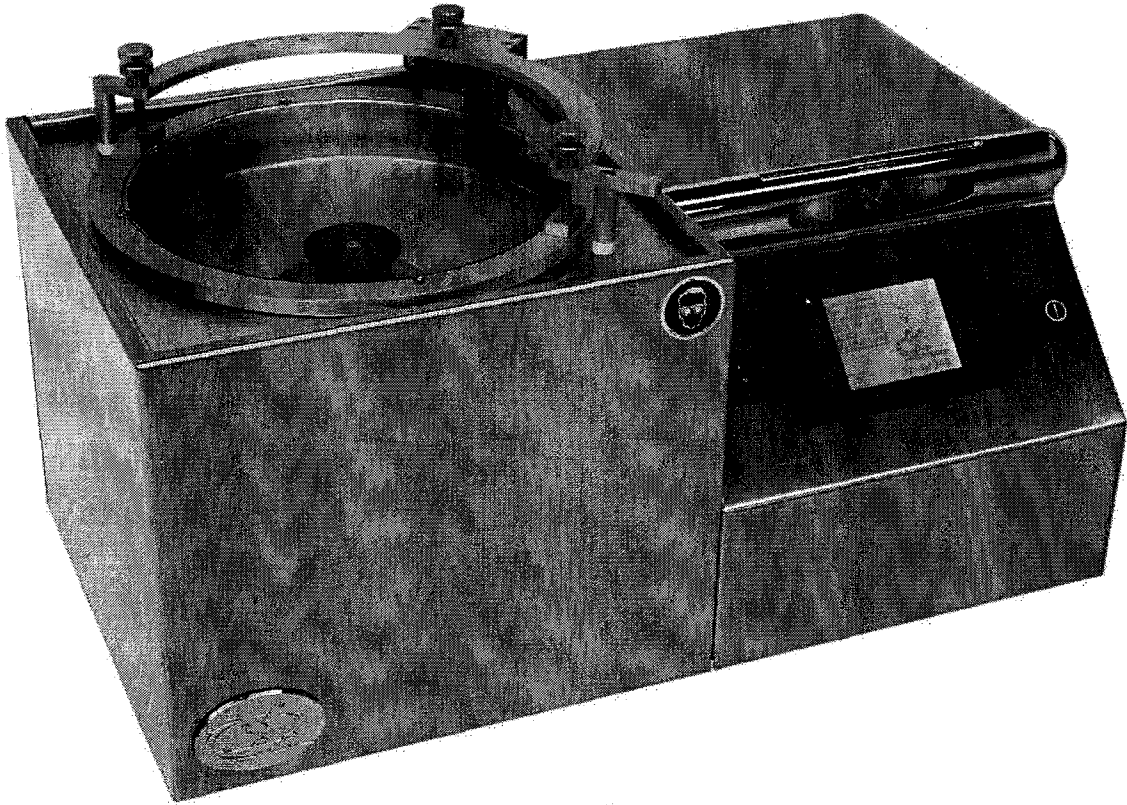


Cee™ 200



Installation & User Manual

1.573.364.0300
Nexark, B. B. K. K. K.
K. 2.136

EQUIPMENT WARRANTY

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

Buyer shall promptly notify Cee of any claim against this warranty, and any item to be returned to Cee shall be sent with transportation charges prepaid by Buyer, clearly marked with a Return Material Authorization (RMA) number obtained from Cee.

Cee's obligation under this warranty is limited to the repair or replacement, at Cee option, of any equipment, component or part which is determined by Cee to be defective in material or workmanship. This obligation shall expire one (1) year after the initial shipment of the Equipment from Cee.

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 Cee. Representatives of Buyer will be authorized to make repairs to Equipment without voiding warranty, on completion of the Cee training program.
- (c) Replacement parts are used other than those made or recommended by Cee.

CEE 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 Cee be liable for consequential loss or damages, however caused. No person or representative of Cee is authorized to assume for Cee 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 Cee in writing.

This warranty shall be governed by the laws of the state of Missouri.

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, September - 2006

1.3 **Revision History**

Version 1.0.0 – Initial Release (software v 2.1.)

Copyright © 2006 Brewer Science, Inc. ® All rights reserved.

Prepared By:	Dan Davis	2
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

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	3
3	List of Illustrations	4
4	Contents	5
	4.1 Introduction	5
	4.1.1 Equipment Description	5
	4.1.2 System Specifications	5
	4.1.3 Safety Symbols	6
	4.1.4 Model and Revisions	6
	4.1.5 Accessories	6
	4.2 Equipment/Process Overview	7
	4.2.1 History	7
	4.2.2 Process Flow Chart	7
	4.2.3 Control Layout	7
	4.3 Safety Hazards/Precautions	8
	4.3.1 Overview of Equipment-Specific Hazards	8
	4.3.2 Electrical	8
	4.3.3 Mechanical	8
	4.3.4 Chemical	9
	4.3.5 Lockout/Tagout Procedures and Information	10
	4.3.6 Intended Use of Machine	10
	4.4 Installation	11
	4.4.1 Facilities Requirements	11
	4.4.2 Environment	11
	4.4.3 Unpacking/Inspection	11
	4.4.4 System Installation and Setup	11
	4.4.5 System Checkout	12
	4.5 Software	13
	4.5.1 Controls	13
	4.5.1.1 Main Screen	13
	4.5.1.2 Edit Recipe Screen	14
	4.5.1.3 Spin Process Screen	16
	4.5.1.4 Diagnostics Screen	17
5	Service and Maintenance	18
	5.1 Troubleshooting	18

Prepared By:	Dan Davis	3
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

3. List of Illustrations

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

Prepared By:	Dan Davis	4
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

4. Contents

4.1 Introduction

4.1.1 Equipment Description

The Cee™ 200 is a programmable hotplate 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.

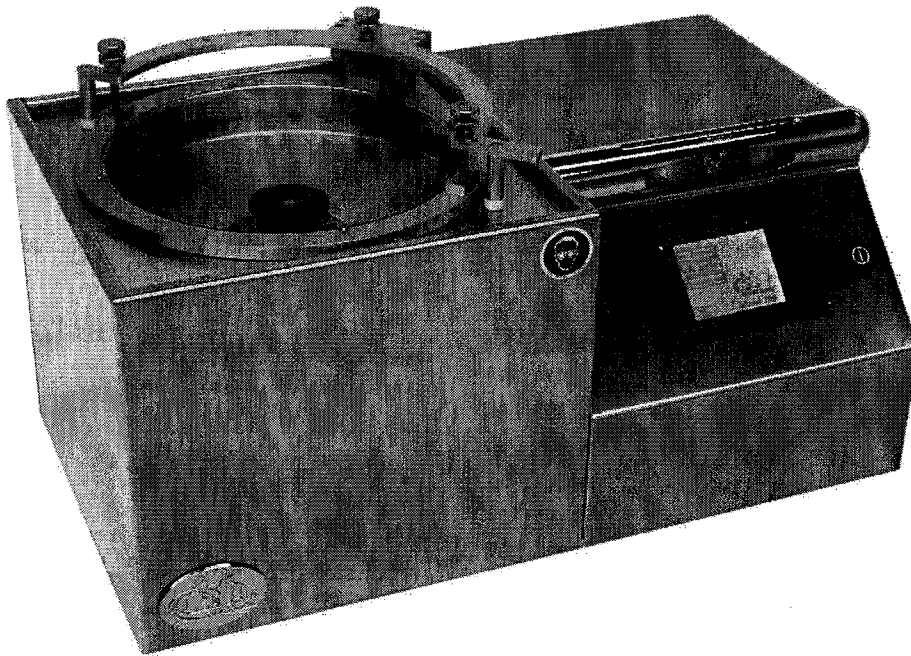


Figure 1 - Model 200

4.1.2 System Specifications

Maximum Spin Speed	6000	RPM
Maximum Ramp	30000	RPM/s
Speed Accuracy	+/- 1	RPM
Maximum Substrate that will	200mm	

Prepared By:	Dan Davis	5
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

fit in bowl		
Recipe Storage	>20	Recipes
Power	100-120	Volt AC – Single Phase
Weight	40	Pounds

Table 1 – System Specifications

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 section 4.3.

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 section 4.6 for screen shots and a detailed explanation of the system software.

4.1.5 Accessories

The exact number and type of accessories included with the Cee™ 200 vary depending on the customer's purchase order. Optional accessory items may include:

- Programmable Exhaust
- Password Protected Access
- Up to Four Dispense Options
- Additional Recipe Storage
- Spin Chucks with Screws
- Dispense Controllers
- Dispense Valves

Prepared By:	Dan Davis	6
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

- Dispense Nozzles
- Dispense Hubs

Please contact Cee™ for more information.

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, and increased number of recipe steps, and an increased recipe storage capacity.

4.2.2 Process Flow Chart

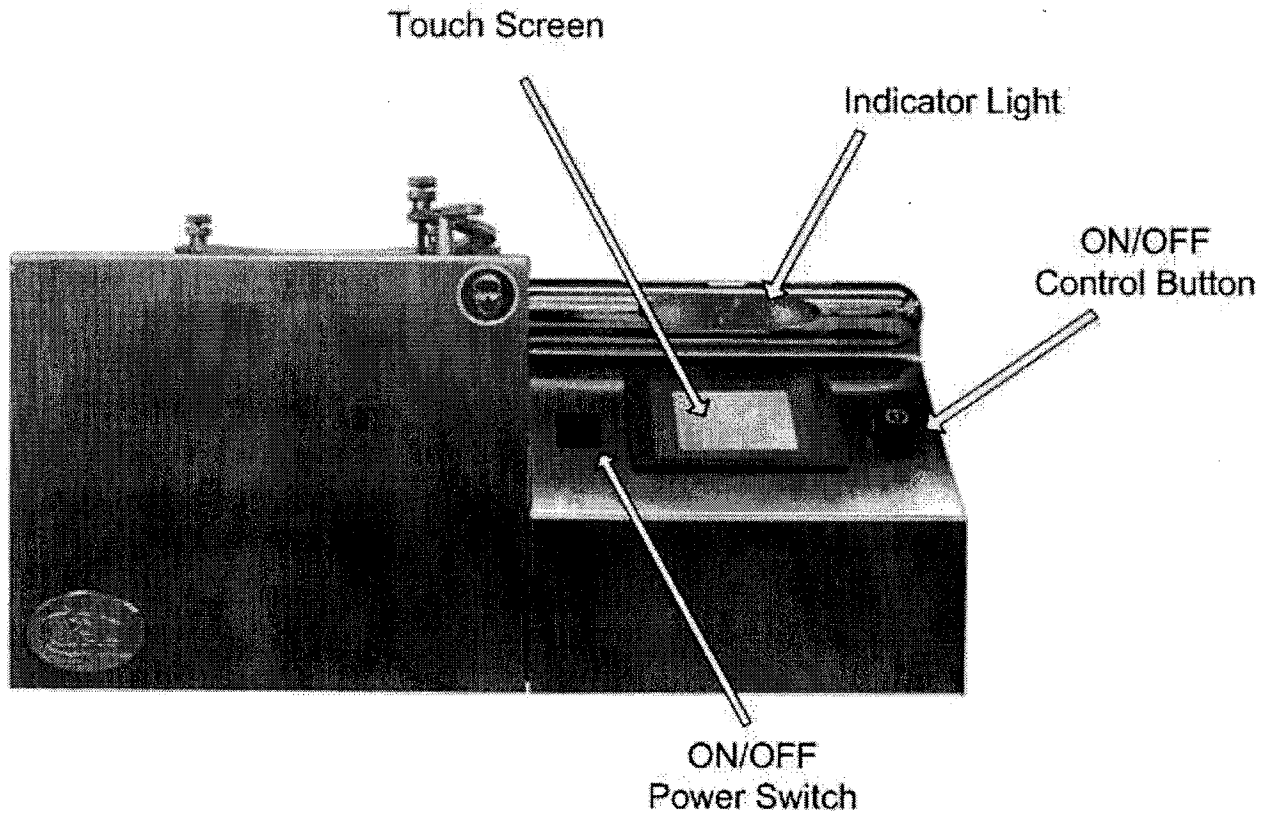


Figure 2 – Basic Flow Chart

4.2.3 Control Layout

Figure 3 – Controls Locations

Prepared By:	Dan Davis	7
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	



Prepared By:	Dan Davis	8
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

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


4.3.2.1  High voltage is present in the Machine. Disconnect the power before servicing.


4.3.2.2  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

4.3.3.1  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.


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

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











4.3.3.4  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.

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

Prepared By:	Dan Davis	9
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

- 4.3.3.6  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.


4.3.4 Chemical

- 4.3.4.1  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.
- 4.3.4.2  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.
- 4.3.4.3  Flammable Chemicals. No open flames/sparks.
- 4.3.4.4  Relieve pressure before opening canisters, tanks, cartridges, or syringes to refill.
- 4.3.4.5  Relieve pressure and Shutoff chemical valves before servicing supply lines, dispense valves or other components.
- 4.3.4.6  Relieve pressure and Shutoff chemical valves before removing spin lid or changing BSR tubes, EBR tubes, or any other dispense nozzle or spray tip.
- 4.3.4.7  Flush tubing and valves with an appropriate solvent and drain system before servicing.
- 4.3.4.8  When draining waste tank, use appropriate containers and connection methods.
- 4.3.4.9  Ensure proper ventilation/exhaust is used at all times.
- 4.3.4.10  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	10
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

4.3.5 Lockout/Tagout Procedures and Information

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

4.3.5.2  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.

4.3.5.3 To lockout/tagout the N2 or CDA use the OSHA rated lockout/tagout valve on the rear of the machine. This valve will also release all pressure in the machine.

4.3.7 Intended Use of Machine

4.3.7.1 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.

4.3.7.2 The Model 200 is not intended for use in food or medical applications or for use in hazardous locations.

4.3.7.3 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.

4.3.7.4 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.

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

Prepared By:	Dan Davis	11
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

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
- Exhaust Port
- Drain Port

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.
- (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.

Prepared By:	Dan Davis	12
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

- (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, and Exhaust Lines.
- (7) Plug in the machine.
- (8) Once plugged in, only the Cooling Fan should be powered, not the Display or Hotplate.
- (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 “Diagnostics” to Show Diagnostic Screen (see Software for access procedure)
- (2) Press the ON/OFF control button to start and stop the spinner.
- (3) Toggle Spin Vac and Dispenses one through four.

If the unit performs all tasks, the machine is ready to go. For recipe programming see section 4.5 – Software. If you have any problems please contact Cee™.

Prepared By:	Dan Davis	13
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

4.5 Software

4.5.1 Controls

4.5.1.1 Main Screen

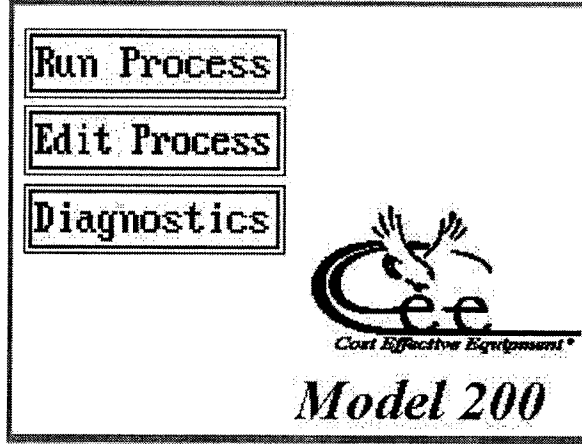


Figure 4 – Main Screen

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 Run Process button will take you to the Run Process screen shown in Figure 6. This is where the recipes can be loaded and run with the status of the machine is updated in real time. The Edit Recipe button will display the Edit Recipe programming screen shown in Figure 5. From this screen the user can load, save, and delete any recipe.

The remaining button is not required for normal operation. The Diagnostic screen allows manual control over temperature, N2 prox, and vacuum.

The main screen can be accessed from any other screen by pressing the “Back” key located in the lower left corner of the screen.



Pressing the Cee™ logo and the start button will allow the Diagnostics button to appear.

Prepared By:	Dan Davis	14
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

4.5.1.2 Edit Recipe Screen

Process Steps

1-5 6-10 11-15 16-20

	Speed	Accel	Time	Disp
1	---	---	---0.0	None
2	---	---	---0.0	None
3	---	---	---0.0	None
4	---	---	---0.0	None
5	---	---	---0.0	None

Back Save Load Delete

Figure 5 – Edit Recipe Screen

The Edit Recipe Screen allows the user to create, save, load, and delete recipes from this screen. Each recipe is comprised of four parameters:

- 1) Speed – The speed for that step
- 2) Accel –The Acceleration/Deceleration value for that step.
- 3) Step Time – The time allowed for each process step
- 4) Disp – The user may determin which, if any, of the dispenses will be used

Parameter	Minimum	Maximum
Speed	0	6000
Ramp	0	30000
Time	0	999.9

Table 2

Prepared By:	Dan Davis	15
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

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 have been set, the recipe can be saved. Saving a recipe may be accomplished by pressing the “Save” button located in the lower part of the screen. The user will then be prompted to enter a recipe name. This name may contain up to 8 characters. Once the user has entered the recipe name pressing the enter key located in the lower right portion of the screen will complete the saving process.

To retrieve a saved file, press the “Load” key located in the lower part of the screen next to the “Save” 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, they will be prompted to “Open Recipe”. To continue to open the recipe, press the “Yes” key, to abort press the “No” key.

To Delete a recipe press the “Delete” key located in the lower right corner of the screen. 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 “Edit Recipe” screen will be the ones used during the spin process.

Prepared By:	Dan Davis	16
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

4.5.1.3 Run Process Screen

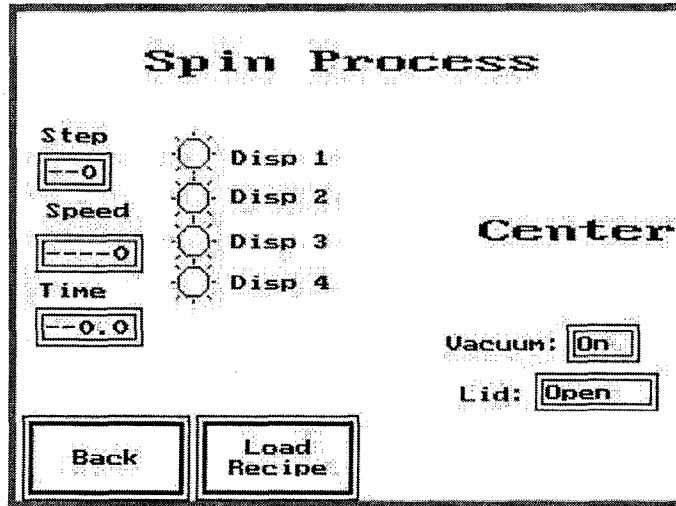


Figure 6 – Run Process

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 process’ speed, step number, and step time, and current dispense are all viewable from this screen. The speed, step number, and step time are located on the left side of the screen. The current dispense indicator may be found in the center of the screen.

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 start coating process. This will continue until the end of the process is reached. At this time a short buzzer will sound and the indicator light will quickly flash, followed by a long pause. Pressing the **ON/OFF** Control Button again will acknowledge the Process Complete and silence the buzzer.

Each function of the Start/Stop Button will be displayed on the screen during each step.

At anytime, pressing the **ON/OFF** Control Button may stop the process.



The ON/OFF Control Button can only Start/Stop the bake process when this screen is active

Prepared By:	Dan Davis	17
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

4.5.1.4 Diagnostics Screen

4.5.1.5

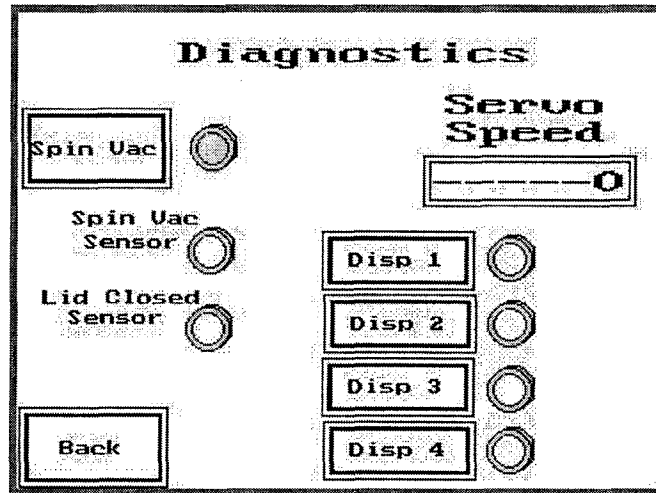


Figure 7 – Diagnostics Screen

The diagnostics screen allows the user manual operation of the Spin Coater's vacuum as and dispenses. In addition the user may monitor the spin vacuum sensor and the lid closed sensor. Pressing the Start/Stop control button at this time will cause the spinner to rotate at 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 chuck.

Prepared By:	Dan Davis	18
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

However, since this may inadvertently 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 or turn on the Disconnect switch.
- (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 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.

Prepared By:	Dan Davis	19
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

- (5) Hold the existing spin chuck in one hand and remove the #8 FHCS vented spin chuck screw in the center of the 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.
- (7) If the chuck was stuck, clean any residue that remains on the spindle or the bore of the chuck. Inspect the spindle and chuck for any damage.
- (8) Place the new spin chuck on the spindle. Note that the 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 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 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 chuck by hand

5.3

5.3.1 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 Fuse Machine not plugged in/power not connected	Replace Fuse, Plug in machine/connect power
Spin Vacuum Error	Vacuum lost during Spin Process Vacuum seal worn out	Check utility connections, Verify incoming Vacuum is more than 25 inHg, Call Cee™ Customer Support
Lid Close Error	Lid not closed fully Lid opened during Spin Process	Close lid before spinning substrate Cycle power on machine. If this error reoccurs, change speed or acceleration parameters and try again.
Process Runs without speed change	Servo motion error	Call Cee™ Customer Support
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	20
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	

Document Revision History

Revision:	Sec/Para Changed	Change Made:	By:	Date
A	Entire Doc	Initial Release	MPB	09.15.06

Distribution List

#	Location	Posted or Received	Date	Retrieved Obsolete	Date
		New Revision(s)		Revision(s)	
1	File Server	<i>Matthew P. Beard</i>	9/15/06		
2	Server Backup	<i>Matthew P. Beard</i>	9/15/06		

Prepared By:	Dan Davis	21
Approved By:	Matt Beard	
Issue/Revision Date	M.4.3.0359.A / 09.15.06	