

*Cee*TM 200



Installation & User Manual

Equipment Warranty

Brewer Science, Inc. ® warrants to the original purchaser (Buyer) that this Equipment is free from defects in material and workmanship under normal use and service in accordance with Brewer Science, Inc. instructions and specifications.

The buyer shall promptly notify Brewer Science, Inc. of any claim against this warranty. Any item to be returned to Brewer Science, Inc. shall be sent with transportation charges prepaid by Buyer. Clearly marked with a Return Material Authorization (RMA) number obtained from the Customer Support Unit.

Brewer Science, Inc. obligation under this warranty is limited to the repair or replacement, at the option of Brewer Science, Inc. of any equipment, component or part that is determined by the Customer Support Unit to be defective in material or workmanship. This obligation shall expire one (1) year after the initial shipment of the Equipment from Brewer Science, Inc..

This warranty shall be void if:

- (a) Any failure is due to the misuse, neglect, improper installation of, or accident to the Equipment.
- (b) Any major repairs or alterations are made to Equipment by anyone other than a duly authorized representative of Brewer Science, Inc.. Representatives of Buyer will be authorized to make repairs to Equipment without voiding warranty, on completion of the Brewer Science, Inc. training program.
- (c) Replacement parts are used other than those made or recommended by the Customer Support Unit.

BREWER SCIENCE, INC. MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO EQUIPMENT. NO WARRANTY IS MADE AS TO THE MERCHANTABILITY OF THE EQUIPMENT NOR TO ITS FITNESS FOR ANY PARTICULAR PURPOSE. In no event shall Brewer Science, Inc. be liable for consequential loss or damages, however caused. No person or representative of Brewer Science, Inc. is authorized to assume any liability in connection with Equipment. Nor to make any change to this warranty unless such change or modification is put in writing and approved by an authorized representative of Brewer Science, Inc. in writing.

The laws of the state of Missouri shall govern this warranty.

Talon™ is a trademark of Brewer Science, Inc. All rights reserved.
Copyright © 2005 Brewer Science, Inc. All rights reserved.

| | |
|---------------------|-------------------------|
| Prepared By: | Kevin Veik / Dan Brewer |
| Approved By: | Kevin Veik |
| Issue/Revision Date | F430362A / 05.31.06 |

1. Manual Status

1.1. Machines Covered

This manual covers the Cee™ Model 200 series machines. It is to be used to install, operate, and troubleshoot this model Spin Coater.

1.2. Authors

Dan Davis, Jeff Leith

1.3. Revision History

Version 1.5 (software v 1.5.)

Copyright © 2007 Brewer Science, Inc. ® All rights reserved.

2. Table of Contents

| | | |
|--------|---|---|
| 1. | Manual Status..... | 2 |
| 1.1. | Machines Covered | 2 |
| 1.2. | Authors..... | 2 |
| 1.3. | Revision History | 2 |
| 2. | Table of Contents..... | 2 |
| 3. | List of Illustrations..... | 3 |
| 4. | Contents | 3 |
| 4.1. | Introduction..... | 3 |
| 4.1.1. | Equipment Description | 3 |
| 4.1.2. | System Specifications | 4 |
| 4.1.3. | Safety Symbols | 5 |
| 4.1.4. | Model and Revisions..... | 5 |
| 4.2. | Equipment/Process Overview..... | 5 |
| 4.2.1. | History..... | 5 |
| 4.2.2. | Process Flow Chart | 5 |
| 4.2.3. | Control Layout..... | 6 |
| 4.3. | Safety Hazards/Precautions | 7 |
| 4.3.1. | Overview of Equipment-Specific Hazards | 7 |
| 4.3.2. | Electrical | 7 |
| 4.3.3. | Mechanical..... | 7 |
| 4.3.4. | Chemical | 8 |
| 4.3.5. | Lockout/Tagout Procedures and Information | 8 |
| 4.3.6. | Intended Use of Machine | 8 |
| 4.4. | Installation..... | 9 |
| 4.4.1. | Facilities Requirements..... | 9 |
| 4.4.2. | Environment..... | 9 |
| 4.4.3. | Unpacking/Inspection | 9 |

| | | |
|---------------------|------------------------|---|
| Prepared By: | Dan Davis / Jeff Leith | 2 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

| | | |
|----------|--|----|
| 4.4.4. | System Installation and Setup | 9 |
| 4.4.5. | System Checkout | 10 |
| 4.5. | Software | 11 |
| 4.5.1. | Controls..... | 11 |
| 4.5.1.1. | Main Screen | 11 |
| 4.5.1.2. | Spin Recipe Screens..... | 12 |
| 4.5.1.3. | Spin Process Screens..... | 13 |
| 4.5.1.4. | Spin Diagnostics Screen | 14 |
| 5. | Service & Maintenance..... | 14 |
| 5.1. | Maintenance – Vacuum Liquid Trap | 14 |
| 5.2. | Spin Chuck Replacement | 15 |
| 5.3. | Troubleshooting Chart | 16 |

3. List of Illustrations

- Figure 1 – Model 200
- Figure 2 – Flow Chart
- Figure 3 – Controls Locations
- Figure 4 – Main Screen
- Figure 5 – Spin Recipe Screen
- Figure 6 – Spin Process Screen
- Figure 7 – Spin Diagnostics Screen

4. Contents

4.1. Introduction

4.1.1. Equipment Description

The Cee™ 200 is a programmable coater combination from Cost Effective Equipment. It features auto tuning PID and digital control and a resilient ¼VGA touch screen offers an easy programming interface with graphic monitoring capabilities.

| | | |
|---------------------|------------------------|---|
| Prepared By: | Dan Davis / Jeff Leith | 3 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |



Figure 1 - Model 200

4.1.2. System Specifications






| | | |
|---|---------|------------------------|
| Maximum Spin Speed | 6000 | RPM |
| Maximum Ramp | 30000 | RPM/s |
| Speed Accuracy | +/- 1 | RPM |
| Maximum Substrate that will fit in bowl | 200mm | |
| Recipe Storage | >20 | Recipes |
| Power | 100-120 | Volt AC – Single Phase |
| Weight | 40 | Pounds |

Table 1 – System Specifications

| | | |
|---------------------|------------------------|---|
| Prepared By: | Dan Davis / Jeff Leith | 4 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

4.1.3. Safety Symbols

Symbols used in the manual and on the machine:

-  **High Voltage Warning**
-  **General Hazard**
-  **Wear Appropriate Safety Equipment**
-  **Pinch Point Warning**
-  **Notes**

The full list of safety considerations can be found in [Safety Hazards/Precautions](#).

4.1.4. Model and Revisions

The model and serial number information for the Cee™ 200 are located on the rear panel near the power inlet. Software version information can be found on the Main screen. See [Software](#) for screen shots and a detailed explanation of the system software.

4.2. Equipment/Process Overview

4.2.1. History

The Cee™ 200 is based on the popular Cee™ 100. The major advantage of the Cee™ 200 is the graphical touch screen user interface, increased number of recipe steps, and an increased recipe storage capacity.

4.2.2. Process Flow Chart

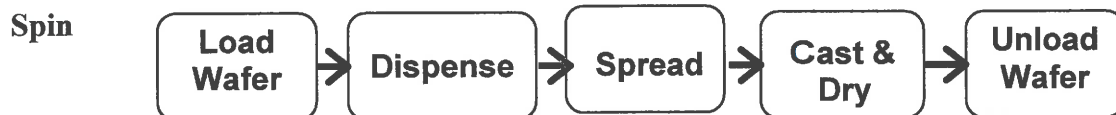


Figure 2 – Basic Flow Chart

| | | |
|---------------------|------------------------|---|
| Prepared By: | Dan Davis / Jeff Leith | 5 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

4.2.3. Control Layout

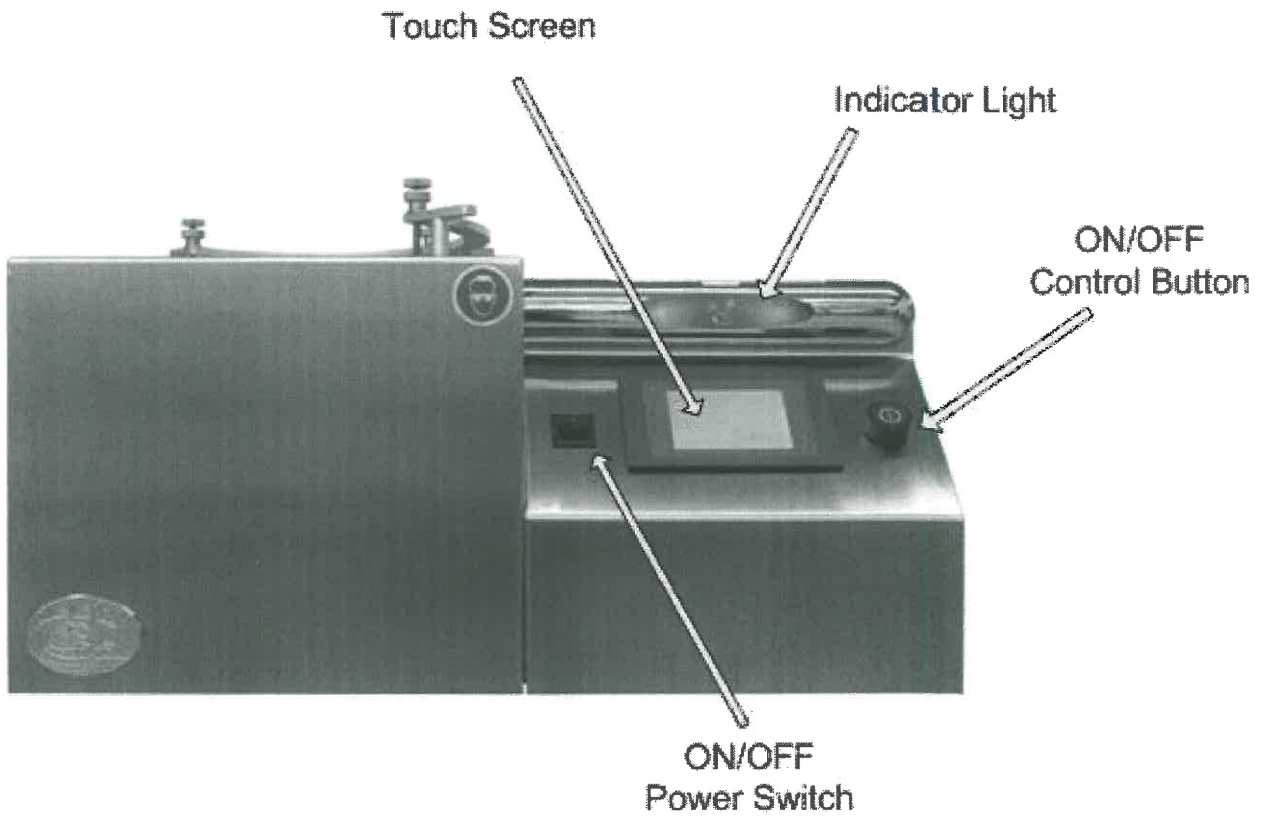


Figure 3 – Controls Locations

| | | |
|---------------------|------------------------|---|
| Prepared By: | Dan Davis / Jeff Leith | 6 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

4.3. Safety Hazards/Precautions



Read this manual in its entirety before operating the machine.

4.3.1. Overview of Equipment-Specific Hazards

The unit is very heavy and proper precautions should be taken when handling the machine to minimize risk of injury. Labels are placed on the machine to identify areas where caution is needed during operation.

4.3.2. Electrical



High voltage is present in the machine. Disconnect the power before servicing.



Stored electrical energy is present in the machine. Before servicing allow sufficient time for discharge. The servo amp has a charge light; do not service the machine until this light has gone out.

4.3.3. Mechanical



This machine uses compressed gasses, which can provide motive force for components and can expand violently upon decompression. Disconnect N2 or CDA before removing any panels.



The machine is capable of very high-speed rotation. Ensure all lids and panels are in place before rotating these devices.



Ensure that all panels are on and in their correct locations before powering up or operating.



When opening the lid be aware of the pinch point at the hinge cover. Open the lid only by using the handle on the lid.




The unit is very heavy and proper precautions should be taken when handling or moving the machine to minimize risk of injury.




Always wear the proper Personal Protective Equipment for the job. This includes safety glasses, gloves and other equipment as needed to protect from mechanical and chemical hazards.

| | | |
|---------------------|------------------------|---|
| Prepared By: | Dan Davis / Jeff Leith | 7 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |


4.3.4. Chemical


 Ensure chemical compatibility of all chemicals and materials being used inside the machine. This includes all wetted parts of the storage, supply, dispense, and waste systems.


 Ensure chemical compatibility of all chemicals with each other. All dispensed materials are held in one common waste storage tank. Check for reactions between chemicals before use.

 Flammable Chemicals. No open flames/sparks.

 Relieve pressure before opening canisters, tanks, cartridges, or syringes to refill.

 Relieve pressure and shut off chemical valves before servicing supply lines, dispense valves or other components.

 Relieve pressure and shut off chemical valves before removing spin lid or changing BSR tubes, EBR tubes, or any other dispense nozzle or spray tip.

 Flush tubing and valves with an appropriate solvent and drain system before servicing.


 When draining waste tank, use appropriate containers and connection methods.

 Ensure proper ventilation/exhaust is used at all times.

 Always wear the proper Personal Protective Equipment for the job. This includes safety glasses, gloves and other equipment as needed to protect from mechanical and chemical hazards.

4.3.5. Lockout/Tagout Procedures and Information

Before servicing, turn off the machine and remove the power inlet cord by disconnecting the plug where it enters the machine.

 The Servo Amp retains a charge for approximately 15 minutes after power is removed, do not service these parts until the charge lamp on the Servo Amp goes out.

4.3.6. Intended Use of Machine

The Cee™ Model 200 is intended for use as a Semiconductor/Optical application spin coating machine. It is primarily intended for substrates up to the maximum size. The Model 200 is not intended for use in food or medical applications or for use in hazardous locations.

| | | |
|---------------------|------------------------|---|
| Prepared By: | Dan Davis / Jeff Leith | 8 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

The Cee™ Model 200 is intended for use only by properly trained personnel wearing the proper personal protective equipment. Anyone not trained in the proper use of the Model 200 and have not fully read this manual should not operate the equipment.

The Cee™ Model 200 is intended for use in a cleanroom environment to provide the proper processing conditions for the substrates. If it is used outside of a cleanroom environment, the substrate cleanliness may be compromised.

The Cee™ Model 200 is not intended for use in a hazardous or explosive environment.

4.4. Installation

4.4.1. Facilities Requirements

The Cee™ 200 requires the following utilities for operation.

- Single Phase 100-120V AC at 10 Amps
- Vacuum Supply at 20 in Hg
- Nitrogen Supply at 45psi to 55psi (Auto Dispense)
- Exhaust Port 1 Inch OD
- Drain Port ¾ Inch OD

4.4.2. Environment

The Cee™ 200 should be operated in a clean, low humidity environment.

4.4.3. Unpacking/Inspection

Thoroughly check machine for shipping damage. If physical damage is seen, DO NOT APPLY POWER! Contact Cee™ immediately.

The following items should be included with the shipment.

- (1) Cee™ 200
- (1) Power Cord with female power connector
- (1) Anodized Aluminum Stylus
- (1) User & Installation Manual

Optionally included items:

- Spin Chucks with Screws
- Dispense Controllers
- Dispense Valves
- Dispense Nozzles
- Dispense Hubs

4.4.4. System Installation and Setup

- (1) Lift the unit out of the packing crate by grasping the bottom only. **Do not** lift the by any of the top covers or protrusions. **Do not** roll or turn the unit on its side or ends.

| | | |
|---------------------|------------------------|---|
| Prepared By: | Dan Davis / Jeff Leith | 9 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

- (2) Remove plastic wrap and packing foam.
- (3) Place Cee™ Model 200 on a table of proper height and strength so that the controls and spin chuck are at the proper ergonomic height.
- (4) Level the machine using the feet so that the spin chuck is level front-to-back and side-to-side.
- (5) Thoroughly clean the spin bowl and spin chuck.
- (6) Connect vacuum, N2, drain, and exhaust lines.
- (7) Plug in the machine.
- (8) Once plugged in, only the cooling fan should be powered, not the display.
- (9) Switch ON the ON/OFF Power Switch.
- (10) Display should momentarily show boot screen and then show main screen.

4.4.5. System Checkout

Once system setup has been completed, perform the following system checkout procedure.

- (1) Press the software version number near the lower left of the screen (see Figure 4).
- (2) Press the Restore Defaults button.
- (3) Turn the power off, then on. This restores factory default settings.
- (4) Press Diagnostics to show diagnostic screen (see Software for access procedure)
- (5) Press the ON/OFF Control Button to start and stop the spinner.

If the unit performs all tasks, the machine is ready to go. For recipe programming see Software. If you have any problems please contact Cee™.

| | | |
|---------------------|------------------------|----|
| Prepared By: | Dan Davis / Jeff Leith | 10 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

4.5. Software

4.5.1. Controls

4.5.1.1. Main Screen

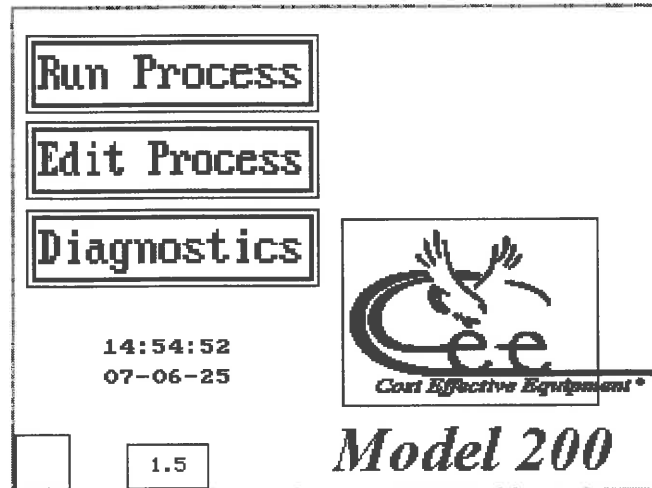


Figure 4 – Main Screen

The Cee™ 200 offers a familiar interface that is similar in appearance and operation to a physical panel. At power-up, the display will show boot screen diagnostics and then switch to the main menu shown here in Figure 4.

The Edit Process button will display the Edit Process screen shown in Figure 5. From this screen the user can edit, load, save, and delete any recipe.

The Run Process button will take you to the Spin Process screen shown in Figure 6. This is where recipes can be loaded and the process status can be monitored.

The remaining button is not required for normal operation. The Diagnostics screen allows manual control over spin vacuum, dispenses, and sensor readings.

| | | |
|---------------------|------------------------|----|
| Prepared By: | Dan Davis / Jeff Leith | 11 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

4.5.1.2. Spin Recipe Screens

Figure 5 – Spin Recipe Screen

The Spin Recipe Screen allows the user to create, edit, save, load, and delete recipes. The CLR key will clear all of the current recipe steps. Each recipe is comprised of four parameters:

Speed – The speed for that step.

Accel –The Acceleration/Deceleration value for that step.

Step Time – The time allowed for that process step.

Disp – The user may determine which, if any, of the dispenses will be used for that step.

Two dispenses can be selected for each step. Four dispense outputs are standard, additional hardware is required to use dispenses 5 through 7.

| Parameter | Minimum | Maximum |
|-----------|---------|-------------------|
| Speed | 0 | 6000 (12000 opt.) |
| Ramp | 0 | 30000 |
| Time | 0 | 999.9 |

Table 2

These parameters may be set by pressing the boxes next to their title. For numeric fields, a keypad will appear in which values may be entered. Other boxes will have dropdown lists with the available options for that field.

Once each of the parameters has been set, the recipe can be saved. Saving a recipe may be accomplished by pressing the Save button. The user will then be prompted to enter a recipe name. This name may contain up to eight characters. Once the user has entered the recipe name, press the enter key to complete the saving process.

| | | |
|---------------------|------------------------|----|
| Prepared By: | Dan Davis / Jeff Leith | 12 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

To retrieve a saved file, press the Load key. This will bring up a scroll down box that will allow the user to select from all of the saved recipes. Once the user has chosen the file to load, an Open Recipe will appear.

To Delete a recipe, press the Delete key. Once the delete key has been pressed, a scroll down box will appear and the user may pick to delete a single recipe or All Recipes. Similar to the load function, a Yes or No confirmation is needed to complete the process.



The parameters displayed on the Spin Recipe screen will be the ones used during the spin process.

4.5.1.3. Spin Process Screens

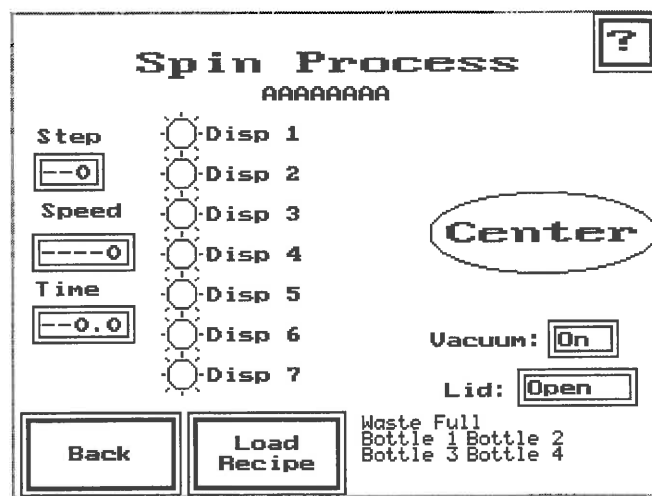


Figure 6 – Spin Process

The Spin Process screen allows the user to start, stop, and monitor the spin/coat process in addition to being able to load previously saved recipes. The spindle speed, step number, step time, and current dispense are all viewable from this screen. The statuses of the waste bottle and source bottles are shown, if installed.

After loading the wafer, press the ON/OFF Control Button. This will initiate the Center Wafer Process. The Center Wafer Process may be paused by lifting the lid so the wafer may be adjusted. Lowering the lid will resume centering.

When the wafer is centered, press the ON/OFF Control Button again to begin the coating process. This will continue until the end of the process is reached. At this time the buzzer will sound and the indicator light will flash briefly, followed by a long pause. Pressing the ON/OFF Control Button again will acknowledge the Process Complete and silence the buzzer.

| | | |
|---------------------|------------------------|----|
| Prepared By: | Dan Davis / Jeff Leith | 13 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

The current function of the ON/OFF Control Button will be displayed on the screen during each step.

At any time during processing, pressing the ON/OFF Control Button will stop the process.

! The ON/OFF Control Button can only Start/Stop the spin process when the Spin Process screen is active.

4.5.1.4. Spin Diagnostics Screen

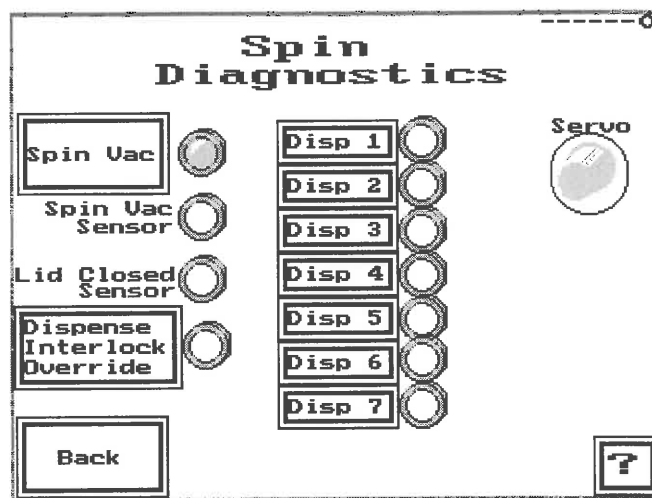


Figure 10 – Spin Diagnostics Screen

The diagnostics screen allows the user to manually operate of the spin coater vacuum and dispenses. In addition the user may monitor the spin vacuum sensor and the lid closed sensor. Press the ON/OFF Control Button will start and stop spindle rotation at a fixed rate of 30 RPMs.

5. Service & Maintenance

5.1. Maintenance – Vacuum Liquid Trap

The Cee™ Model 200 is relatively maintenance free. The only part that needs attention is the vacuum liquid trap. Its purpose is to trap any liquids that go down the spindle vacuum hole and prevent them from contaminating down stream components. It is recommended that the user avoid getting any liquids down the spindle vacuum hole by not spraying any cleaners or solvents directly on the center of the spin chuck and by not dispensing without a substrate on the spin chuck. However, since this may inadvertently

| | | |
|---------------------|------------------------|----|
| Prepared By: | Dan Davis / Jeff Leith | 14 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

occur, the trap will need to be emptied on occasion. Follow the steps below to empty the vacuum liquid trap.

- (1) Turn off the machine by pressing the ON/OFF Power Switch
- (2) Disconnect power by removing the plug from the rear of the machine. Use appropriate Lockout/Tagout procedures.
- (3) Shut off the vacuum supply at the facility supply port.
- (4) Remove the rear sheet metal cover from the machine. Removing any dispense tubes or valves as needed.
- (5) Inside the tool, mounted on the large aluminum block, is the vacuum liquid trap. It is a translucent white canister with a conical lid. Remove the vacuum liquid trap from the clips that attach it to the block.
- (6) Unscrew the canister from the lid, being careful not to spill any liquid into the machine.
- (7) Dispose of the liquid and any solids that have accumulated in the vacuum liquid trap. Follow all hazardous waste disposal procedures as necessary.
- (8) Clean the canister and the metal wool inside it with an appropriate solvent. Again disposing of the solvent following all hazardous waste disposal procedures.
- (9) Screw the canister back on the lid. The tube protruding down from the lid should be pushed through the metal wool.
- (10) Snap the vacuum liquid trap back on to the clips. Take care to ensure that no tubes are kinked.
- (11) Replace the rear sheet metal cover, replacing any dispense tubes or valves that were removed.
- (12) Reconnect the power cord.
- (13) Turn on the machine by pressing the ON/OFF Power Switch.
- (14) The Cee™ Model 200 is now ready to use.

5.2. Spin Chuck Replacement

The Cee™ Model 200 is capable of processing many different sizes of substrates. It may be necessary to change spin chucks in order to run different sizes of substrates, depending on the spin chuck design. Follow the steps below to change a spin chuck.

- (1) Open the spin bowl lid and leave it open.
- (2) Turn off the machine by pressing the ON/OFF Power Switch.
- (3) Disconnect power by removing the plug from the rear of the machine. Use appropriate Lockout/Tagout procedures.
- (4) Shut off the vacuum supply at the facility supply port.
- (5) Hold the existing spin chuck in one hand and remove the #8 FHCS vented spin chuck screw in the center of the spin chuck using a 3/32" hex wrench.
- (6) Pull the spin chuck straight up. It should lift straight off the spindle. If it is stuck, wiggling it slightly should free it.

| | | |
|---------------------|------------------------|----|
| Prepared By: | Dan Davis / Jeff Leith | 15 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |

- (7) If the spin chuck was stuck, clean any residue that remains on the spindle or the bore of the spin chuck. Inspect the spindle and check for any damage.
- (8) Place the new spin chuck on the spindle. Note that the spin chuck has a notch that the drive pin on the spindle fits in. When placing the spin chuck on the spindle align this notch with the drive pin and push the spin chuck all the way down so that the pin is in the notch.
- (9) Replace the vented spin chuck screw and tighten it using the hex wrench.

Spin the spin chuck by hand and verify that it is not wobbling. If it is, loosen the screw and reposition the spin chuck. Retighten the screw and verify it by spinning the spin chuck by hand.

5.3. Troubleshooting Chart

The following chart gives alarm messages that may appear on the touch screen and how to resolve them. It also gives other conditions that may cause problems and their potential solutions.

| Alarm or Indication | Potential Problem | Resolution |
|--|---|--|
| System dead, no display on touch screen | Blown fuses Machine not plugged in/power not connected | Replace fuse, Plug in machine/connect power |
| Spin vacuum error | Vacuum lost during spin process Spindle vacuum seal worn out | Check utility connections, Verify incoming vacuum is more than 25 in. Hg Call Cee™ Customer Support |
| Lid close error | Lid not closed fully Lid opened during spin process | Close lid before spinning substrate |
| Process runs without speed change | Servo motion error | Cycle power on machine. If this error reoccurs, change speed or acceleration parameters and try again. Call Cee™ Customer Support |
| System will not allow programs to be saved | PLC memory is corrupt | Perform steps 1 – 4 of <u>System Checkout</u> |
| Grinding sound | Bearings going bad | Call Cee™ Customer Support |
| Vibration | Loose belt or mechanical damage | Call Cee™ Customer Support |
| Oscillation | Loose belt | Call Cee™ Customer Support |

| | | |
|---------------------|------------------------|----|
| Prepared By: | Dan Davis / Jeff Leith | 16 |
| Approved By: | Matt Beard | |
| Issue/Revision Date | M.4.3.0359.D / 1.23.07 | |