ADJ
N
N
18BLK
WHT
18 LT BLU
18BLK
3 COND 14G
BLK
GRN
CB1
5A
P12
ON BACK PANEL
GROUND STUDS
14GRN/YEL
TGND1
18GRN/YEL
18GRN/YEL
SHUTTER DRIVER PCB
J1
18RED
18BRN
22WHT/BLK
+24V
RTN
IN1
OUT+
OUT-
GND
J2
CON3R
0601-012-04
18YEL
18ORG/WHT
BACK PANEL
J2
TO LIGHT SOURCE

NOTES:

1. WRAP WHITE ELECTRICAL TAPE (OR) WHT SHRINK TUBING ON LIGHT BLUE WIRE APPROXIMATELY WHERE SHOWN.
2.



3. LAST CONNECTOR USED WAS J25.
4. SET SWITCH ON POWER SUPPLY FOR 115V.
5. SEPERATE R1 & R2 SO THERE IS FREE AIR FLOW AROUND BOTH RESISTORS.

DAI

SCHEM SYSTEM ELECTRICAL 120V MDL800MBA

ENGINEER: MIKE MANLEY
DRAWN BY: MIKE MANLEY

Tuesday, July 29, 2008

Size	CAGE Code	DWG NO	Rev
C	(Cage Code)	0420-127-01	F

Scale

Sheet 1 of 2

ON TOOLING

TOOLING CLUTCH

CHUCK BALL LOCK
S2
COM
NC
NO

BLK
BLK
P20
J20
22RED
18 VIO
18 BLK/WHT
22WHT
18GRN/YEL
GROUND SCREW
P3
J3
TO ELE. PANEL - TGND2
SHEET 1
18GRN/YEL
18RED
18WHT
18 BLK/WHT
18 VIO

18 VIO
R5
18 GRY
1K
M1
MA
25 MA
(+)
(-)
Z MOTION
CLUTCH
CONTROLLER
18 BLK/WHT
18 ORG
J13
P13
P11B
TO ELE. PANEL
SHEET 1
18GRN/YEL
TO ELE. PANEL
SHEET 1
GROUND STUD

ON FRONT PANEL

22WHT/YEL
22WHT/BLU
J18A
TO LEFT TOP ILLUMINATOR
22BRN
22WHT/GRY
J17A
TO LEFT BOTTOM ILLUMINATOR
22WHT/ORG
TOP
S1
BOTTOM
22ORG
22BLU
J21A
TO RIGHT TOP ILLUMINATOR
J19A
TO RIGHT BOTTOM ILLUMINATOR
R3
10K
R4
10K
R1
150
R2
150
5
P4B

TO J16-1
TO J16-2
22WHT/GRN
22YEL
CHUCK BALL LOCK VAC
MICROSCOPE Y VAC
MICROSCOPE X VAC
P14 J14
18RED
18WHT
18RED
22WHT
V1
V2
V3
22BRN
3 WAY NO VALVE
3 WAY NO VALVE
3 WAY NO VALVE
TO TB3-9

Y2
Y3
Y5
22WHT/BRN
22BLU
22WHT/YEL
MASK VAC
SUB VAC
CONTACT VAC
V4
V5
V6
3 WAY NO VALVE
3 WAY NC VALVE
3 WAY NC VALVE
P26
RED
BLK
Y6
TO PLC
SHEET 1
RED
TO J26-1 22BRN
Y10 22WHT/GRY
22WHT/GRY
N2 SUB PURGE
HARD CONTACT N2
ALIGN PDS. AIR
V9
BLK
Y11 22ORG/VIO
V7
V8
3 WAY NC VALVE
3 WAY NC VALVE
3 WAY NC VALVE

EXPOSE PDS. AIR
P27
Y7
RED
BLK
V10
TO J27-1 22BRN
3 WAY NC VALVE
TO TB4-9
18BRN
TB7
TB10
22BRN

LED ILLUMATOR
RIGHT TOP
D?
LED
P21B J21B
6000-314-01
P21A
TO FRONT PANEL

LED ILLUMATOR
RIGHT BOTTOM
D?
LED
P19B J19B
6000-314-01
P19A
TO FRONT PANEL

LED ILLUMATOR
LEFT TOP
D?
LED
P18B J18B
6000-314-01
P18A
TO FRONT PANEL

LED ILLUMATOR
LEFT BOTTOM
D?
LED
P17B J17B
6000-314-01
P17A
TO FRONT PANEL

22RED
S16
MICROSCOPE X
S17
MICROSCOPE Y
22BLK
3COND 22G
RED
WHT
BLK
J15 P15
22WHT
P16
TO ELE. PANEL
SHEET 1

PART OF OPTICS ASSY

DAI

SCHEM SYSTEM ELECTRICAL 120V MDL800MBA

ENGINEER: MIKE MANLEY
DRAWN BY: MIKE MANLEY
Tuesday, July 29, 2008

Size	CAGE Code	DWG NO	Rev
C	(Cage Code)	0420-127-01	F

Scale

Sheet 2 of 2

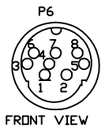
Revisions

REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	9036	NEW RELEASE	M.M.	M.M.	4/19/05
B	9220	CHANGED R3,R4 TO 10K	M.M.	M.M.	11/16/05
C	9647	ADDED NOTE 5	MZ	M.M.	4/3/07
D	10076	MADE TOOL WIRE - 18GA	M.M.	M.M.	05/07/08
E	10136	CHANGE J26 & J27	M.M.	M.M.	07/29/08
F	10210	CHANGE F1 & CB1	M.M.	M.M.	12/08/08

TO FRONT PANEL
J11B
18 BLK/WHT
18 ORG
P11A
J11A
PS1
Z MOTION CLUTCH POWER SUPPLY
4(-) 7(+)
2 5
18BLK
F2
1/2A
18 LT BLU
18GRN/YEL
18BLK
X1
X2
T1
5600-088-01
H4 H2 H3 H1
JUMPER
JUMPER
N
18BLK
F3
2A
18BLK
18 LT BLU
18 LT BLU
N
TB1
N
LT BLU
N
18 LT BLU
18BLK
18BLK
F1
1.6A
18BLK
N
18GRN/YEL
18BRN
18RED
TB2
PS2
L N (AC)
DJ
-V -V +V +V
V ADJ
SET FOR 230V
AS-150-24
18BLK
18GRN/YEL
TGND2
TO FRONT PANEL
TO J3-6
18GRN/YEL
22BRN
22BLU
22ORG
22BLU
22BRN
J4B
J4A
P4A
BLK
BLK/WHT
BLU/WHT
ORG/BLK
ORG
BLU
RED/WHT
RED
SCRND 24G
TO FRONT PANEL
J25
24VIO
24BLU
RED
24BLU
WHT
24YEL
24YEL
BLK
3CON 22G
10 FT.
J24
RS-232
BLK
RED
WHT
J23
P5
RS-422/485
SHLD
BLK
WHT
BLK
RED
P22
J22
18GRN/YEL
22BRN
22RED
22RED
22RED
18GRN/YEL
TOUCH SCREEN
MICROSCOPE X&Y TO OPTICS
J16
22BLU
22ORG/RED
22WHT/BRN
L/S @ EXPOSE
J9
2100-1065-01
BLU
BLK
BRN
18 IN. LONG
P7
J7
MICROSCOPE @ ALIGN
J10
2100-1065-01
BLU
BLK
BRN
18 IN. LONG
P8
J8
22BRN
22RED/WHT
22BRN
22WHT/BLU
22ORG/RED
TO V3
TO V2
TO PNEUMATICS SHEET 2
TB5
TB6
22BRN
22BRN
22BRN
22BRN
22RED/WHT
22RED/WHT
22RED/WHT
TB4
TB3
22BRN
22BRN
22BRN
22RED
22RED
22RED
18GRN/YEL
18BRN
TO J14-1
18RED
18RED
18RED
18GRN/YEL
2PAIRS 24G
905398-0002
P6
WHT
BLK
RED
BLK
22BRN
22ORG/RED
18GRN/YEL
FXIN-24MT
PLC1
22WHT/BLU
N
18BLK
18 LT BLU
22WHT/YEL
22WHT/BRN
22BLU
22WHT/ORG
22WHT/GRY
TO V6
TO V5
TO V4
TO V9 22WHT/ORG
22BRN
J26
TO TB7-6
TO V8
TO PNEUMATICS SHEET 2
22ORG/VID
TO V7
TO V10 22WHT/VID
22WHT/VID
22BRN
J27
TO TB7-3
18RED
18RED
22WHT/BLU
18RED
18BRN
TO TB7-1
18GRN/YEL
18GRN/YEL
18GRN/YEL
3 COND 14G
BRN
CB1
2A
P12
ON BACK PANEL
GRN/YEL
14GRN/YEL
GROUND STUDS
TGND1
SHUTTER DRIVER PCB
J1
18RED
18BRN
22WHT/BLK
+24V
RTN
IN1
J2
OUT+
OUT-
GND
CON3R
0601-012-04
18YEL
18ORG/WHT
BACK PANEL
J6
TO LIGHT SOURCE

NOTES:

1. WRAP WHITE ELECTRICAL TAPE (OR) WHT SHRINK TUBING ON LIGHT BLUE WIRE APPROXIMATELY WHERE SHOWN.
2. P6



3. LAST CONNECTOR USED WAS J25.
4. SET SWITCH ON POWER SUPPLY FOR 230V.
5. SEPERATE R1 & R2 SO THERE IS FREE AIR FLOW AROUND BOTH RESISTORS.

	DAI		
	SCHEM SYSTEM ELECTRICAL 240V MDL800MBA		
ENGINEER: MIKE MANLEY DRAWN BY: MIKE MANLEY	Size: C	CAGE Code: (Cage Code)	DWG NO: 0420-127-02 Rev: F
Monday, December 08, 2008	Scale:		Sheet: 1 of 2

ON TOOLING

TOOLING CLUTCH

CHUCK BALL LOCK
S2
COM
NC
NO

BLK
BLK
P20
J20
22RED
18 VIO
18 BLK/WHT
22WHT
18GRN/YEL
GROUND SCREW
P3
J3
TO ELE. PANEL - TGND2
SHEET 1
18GRN/YEL
18RED
18WHT
18 BLK/WHT
18 VIO

18 VIO
R5
18 GRY
1K
M1
MA
25 MA
(+)
(-)
Z MOTION
CLUTCH
CONTROLLER
18 BLK/WHT
18 ORG
J13
P13
P11B
TO ELE. PANEL
SHEET 1
18GRN/YEL
TO ELE. PANEL
SHEET 1
GROUND STUD

ON FRONT PANEL

22WHT/YEL
22WHT/BLU
J18A
TO LEFT TOP ILLUMINATOR
22BRN
22WHT/GRY
J17A
TO LEFT BOTTOM ILLUMINATOR
22WHT/ORG
TOP
S1
BOTTOM
22ORG
22BLU
J21A
TO RIGHT TOP ILLUMINATOR
J19A
TO RIGHT BOTTOM ILLUMINATOR
R3
10K
R4
10K
R1
150
R2
150
5
P4B

TO J16-1
TO J16-2
22WHT/GRN
22YEL
CHUCK BALL LOCK VAC
MICROSCOPE Y VAC
MICROSCOPE X VAC
P14 J14
18RED
18WHT
18RED
22WHT
V1
V2
V3
22BRN
3 WAY NO VALVE
3 WAY NO VALVE
3 WAY NO VALVE
TO TB3-9

Y2
Y3
Y5
22WHT/BRN
22BLU
22WHT/YEL
MASK VAC
SUB VAC
CONTACT VAC
V4
V5
V6
3 WAY NO VALVE
3 WAY NC VALVE
3 WAY NC VALVE
P26
RED
BLK
Y6
TO PLC
SHEET 1
RED
TO J26-1 22BRN
Y10 22WHT/GRY
22WHT/GRY
N2 SUB PURGE
HARD CONTACT N2
ALIGN PDS. AIR
V9
BLK
Y11 22ORG/VIO
V7
V8
3 WAY NC VALVE
3 WAY NC VALVE
3 WAY NC VALVE
EXPOSE PDS. AIR
P27
Y7
RED
BLK
V10
TO J27-1 22BRN
3 WAY NC VALVE
TO TB4-9
18BRN
TB7
TB10
22BRN

LED ILLUMATOR
RIGHT TOP
D?
LED
P21B J21B
6000-314-01
P21A
TO FRONT PANEL

LED ILLUMATOR
RIGHT BOTTOM
D?
LED
P19B J19B
6000-314-01
P19A
TO FRONT PANEL

LED ILLUMATOR
LEFT TOP
D?
LED
P18B J18B
6000-314-01
P18A
TO FRONT PANEL

LED ILLUMATOR
LEFT BOTTOM
D?
LED
P17B J17B
6000-314-01
P17A
TO FRONT PANEL

22RED
S16
MICROSCOPE X
S17
MICROSCOPE Y
22BLK
3COND 22G
RED
WHT
BLK
J15 P15
22WHT
P16
TO ELE. PANEL
SHEET 1

PART OF OPTICS ASSY

DAI

SCHEM SYSTEM ELECTRICAL 240V MDL800MBA

ENGINEER: MIKE MANLEY
DRAWN BY: MIKE MANLEY
Monday, December 08, 2008

Size	CAGE Code	DWG NO	Rev
C	(Cage Code)	0420-127-02	F

Scale

Sheet 2 of 2

Revisions

REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	10212	NEW RELEASE	M.M.	M.M.	12/11/08
B	10253	ADD ENCODER OPTION	M.M.	M.M.	2/4/09
C	10280	ADD E1043 CABLE	M.M.	M.M.	3/6/09
D	10893	ADD MD4 NOTE & CABLE	M.M.	M.M.	09/14/11

NOTES:

1. WRAP WHITE ELECTRICAL TAPE OR WHT SHRINK TUBING ON LIGHT BLUE WIRE APPROX WHERE SHOWN.
2. P6 FRONT VIEW
3. LAST CONNECTOR USED WAS J47.
4. SET SWITCH ON POWER SUPPLY FOR 115V.
5. SEPERATE R1 & R2 SO THERE IS FREE AIR FLOW AROUND BOTH RESISTORS.
6. THE CONNECTOR HOUSING AND PINS FOR J43 & J44 COME WITH THE MOTOR DRIVER.
7. SET THE MOTOR DRIVER STEP ANGLE TO 1/2 BY SET JP3 TO POSITIONS 1-2 & JP4 TO POSITIONS 2-3. ALSO SET FOR 2A/PHASE BY SETTING JP5 TO POSITION 1 & 2. SET FOR 1 PULSE BY SETTING JP1 & JP2 TO POSITION 2 & 3.

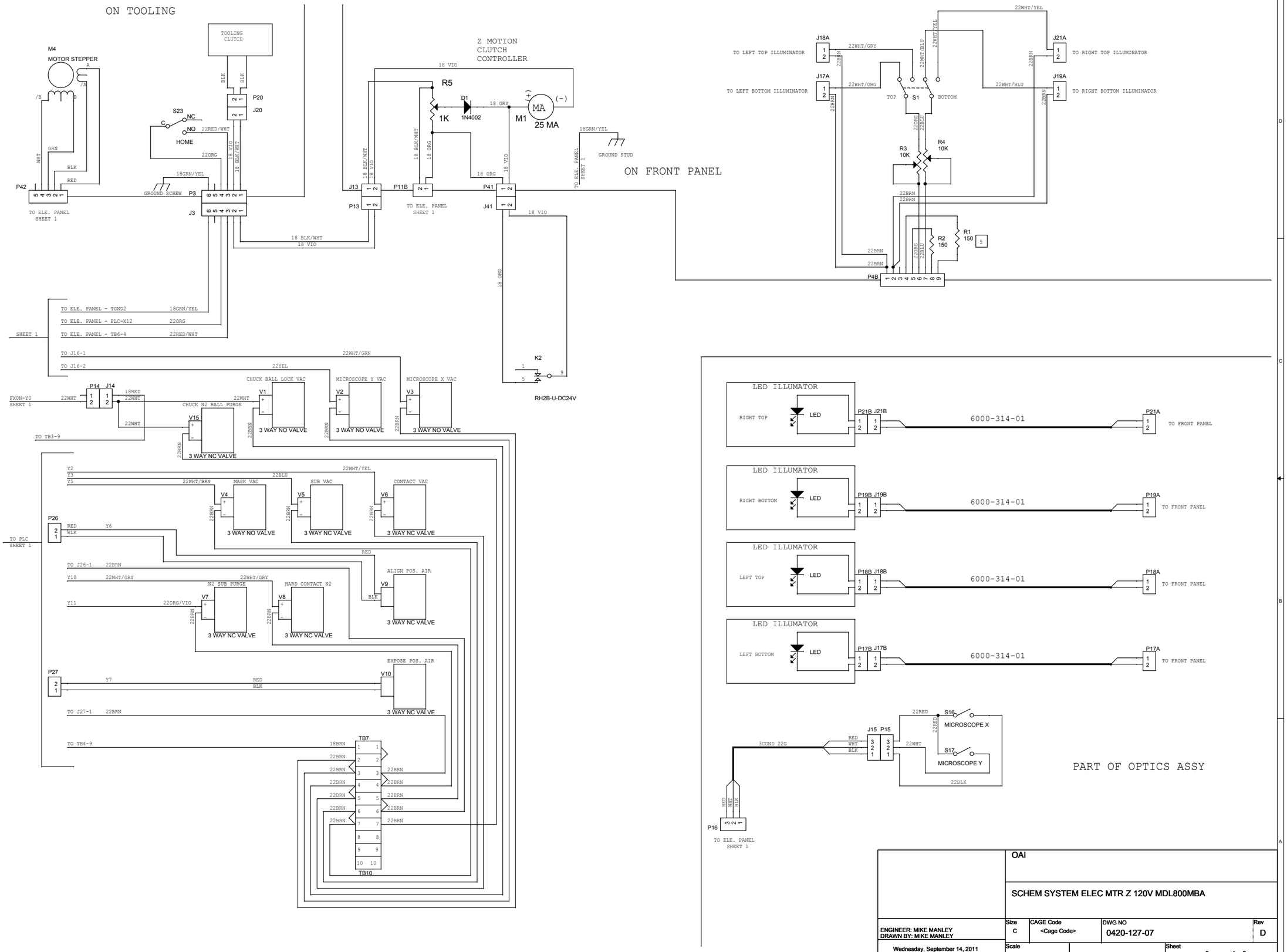
IR LAMP OPTION

TOOLING ENCODER

ENCODER OPTION 0420-1130-01

0420-1145-01

OAI	
SCHEM SYSTEM ELEC MTR Z 120V MDL800MBA	
ENGINEER: MIKE MANLEY DRAWN BY: MIKE MANLEY	Size C · CAGE Code <Cage Code> · DWG NO 0420-127-07 · Rev D
Wednesday, September 14, 2011	Scale · Sheet 1 of 2



	OAI
	SCHEM SYSTEM ELEC MTR Z 120V MDL800MBA
ENGINEER: MIKE MANLEY DRAWN BY: MIKE MANLEY	Size: C · CAGE Code: <Cage Code> · DWG NO: 0420-127-07 · Rev: D
Wednesday, September 14, 2011	Scale · Sheet: 2 of 2

Revisions

REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	10210	NEW RELEASE	M.M.	M.M.	12/09/08
B	10253	ADD ENCODER OPTION	M.M.	M.M.	2/4/09
C	10280	ADD E1043 CABLE	M.M.	M.M.	3/6/09
D	10893	ADD MD4 NOTE & CABLE	M.M.	M.M.	09/14/11

NOTES:

1. WRAP WHITE ELECTRICAL TAPE OR WHT SHRINK TUBING ON LIGHT BLUE WIRE APPROX WHERE SHOWN.
2. P6 FRONT VIEW
3. LAST CONNECTOR USED WAS J47.
4. SET SWITCH ON POWER SUPPLY FOR 230V.
5. SEPERATE R1 & R2 SO THERE IS FREE AIR FLOW AROUND BOTH RESISTORS.
6. THE CONNECTOR HOUSING AND PINS FOR J43 & J44 COME WITH THE MOTOR DRIVER.
7. SET THE MOTOR DRIVER STEP ANGLE TO 1/2 BY SET JP3 TO POSITIONS 1-2 & JP4 TO POSITIONS 2-3. ALSO SET FOR 2A/PHASE BY SETTING JP5 TO POSITION 1 & 2. SET FOR 1 PULSE BY SETTING JP1 & JP2 TO POSITION 2 & 3.

IR LAMP OPTION

ENCODER OPTION 0420-1130-01

0420-1145-01

OAI	
SCHEM SYSTEM ELEC MTR Z 240V MDL800MBA	
ENGINEER: MIKE MANLEY DRAWN BY: MIKE MANLEY	Size C; CAGE Code <Cage Code>; DWG NO 0420-127-08; Rev D
Wednesday, September 14, 2011	Scale; Sheet 1 of 2

ON TOOLING

M4
MOTOR STEPPER
A
/A
/B
B
WHT
GRN
BLK
RED
P42
TO ELE. PANEL SHEET 1

TOOLING CLUTCH
BLK
BLK
P20
J20

S23
NC
C
NO
HOME
22RED/WHT
22ORG
18 VIO
18 BLK/WHT
18GRN/YEL
GROUND SCREW
P3
J3

Z MOTION CLUTCH CONTROLLER
18 VIO
R5
1K
D1
1N4002
18 GRY
(+)
MA
(-)
M1
25 MA
18 BLK/WHT
18 VIO
18 BLK/WHT
18 ORG
18 VIO
J13
P13
P11B
TO ELE. PANEL SHEET 1
P41
J41
18GRN/YEL
GROUND STUD
TO ELE. PANEL SHEET 1

ON FRONT PANEL

22WHT/YEL
J18A
TO LEFT TOP ILLUMINATOR
22WHT/GRY
22BRN
22WHT/YEL
22WHT/BLU
J21A
TO RIGHT TOP ILLUMINATOR
22BRN
J17A
TO LEFT BOTTOM ILLUMINATOR
22WHT/ORG
22BRN
TOP
S1
BOTTOM
22WHT/BLU
22BRN
J19A
TO RIGHT BOTTOM ILLUMINATOR
22ORG
22BLU
R3
10K
R4
10K
22BRN
22BRN
R2
150
R1
150
5
22BRN
22BRN
22ORG
22BLU
P4B

18 BLK/WHT
18 VIO
18 VIO
18 ORG
K2
RH2B-U-DC24V

TO ELE. PANEL - TGND2 18GRN/YEL
TO ELE. PANEL - PLC-X12 22ORG
SHEET 1 TO ELE. PANEL - TB6-4 22RED/WHT
TO J16-1 22WHT/GRN
TO J16-2 22YEL

FXON-Y0 SHEET 1
22WHT
P14 J14
18RED
22WHT
TO TB3-9
22WHT
CHUCK N2 BALL PURGE
V15
3 WAY NC VALVE
22BRN
CHUCK BALL LOCK VAC
V1
3 WAY NO VALVE
22BRN
MICROSCOPE Y VAC
V2
3 WAY NO VALVE
22BRN
MICROSCOPE X VAC
V3
3 WAY NO VALVE
22BRN

Y2
Y3
Y5
22WHT/BRN
MASK VAC
V4
3 WAY NO VALVE
22BRN
22BLU
SUB VAC
V5
3 WAY NO VALVE
22BRN
22WHT/YEL
CONTACT VAC
V6
3 WAY NC VALVE
22BRN

P26
RED
BLK
Y6
TO PLC SHEET 1
RED
TO J26-1 22BRN
Y10 22WHT/GRY
22WHT/GRY
N2 SUB PURGE
V7
3 WAY NC VALVE
22BRN
HARD CONTACT N2
V8
3 WAY NC VALVE
22BRN
Y11 22ORG/VIO
BLK
ALIGN POS. AIR
V9
3 WAY NC VALVE

P27
Y7
RED
BLK
V10
EXPOSE POS. AIR
3 WAY NC VALVE
TO J27-1 22BRN
TO TB4-9 18BRN

TB7
22BRN
22BRN
22BRN
22BRN
22BRN
22BRN
22BRN
22BRN
22BRN
22BRN
22BRN
22BRN
TB10

LED ILLUMATOR
RIGHT TOP
LED
P21B J21B
6000-314-01
P21A
TO FRONT PANEL

LED ILLUMATOR
RIGHT BOTTOM
LED
P19B J19B
6000-314-01
P19A
TO FRONT PANEL

LED ILLUMATOR
LEFT TOP
LED
P18B J18B
6000-314-01
P18A
TO FRONT PANEL

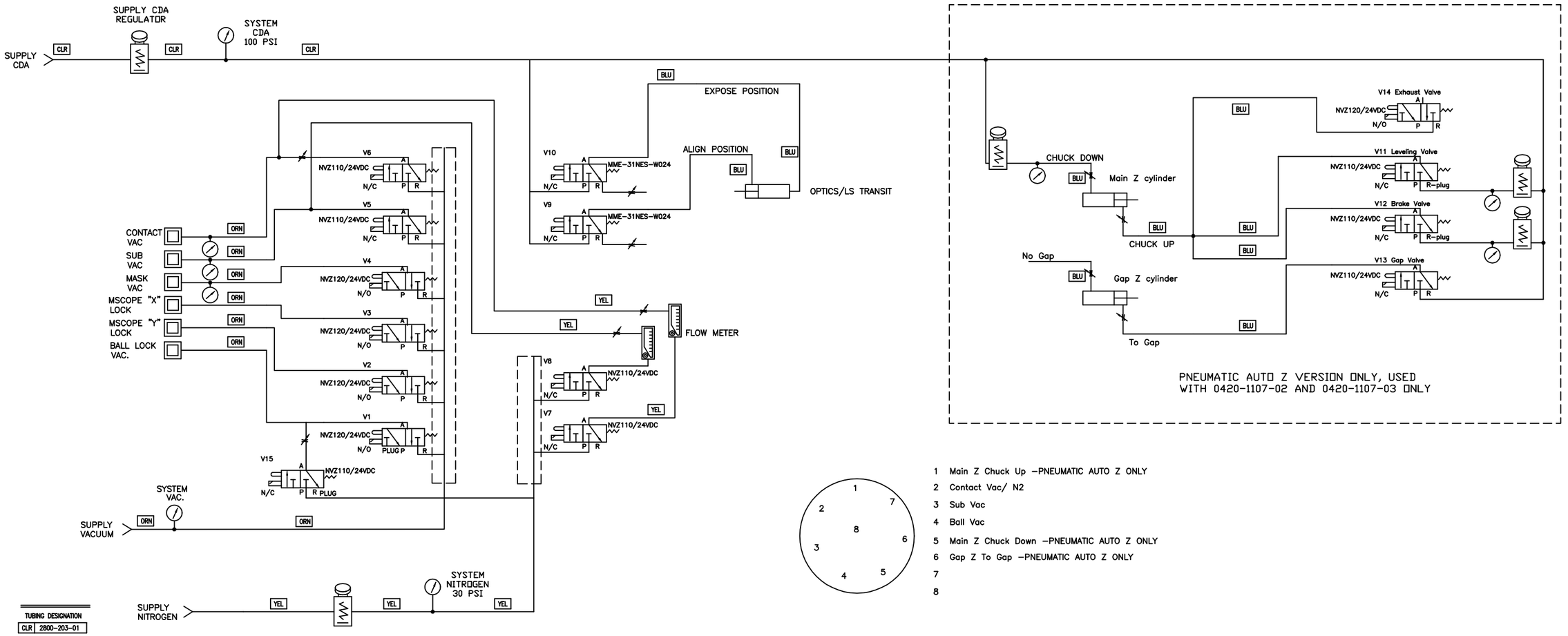
LED ILLUMATOR
LEFT BOTTOM
LED
P17B J17B
6000-314-01
P17A
TO FRONT PANEL

22RED
S16
MICROSCOPE X
22RED
3COND 22G
RED
WHT
BLK
J15 P15
22WHT
S17
MICROSCOPE Y
22BLK
RED
WHT
BLK
P16
TO ELE. PANEL SHEET 1

PART OF OPTICS ASSY

	OAI			
	SCHEM SYSTEM ELEC MTR Z 240V MDL800MBA			
ENGINEER: MIKE MANLEY DRAWN BY: MIKE MANLEY	Size C	CAGE Code <Cage Code>	DWG NO 0420-127-08	Rev D
Wednesday, September 14, 2011	Scale		Sheet 2 of 2	

REVISIONS					D 0420-128-01 F
REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	9025	ENGINEER RELEASE PER ECO	EP	EP	2/14/05
B	9182	ADD AUTO Z SECTION	EP	EP	10/2/05
C	9348	ADD SUPPLY CDA REG, SYSTEM CDA 100 PSI & NITROG 30 PSI	VSP	VSP	4/12/06
D	9442	CHG CONT VLV>BRK VLV, UPDT AUTO-Z EXHAUST CONN AREA	SP	EP	8/29/06
E	10060	CHG LS TRANSIT PLUMBING	EP	EP	4/24/08
F	10210	ADD LEVELING BALL NITROGEN PURGE	EP	EP	12/5/08



TUBING DESIGNATION	
CLR	2800-203-01
BLU	2500-1078-01
YEL	2500-1079-01
ORN	2500-1080-01

1 Main Z Chuck Up –PNEUMATIC AUTO Z ONLY
2 Contact Vac/ N2
3 Sub Vac
4 Ball Vac
5 Main Z Chuck Down –PNEUMATIC AUTO Z ONLY
6 Gap Z To Gap –PNEUMATIC AUTO Z ONLY
7
8

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES.
ALL PARTS TO BE DEBURRED
AND EDGES BROKEN .015 MAXIMUM
TOLERANCES ±
.X .030 | .XX .010 | .XXX .005 | DEG. 1/2°
THIRD ANGLE PROJECTION
SCALE: NONE
DO NOT SCALE DRAWING

	DRAWN	CHECKED	ENGINEER
	EP		EP
	2/14/05		2/14/05

NEXT ASSY.	MODEL	QTY
APPLICATION		

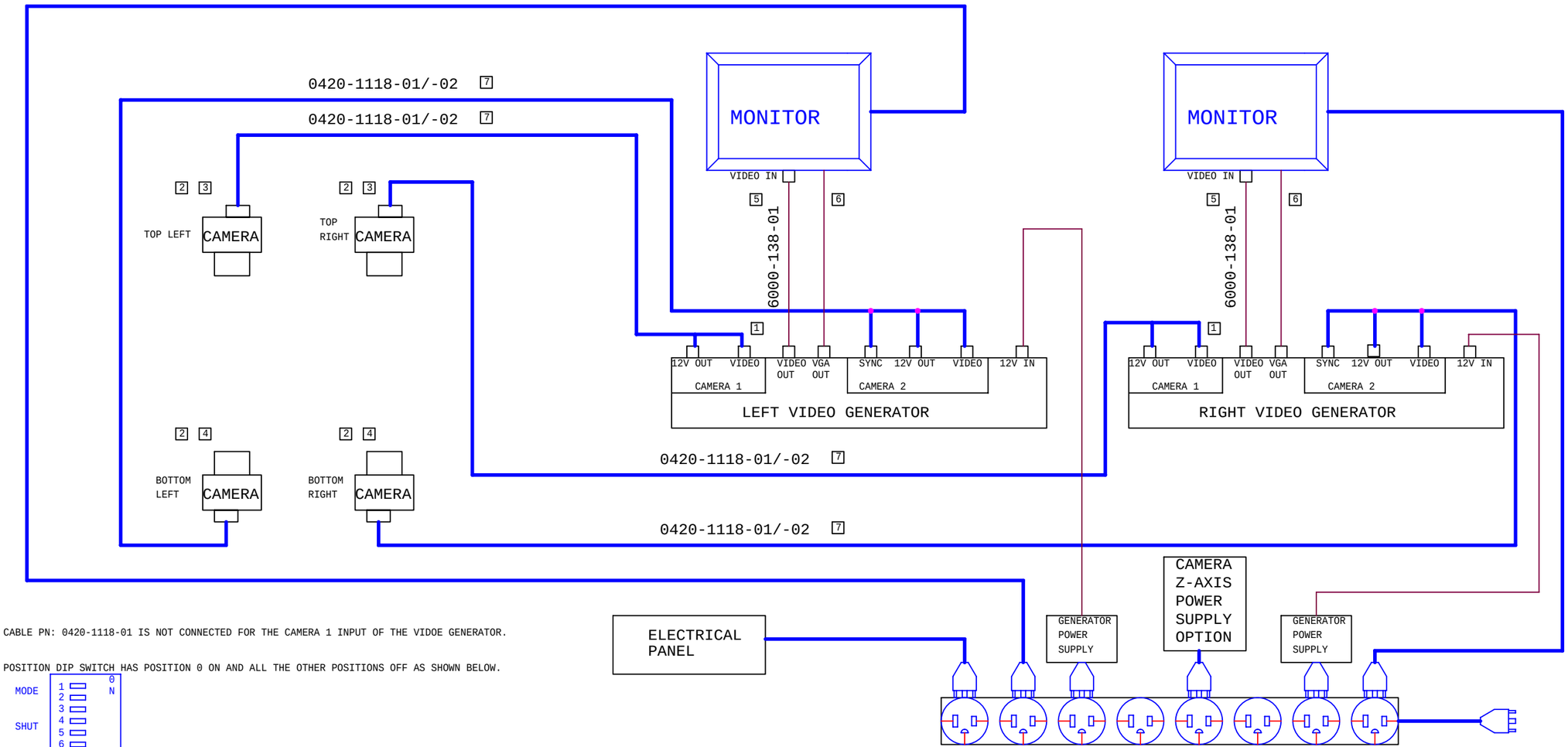
TITLE: SCHEM PNEU PNL MDL 800MBA
MATERIAL: N/A
FINISH: N/A
ACAD FILE NAME: 128-01D.dwg

OAI
Optical Associates Inc.
San Jose, Calif. 95134
(408)232-0600

D 0420-128-01 REV.: F
SHEET: 1 OF 1

Revisions

REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	9036	NEW RELEASE	M.M.	M.M.	3/17/05
B	9106	CHANGED SYNC CONNECTION	M.M.	M.M.	5/23/05
C	10228	ADD VGA CONNECTION	M.M.	M.M.	1/12/09
D	10310	ADD 0420-1118-02	M.M.	M.M.	3/31/09



NOTES:

1. THE SYNC CONNECTOR OF THE CABLE PN: 0420-1118-01 IS NOT CONNECTED FOR THE CAMERA 1 INPUT OF THE VIDOE GENERATOR.
2. ON ALL THE CAMERAS THE 10 POSITION DIP SWITCH HAS POSITION 0 ON AND ALL THE OTHER POSITIONS OFF AS SHOWN BELOW.

3. ON THE TOP CAMERAS THE HIGH 75 HD/VD SWITCH IS SET RIGHT TO 75 AND THE IN OUT HD/VD SWITCH IS SET RIGHT TO OUT.
4. ON THE BOTTOM CAMERAS THE HIGH 75 HD/VD SWITCH IS SET LEFT TO HIGH AND THE IN OUT HD/VD SWITCH IS SET LEFT TO IN.
5. CONNECTION FOR VIDEO MONITOR.
6. CONNECTION FOR VGA COMPUTER MONITOR.
7. OLDER SYSTEMS USED 0420-1118-01 BECAUSE THE VIDEO GENERATORS HAD 2.5 MM POWER CONNECTORS. NEWER SYSTEMS USE 0420-1118-02 BECAUSE THE VIDEO GENERATORS HAVE 2.1MM POWER CONNECTORS.

OAI

DIAGRAM INTCON 2 TOP/2 BOT CAMR 800MBA

Size	CAGE Code	DWG NO	Rev
B	{Cage Code}	0420-129-01	D

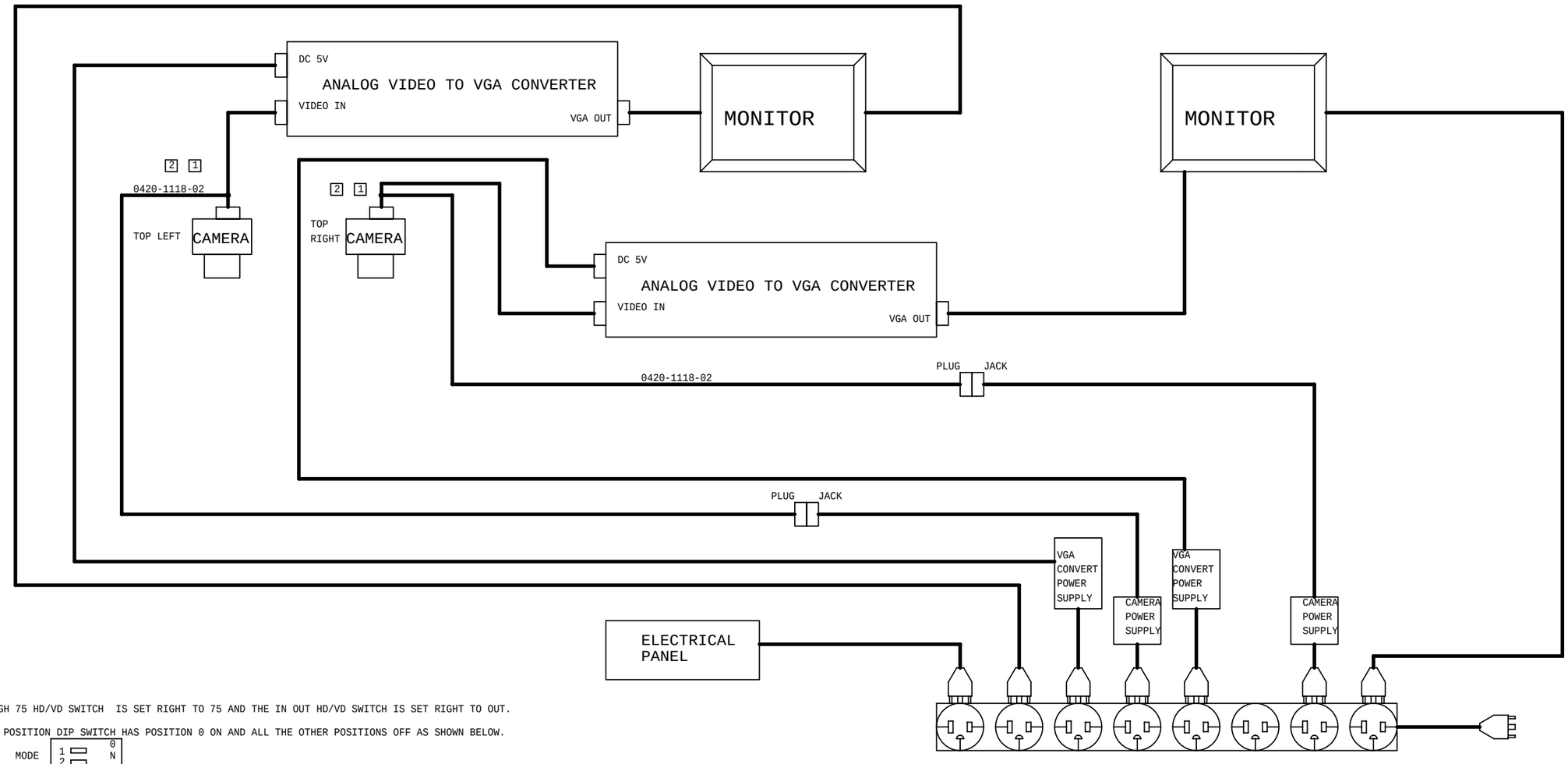
Tuesday, March 31, 2009

Scale

Sheet 1 of 1

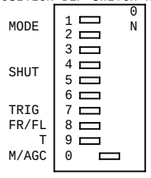
Revisions

REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	10228	NEW RELEASE	M.M.	M.M.	1/12/09
B	10411	CHANGE TO 0420-1118-02	M.M.	M.M.	9/10/09



NOTES:

1. ON THE TOP CAMERAS THE HIGH 75 HD/VD SWITCH IS SET RIGHT TO 75 AND THE IN OUT HD/VD SWITCH IS SET RIGHT TO OUT.
2. ON ALL THE CAMERAS THE 10 POSITION DIP SWITCH HAS POSITION 0 ON AND ALL THE OTHER POSITIONS OFF AS SHOWN BELOW.



OAI

DIAGRAM INTCON 2 TOP CAMR 800MBA

Size	CAGE Code	DWG NO	Rev
B	{Cage Code}	0420-129-03	B

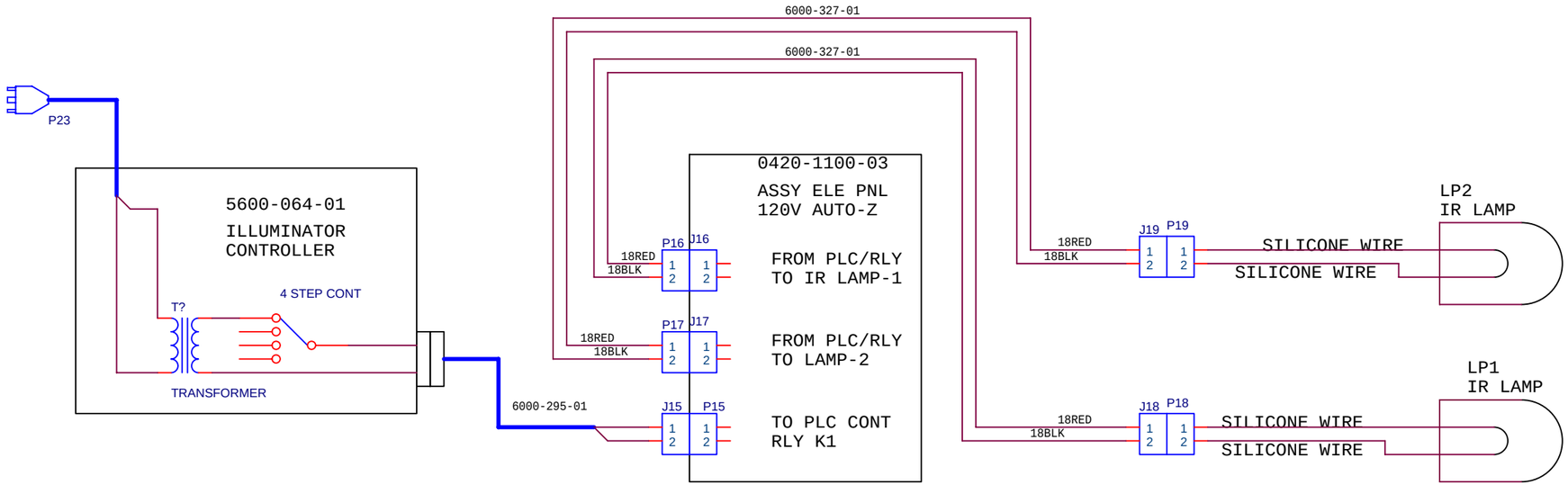
Monday, January 12, 2009

Scale

Sheet 1 of 1

Revisions

REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	9619	NEW RELEASE	M.Z.	M.M.	03/02/07
B	10298	ADD 6000-295-01	M.M.	M.M.	3/18/09



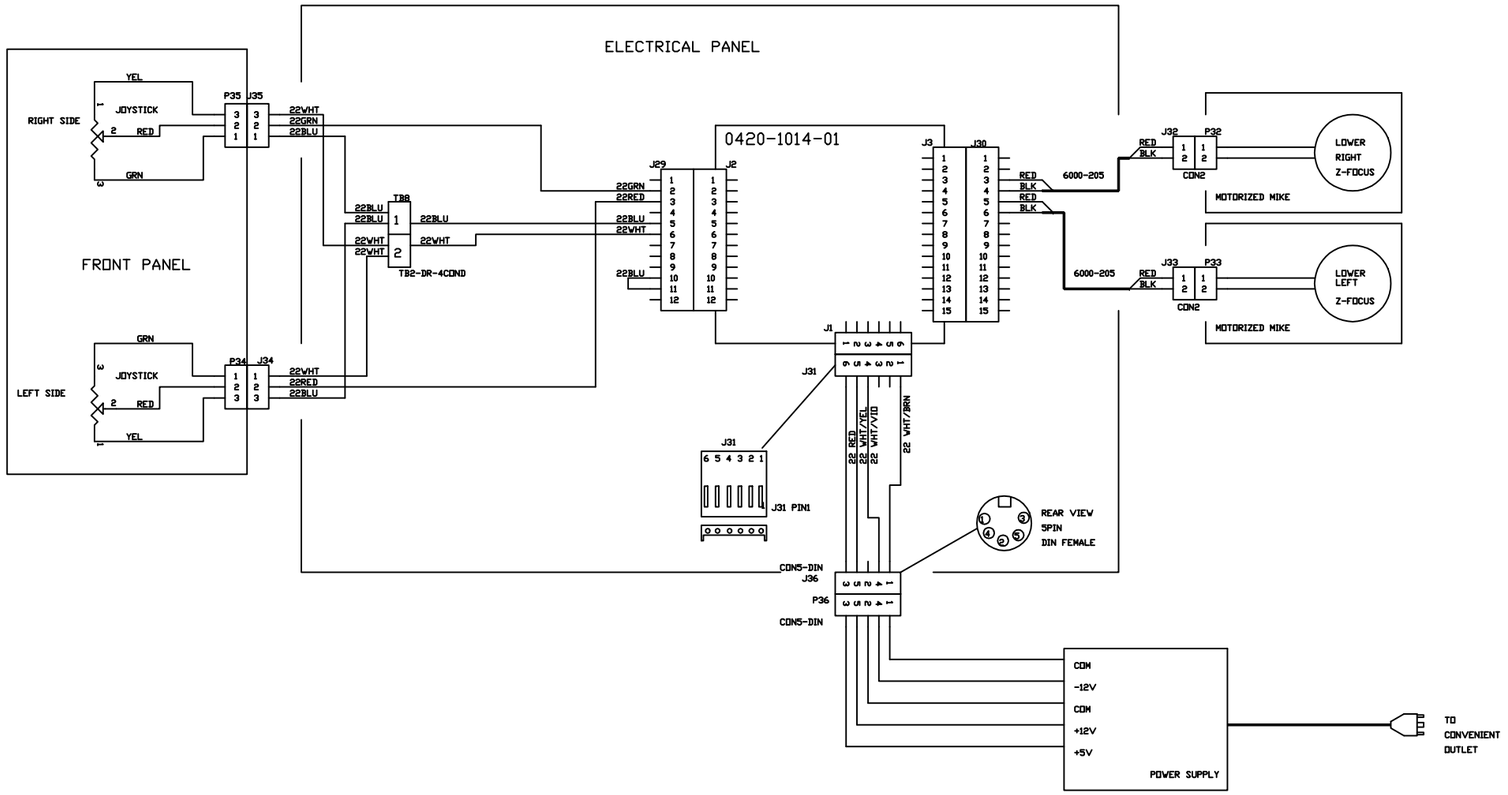
NOTES:

1 ASSY: 0420-0008-01

	OAI		
	WIRING DIAGRAM IR LAMP OPTION MDL804MBA		
DRAWN BY:M.M. ENGINEER:M.M.	Size: B	CAGE Code: {Cage Code}	DWG NO: 0420-133-01 / Rev: B
Wednesday, March 18, 2009	Scale		Sheet: 1 of 1

Revisions

REV.	ECO No.	DESCRIPTION	INCORP. BY	ENGINEER APPROVAL	DATE
A	9619	INTIAL RELEASE	MZ	MM	03/05/07
B	9634	ADD WIRE COLOR & CHG WIRING	MZ	MM	03/22/07
C	10076	CORRECTED WIRE COLORS	MM	MM	05/08/08
D	10136	CORRECT WIRING FOR POTS	MM	MM	07/29/08



NOTES:

1 ASSY 0420-1132-01 & 0420-1132-02.

DAI

SCHEM Z-FOCUS MTRZD BACKSIDE MDL 800

DRAWN BY:M.M. ENGINEER:M.M.	Size C	CAGE Code (Cage Code)	DWG NO 0420-134-01	Rev D
Tuesday, July 29, 2008	Scale		Sheet 1 of 1	