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2 OPEN

SPINNING WITH GYRSET COVER OPEN (DRYING)

The function <2/OPEN> allows the programming of a spin sequence with the GYRSET cover open. The maximum allowed speed is approx 1000 rpm (depending on the parameters) for safety CE reasons. Error 28 is returned if a value of higher than 1000 rpm is programmed. This function can be used for various purposes:

Drying of the fluid film

As explained in a previous chapter, the GYRSET cover forms a closed cabinet with the chuck which prevents solvent evaporation. This results in a significant improvement in coating uniformity. The drawback is that the coat is still wet at the end of centrifugation. To dry the coated film faster, it is then possible to spin the substrate at a speed low enough to avoid turbulence, but high enough to evaporate the solvent faster.

Dynamic dispense

at low speed is used for dynamic dispense of solvent or coating fluid. It allows the emphasis of fluid spreading over the chuck (cleaning) or the substrate (coating fluid dispense).

Speed and acceleration are to be programmed according to the fluid viscosity and the final result to be obtained. Usually, a slow spin speed is used. This function starts the chuck rotation, but does not stop it. The spin time is not programmed at this step. There is a specific sequence to program the duration of this function. Subsequently, another command is needed to stop the chuck rotation.

SPINNING WITH COVER DOWN AND GYRSET UP (DRYING ONLY FOR INDEXED GYRSET TYPE 1)

Step 12 is activated by pressing <1/CLOSE> key then <2/OPEN> key.

3 TIME

TIME (DELAY PRIOR TO JUMPING TO NEXT FUNCTION)

The function <3/TIME> allows the programming of a duration for sequences which do not have a duration parameter. This allows several functions simultaneously to be run. For example, to make a dynamic dispense, it is necessary to start chuck rotation and to send the dispense command, then a time is entered prior to jumping to the next function.

MANUAL DELAY (DELAY STOPPED BY <ENTER> KEY)

Step 33 is activated by pressing <3/TIME> twice.

4 N2

NITROGEN BLOW-OFF (SUBSTRATE CLEANING)

The function <4/N2> allows dust to be blown off the substrate surface prior to dispensing the fluid. This function is not suitable for highly sensitive applications for which it is recommended to clean the substrate away from the spin coater. The blow-off function induces a temperature gradient along the surface of the substrate which can cause non-uniformity. During the blow-off sequence, the arm moves in, the nitrogen valve turns on for a duration which is programmed as a parameter. Then the nitrogen valve turns off and the arm moves out to the park position.

5
SOLV1/3

SOLVENT1 DISPENSE (MACHINE CLEANING)

Solvent1 is dedicated to automatic machine cleaning, although the function <5/SOLV1/3> allows the programming of a solvent dispense on the outer ring of the chuck. The arm moves into the chuck centre, but the solvent dispense nozzle is oriented in such a way as to dispense the solvent on the outer ring of the chuck only. During the Solvent1 sequence, the chuck rotates, the solvent 1 valve turns on for a duration which is programmed as a parameter. Then the solvent valve turns off and the arm moves out to the park position.

SOLVENT3 DISPENSE

Solvent 3 is activated by pressing the <5/SOLV1/3> key twice.

6
SOLV2/4

SOLVENT2 DISPENSE (GYRSET CLEANING)

Solvent2 is dedicated to GYRSET cleaning. The dispense nozzle is located between the GYRSET and the cover. During the Solvent2 sequence, the arm does not move in. The cover must be closed or error 70 occurs. The solvent2 valve turns on for a duration which is programmed as a parameter. Then the solvent valve turns off.

SOLVENT4 DISPENSE

Solvent4 is activated by pressing the <6/SOLV2/4> key twice.

7
DISP1/3

DISPENSE1

The function <7/DISP1/3> allows the start pulse to be sent to dispensing pump1. There is no parameter for this function. The system waits for the end-of-dispense signal which is sent by the dispenser. To avoid any lock-up of the system due to a malfunction of the dispenser, a thirty seconds time-out allows the cycle to be exited and error to be generated.

DISPENSE3

Dispenser3 is activated by pressing the <7/DISP1/3> key twice.

8
DISP2/4

DISPENSE2

The function <8/DISP2/4> allows you to send the start pulse to the dispensing pump2. There is no parameter for this function. The system wait for the end of dispense signal which is sent by the dispenser. To avoid any lock up of the system due to a malfunction of the dispenser, a thirty seconds time out allows to exit the cycle and to generate an error.

DISPENSE4

Dispenser4 is activated by pressing the <8/DISP2/4> key twice.

MOTORISED ARM

The above description of the fluid dispense is for a pneumatic arm (2 or 6 positions). With the motorised arm dynamic dispenses are available, but additional parameters to those above are needed. This sequence proceeds as follows:

1. The arm moves to the starting diameter programmed as fluid parameter #1 at full speed
2. The valve turns on
3. The arm moves to the ending diameter programmed as fluid parameter #2 at the speed pre-set as fluid parameter #3.
4. The valve turns off

5. The arm moves out to the park position at full speed.

Diameters are relative to the centre of the substrate. These values are defined for each fluids and programmed in the parameters.

For a resist dispense, the end of dispense must occur (a) before the arm reaches the programmed diameter or (b) during a 120 seconds time out which exits the cycle and generates an error. The arm moves out to the park position as the dispense ends.

SWINGING RESIST

Swinging resist is a rotational dispenser nozzle at the end of the dispenser arm which is used to dispense a thick ring of resist. Fix a needle at the end of the nozzle to be more accurate. The dispenser1 line which is used for the swinging resist needs to be enabled. Set parameter 39 equal to 1 to do this. For a swinging resist dispense the first diameter is the internal diameter of the dispense, the second is the outer diameter of the dispense, the third is the arm speed. In addition, there is a further machine parameter: n° 41, which is an offset from the internal diameter.

1. The arm moves to the internal diameter (first position) plus the offset (41).
2. A finger presses the dispenser nozzle close to the substrate.
3. The arm moves to the inter diameter (first position).
4. Then It moves back out to the outer diameter (second position) at the programmed speed.
5. The finger releases the dispenser nozzle.

Example: For swinging resist set to dispenser1, ID of 20 mm, OD of 80 mm and SD of 5:

<7/DISP1>	select dispenser1/swinging resist
<ENTER>	validate function, move to parameter setting
<2><0>	enter ID 20 mm
<ENTER>	validate ID, move OD
<8><0>	enter OD 80 mm
<ENTER>	validate OD, move SD
<5>	enter SD 5
<ENTER>	validate swinging resist, move to next function

Cotton Candy Remover

After a lot of dispense cycles, the resist sticks to the outside of the gyrset and makes threads like a cotton candy. To clean it a solvent nozzle is fixed on the cover. The solvent3 line which is going to be used for the cotton candy remover needs to be enabled. Set parameter 28 equal 1 to do this.

Remember, the cover must be closed when using this function. If it isn't, error n°70 will be returned.

For the cotton candy remover there is one parameter: time.

Example: For cotton candy remover set to solvent3, dispense duration of 10s:

<5/SOLV3><5/SOLV3>	select solvent2/cotton candy remover
<ENTER>	validate function, move to parameter setting
<1><0>	enter duration 10s
<ENTER>	validate cotton candy remover, move to next function

EDGE BEAD REMOVER

During centrifugation, the resist is centrifuged out of the substrate and falls on the chuck. This step causes turbulence which solidifies more resist than on the substrate and increases the height of the resist on the edge of the substrate. The edge bead remover is a rotating solvent nozzle at the end of the dispenser arm which is used to clean a thick ring of resist. Fix a needle to the end of the nozzle to be more accurate. Remove edge bead after baking. The solvent2 line which is used for the edge bead remover needs to be enabled: set parameter 29 equal 1.

For the edge bead remover the first diameter is the outer diameter of the dispense in mm (some mm larger than the substrate diameter), the second is the internal diameter of the dispense (some mm smaller than the substrate diameter). The third is the speed of removing.

1. The arm moves to the first outer position at full speed.
2. A finger presses the solvent nozzle close to the substrate.
3. It moves into the substrate diameter (second position) at the speed programmed as parameter #3
4. It stays at this position for a delay programmed as machine parameter n° 60
5. It moves back to the first position at the speed programmed as parameter #3.
6. The solvent washes the substrate by capillary reaction.
7. The finger releases the solvent nozzle.
8. The arm moves out to the park position at full speed.

Example: For edge bead remover set to solvent2, OD of 155 mm, ID of 145 mm and SD of 5:

<6/SOLV2>	select solvent1/edge bead remover
<ENTER>	validate function, move to parameter setting
<1><5><5>	enter OD 155 mm
<ENTER>	validate OD, move to ID
<1><4><5>	enter ID 145 mm
<ENTER>	validate ID, move to SD
<5>	enter SD 5 mm
<ENTER>	validate edge bead remover, move to next function

BACK SIDE RINSE

During dispense, resist may return under the substrate due to use of low spin speed. To avoid pollution rinse the back side of the substrate with this solvent. It is fixed on the right side of the dispenser arm and has a up and down movement. When the nozzle is down, the arm rotates and place it under the substrate allowing the rinsing. We recommend to rinse the back side of the substrate before baking. The solvent4 line which is going to be used for the back side rinse needs to be declared. Set parameter 32 equal 1 to do this. The rinse is static, being carried out at the position specified when entering the function.

For the back side rinse the first and second parameter are equal to the substrate rinsing diameter in mm, the third is the rinse duration. In addition, there is two further machine parameter: n° 33, which is the position at which the nozzle lowers and n°61 which is a delay after stopping rinsing and before moving the dispenser arm.

1. The arm moves to the position programmed as machine parameter 33 at full speed.
2. A finger presses the solvent nozzle against the underside of the substrate.
3. It moves into the substrate diameter (first position) at full speed
4. The valve turns on and rinses during the time programmed as the second parameter. Then the valve turns off.
5. Countdown parameter 61
6. The arm moves to the position programmed as machine parameter 33 at full speed.

7. The finger releases the solvent nozzle.
8. The arm moves out to the park position at full speed.

Example: For back side rinse set to solvent4, substrate diameter of 150 mm, rinse duration of 10 s:

<6/SOLV4><6/SOLV4>	select solvent4/ back side rinse
<ENTER>	validate function, move to parameter setting
<1><5><0>	enter substrate diameter 150 mm
<ENTER>	validate substrate diameter, move to substrate diameter
<1><5><0>	enter the same diameter for static rinse
<ENTER>	validate substrate diameter, move to rinse duration
<1><0>	rinse duration 10 s
<ENTER>	validate back side rinse, move to next function

RESIST NOZZLE AUTOCLEAN

When a dispenser is not used for a long time, a bubble of resist at the end of the dispenser nozzle solidifies. A pre-dispense could not be enough to clean it. So the resist nozzle autoclean is fixed in front of the dispenser nozzles when arm is at the parking position. This solvent nozzle has such a design it cleans inside the resist tube by capillarity. The solvent5 line which is going to be used for the resist nozzle autoclean needs to be enabled. Set machine parameter n° 34 equal to 1 to do this. In this case, the first parameter of a dispense is the cleaning duration in seconds. The other parameters are standard: diameter and arm speed. If the duration is set to zero, the nozzle is not rinsed.

Cycle with resist nozzle autoclean:

1. The arm moves to the position programmed as a machine parameter to align resist and autoclean nozzles.
2. Nozzle autoclean is turned on for the programmed duration, which is the first parameter entered when programming a dispense.
3. Waits for pre-dispense to end.
4. The arm dispenses normally.

BOWL REFILLING

To avoid the solid bubble of resist at the end of the dispenser lines, a stream of solvent blow the dispenser nozzles when parked. The solvent vapour use solvent from the bowl. This bowl needs to be periodically refilled. The solvent8 line which is going to be used for the bowl refilling needs to be enabled. Set parameter 68 to 1. Set parameter 70 equal to the period in minute. Then set parameter 71 equal to the duration of refilling. While parameters 68, 70 and 71 are set to a non zero value, bowl refilling is running up the spinner is powered off.

0 END

END (END OF CYCLE)

The <0/END> key is an editing key. It allows, in an existing cycle, to change the end of cycle. When this function is activated when modifying a program, all functions, from the current step to the end of the cycle, are deleted.

INS

INSERT (INSERT FUNCTION)

The <INS> key is an editing key. It allows, in an existing cycle, to insert a new function before an existing function.

DEL

DELETE (RESET PARAMETER OR DELETE FUNCTION)

The <DEL> key is an editing key. It has two different functions according to the current status of the display when modifying an existing program. If the display shows a function code (the associated green lamp lights on), press this function to delete the current function and its associated parameters if applicable. If the display shows a parameter (the associated yellow lamp lights on), press this function to set the current parameter to zero.

RESET CYCLE

RESET CYCLE (CLEAR THE ENTIRE FUNCTION LIST OF AN EXISTING CYCLE)

The <RESET/CYCLE> function allows the deletion of the contents of an existing cycle. It is recommended to use this function each time a new cycle is programmed to avoid leaving any wrong data in the memory. Refer to the corresponding chapter for further information on this function.

ENTER

ENTER (VALIDATION)

The <ENTER> key is an editing key. When in the programming or modifying mode, it allows validation of the entered datum (function or parameter) and to jump to the next datum. It also validates the resetting cycle command.

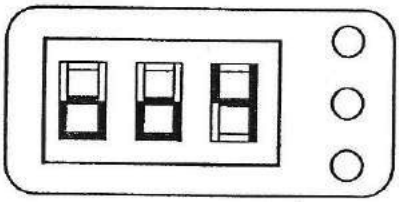
START / STOP

START/STOP (CYCLE EXECUTION CONTROL)

The <START/STOP> key controls the execution of the cycle. When in standby mode (cycle number on display, eg: oo2), press the <START/STOP> key to start the cycle. Then, if the cycle must be stopped before its end, press the <START/STOP> key again. When modifying an existing cycle, press the <START/STOP> key to return to standby mode without saving the modification. To validate the modification, the user must go through the whole program and exit using the <ENTER> key.

9.3 DISPLAY AND PARAMETER FLAGS DESCRIPTION

The keyboard, described previously, and the three-digit display make up the user interface. The following diagram shows the three-digit display in standby mode and the three yellow lamps or flags which identify the parameters. The standby mode is easily identified by two small zeros followed by the cycle number.



TIME (SEC.)

When this lamp blinks, the 'time' parameter can be modified using the keyboard. The step is one second (1 sec.). The range is 1 second to 999 seconds (1-999 on the display).

SPEED (X10RPM)

When this lamp blinks, the spinning 'Speed' parameter can be modified using the keyboard. The resolution is ten rotations per minutes (10 rpm). Range is 0 to 9990 rpm (0-999 on display).

Note: Some models have a speed limitation of 5 000 or 3 000 rpm. At some steps of the cycle, the limitation can be programmed to 500 rpm. If one parameter is out of limits, the <ENTER> key is defeated. The CT62 beeps, the display is set to ra2, and a new value is requested.

ACC (X100RPM/S)

When this lamp blinks, the spin 'acceleration' parameter can be modified using the keyboard. The resolution is a hundred rotations per minute (100 rpm). The range is 100 to 20 000 rpm (1-200 on the display)

The <DEL> key can be used to clear the parameter (set it to 0), then the parameter is entered as on a calculator. For instance, to program 100, type 1, then 0 and 0 again. Validate with <ENTER>.

9.4 FUNCTION FLAGS DESCRIPTION

A set of green lamps or flags is used to identify the function being executed or programmed.

SPIN OPEN

When a cycle is running, this lamp lights on if the spin-with-cover-closed sequence is being started. It lights on during the acceleration phase, and lights off as soon as the pre-set speed is reached. Then, it is replaced by the next function, even if the chuck is still rotating.

When modifying a program, the 'SPIN OPEN' flag blinks to inform the user that the function can be modified. After the validation key <ENTER> has been pressed, the green flag 'SPIN OPEN' lights on and the first associated parameter blinks. The green flag 'SPIN OPEN' goes out after completion of parameter setting.

SPIN CLOSED

When the cycle is running, this lamp lights on if the spin-with-cover-open sequence is being started. It lights on during the acceleration phase, and goes out as soon as the preset speed is reached. Then, it is replaced by the next function, even if the chuck is still rotating.

When modifying a program, the 'SPIN CLOSE' flag blinks to inform the user that the unction can be modified. After the validation key <ENTER> has been pressed, the green flag 'SPIN CLOSE' lights on and the first associated parameter blinks. The green flag 'SPIN CLOSE' goes out after completion of parameter setting.

TIME

When the cycle is running, the green flag 'TIME' lights on while the delay is being executed. It lights on until the pre-set time has elapsed.

When modifying a program, the green 'TIME' flag blinks to inform the user that the function can be modified. After the validation key <ENTER> has been pressed, the green flag 'TIME' lights on and the yellow parameter flag 'time' blinks. The green flag 'SPIN CLOSE' goes out after completion of parameter setting.

PERIOD

The green flag 'PERIOD' blinks while the time between two successive cleaning cycles is entered. It lights on while the number of spin cycles between two successive cleaning cycles is entered.

NITROGEN

When a cycle is running, the green flag 'NITROGEN' lights on while nitrogen dispense is being executed. It lights on until the pre-set dispense time has elapsed.

When modifying a program, the 'NITROGEN' green flag blinks to inform the user that the function can be modified. After the validation key <ENTER> has been pressed, the green flag 'NITROGEN' lights on and the yellow parameter flag 'time' blinks. The green flag 'NITROGEN' goes out after completion of parameter setting.

DISPENSER1/3

When a cycle is running, the green flag 'DISPENSER1/3' lights on while dispense with pump1 or 3 is being executed. It lights on until the dispense sends its end-of-dispense to the spin coater controller. If the dispenser does not respond before the end of the thirty seconds time-out, an error message is displayed.

When modifying a program, the 'DISPENSER1/3' green flag blinks to inform the user that the function can be modified. After the validation key <ENTER> has been pressed, the green flag 'DISPENSER1/3' goes out.

DISPENSER2/4

When a cycle is running, the green flag 'DISPENSER2/4' lights on while dispense with pump2 or 4 is being executed. It lights on until the dispense sends its end-of-dispense to the spin coater controller. If the dispenser does not respond before the end of the thirty seconds time-out, an error message is displayed.

When modifying a program, the 'DISPENSER2/4' green flag blinks to inform the user that function can be modified. After the validation key <ENTER> has been pressed, the green flag 'DISPENSER2/4' goes out.

SOLVENT1/3

When a cycle is running, the green flag 'SOLVENT1/3' lights on while solvent dispense 1 or 3 is being executed. It lights on until the pre-set solvent dispense time has elapsed.

When modifying a program, the 'SOLVENT1/3' green flag blinks to inform the user that the function can be modified. After the validation key <ENTER> has been pressed, the green flag 'SOLVENT1/3' lights on and the yellow parameter flag 'time' blinks. The green flag 'SOLVENT1/3' goes out after completion of parameter setting.

SOLVENT2/4

When a cycle is running, the green flag 'SOLVENT2/4' lights on while solvent dispense 2 or 4 is being executed. It lights on until the pre-set solvent dispense time has elapsed.

When modifying a program, the 'SOLVENT2/4' green flag blinks to inform the user that the function can be modified. After the validation key <ENTER> has been pressed, the green flag 'SOLVENT2/4' lights on and the yellow parameter flag 'time' blinks. The green flag 'SOLVENT2/4' goes out after completion of parameter setting.

REMOTE

The green lamp (or flag) 'REMOTE' lights on briefly each time a command is received by the controller through the RS232 serial interface.

When the debug program is used through an external terminal, the 'REMOTE' flags lights on as soon as the debug command is sent and goes out when exiting from the debug menu.

AUTOCLEAN

This function is only available with a motorised arm. The green flag 'AUTOCLEAN' lights on either while the automatic cleaning cycle is being executed or when the automatic cleaning parameters are being programmed.

ARM SPEED

When modifying a program, the 'ARM SPEED' green flag blinks to inform the user that the parameter can be modified using the keyboard. After the validation key <ENTER> has been pressed, the green flag 'ARM SPEED' goes out.

SUBSTRATE SIZE

When modifying a program, the 'SUBSTRATE SIZE' green flag blinks to inform the user that the parameter can be modified using the keyboard. After the validation key <ENTER> has been pressed, the green flag 'SUBSTRATE SIZE' goes out.

9.5 FAILURE FLAGS DESCRIPTION

A set five green lamps or flags is used to identify the failures which are detected by the system, either at power on or during a cycle execution.

VACUUM

The 'VACUUM' flag lights on when a vacuum failure is detected at the beginning of cycle. A vacuum failure can be either no vacuum supplied to the spin coater, or a vacuum leak at substrate level. The vacuum failure information is provided to the controller by a vacuum sensor for which the detection threshold has been factory adjusted.

PRESSURE

The 'PRESSURE' flag lights on at power on or during a cycle if the air pressure is not supplied to the spin coater, or if the air pressure becomes insufficient. The air pressure failure information is provided to the controller by an air pressure sensor for which the detection threshold has been factory adjusted.

DRAIN

The 'DRAIN' flag lights on when the bottle receiving the waste material from the collecting bowl is full. This level sensor is optional and is fitted directly onto the bottle. This information avoids waste fluid overflow.

RESIST

The 'DISPENSER' flag lights up during cycle execution when the dispenser does not respond to the controller. It also lights up as 'DRAIN 2'. DRAIN 2 works as 'DRAIN' if option is fitted

SOLVENT

The 'SOLVENT' flag lights up as 'DRAIN 3' if option is fitted. See 'DRAIN'

RESIST+SOLVENT

RESIST+SOLVENT flags both light up when the GYRSET cover is not properly closed.

Note The red failure flags signal the main hardware errors. In addition to the failure flags, error codes are displayed on the three-digit display. The error list is given later in this manual.

9.6 SPEED INDICATOR

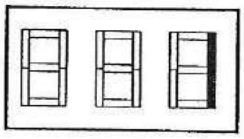
An analogue meter informs the user of the real rotation speed of the spinning chuck. Graduation range is from zero to one hundred (0-100). The speed meter information is to be multiplied by one hundred to get the real speed. It is directly connected to the tachometric generator.

Note: To avoid any risk for the user or the substrate being processed, an automatic speed level keeps the vacuum on until the complete stop of the chuck.

9.7 POWER ON

Prior to powering on the system, check the utilities. At power on, a self-test sequence is automatically activated to check the utilities and hardware status of the system. The software version is displayed. When the chuck indexing option is available on the system, the indexing sequence of the chuck is executed first, then, if applicable, the cover is opened. After the self-test sequence, cycle '1' is automatically selected, and the machine is placed in the standby mode.

The program number is displayed as illustrated below.



To run the same cycle as before, simply press the <START/STOP> key on the front panel.

10. CYCLES

10.1 A SHORT DESCRIPTION

Cycle '0' A single-step cycle to allow fast programming of some specific functions which are useful for servicing or during machine cleaning. These functions are:

1. Command a fluid dispense, the arm being positioned on the collecting bowl at the park position.
2. Open or close the automatic GYRSET cover according to the initial position.
3. Turn on/off the chuck vacuum.
4. Index the chuck and lift up/down the substrate.
5. Move the dispenser arm to the servicing position and rotate the edge bead remover and swinging resist for needle adjustment
6. Unloading sequence for spinner with manual loader

Cycle '1' A very simple cycle which is suitable for a large number of applications ie one-step spin with cover closed (speed, acceleration and time)

Cycle '2' to '8' Programmable (customised) cycles. The user is free to program up to thirty (30) steps of program that allows the programming of sophisticated cycles for very specific applications.

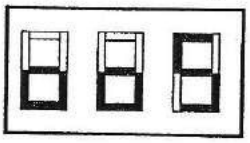
Cycle '9' Used in connection with the automatic machine cleaning sequence. It determines the cleaning frequency in automatic mode.

10.2 READING THE CYCLE CONTENTS

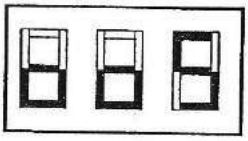
10.2.1 CYCLE SELECTION

In case the program number being displayed does not correspond to the program you want to read, select another one. To do so:

Enter the program number by pressing the numerical key corresponding to the program number (eg: new program number 5), the display changes as illustrated below:



Press the <ENTER> key to validate the cycle number. The display changes as illustrated below, informing the user that the cycle can be started.



10.2.2 CYCLE READING

To enter the reading function of the cycle, press the <ENTER> key when the cycle number is displayed. If the cycle is empty (no function is programmed) three (3) zeros (0) are displayed as illustrated below:



To return to the cycle number display, press <ENTER> key once again, or press the <START/STOP> key. Since the system is equipped with a three-digit display, the function list and their associated parameters are displayed sequentially each time the <ENTER> key is pressed.

The function code is displayed first and the lamp (flag) corresponding to the function blinks. After the <ENTER> key is pressed, the function flag stops flashing and lights ON. The associated parameters, if applicable, are displayed sequentially and the flag corresponding to the parameter blinks until the <ENTER> key is pressed again.

For instance, the simple spin cycle '1' with the cover closed at 2000 rotations per minute, with an acceleration of 1000 rotations per minute per second for a duration of 15 seconds, is displayed as follows:

oo1	Standby mode, cycle '1'	
001	Function '1' - spin cover closed	Green lamp CLOSE blinks
200	Spin Speed '200' - 2000 rpm	Green lamp CLOSE lights ON. Yellow lamp SPEED blinks
010	Acceleration '010' - 1000 rpm/sec.	Green lamp CLOSE lights ON. Yellow lamp ACCELERATION blinks
003	Function '3' - Time	Green lamp TIME blinks
015	Time '015' - 15 seconds	Green lamp TIME lights ON. Yellow lamp TIME blinks
000	End of cycle	
oo1	Standby mode, cycle '1'	

10.3 RESETTING A CYCLE

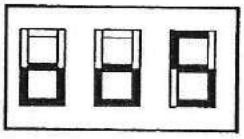
10.3.1 CYCLE SELECTION

If the cycle number being displayed does not correspond to the cycle you want to read, select another. To do so:

Enter the cycle number by pressing the numerical key corresponding to that cycle number (eg: new cycle number 5), the display changes as illustrated below:

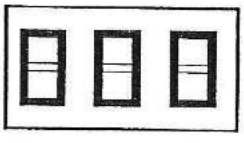


Press the <ENTER> key to validate the cycle number. The display changes as illustrated below, informing the user that the cycle can be started.



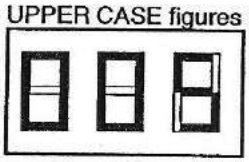
10.3.2 CYCLE RESET

Prior to programming a new cycle, ensure that the cycle number to be programmed is empty. To do so, press the <ENTER> key when the cycle number to be programmed is displayed. If the cycle is empty (no function is programmed) three (3) zeros (0) are displayed as illustrated below:



If the cycle is not empty, use the reset cycle function to clear all functions recorded in the memory for this specific cycle number:

1. Return to the cycle number display.
2. Press the <RESET CYCLE> key.
3. Immediately after the <RESET CYCLE> key has been pressed, the cycle number flashes and displayed in UPPER CASE figures as illustrated below (eg: cycle '5')



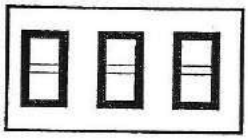
4. Press the <ENTER> key while the cycle number is flashing to clear the displayed cycle number. If the cycle is not to be erased, press the <START/STOP> key to cancel the command.

10.4 SERVICE CYCLE '0'

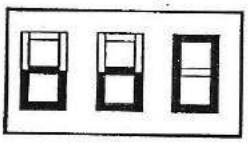
10.4.1 CYCLE '0' SELECTION

To select cycle '0', the system must be in the standby mode.

<ENTER> the cycle number by pressing the numerical key <0>: the display changes as illustrated below:



Press the <ENTER> key to validate the cycle number. The display changes as illustrated below, informing the user that the cycle can be started.



10.4.2 PROGRAMMING

The service cycle '0' is a single step program which allows you to check some specific functions of the system. The available functions are listed in the table on the next page

To program one of the functions available with cycle '0', proceed as follows:

1. Select cycle number '0'. To do so, press the <0> key, then the <ENTER> key
2. The display shows (000) if cycle '0' has never been used before. Otherwise, the function code corresponding to the latest function being used through this program is displayed.
3. Press the function key corresponding to the function to enter (1-8, 55, 66, 77, 88), then press the <ENTER> key to validate the function number and return to standby mode with the cycle number displayed.
4. For functions 4, 5, 55, 6 and 66, enter the time, the only requested parameter. Validate the parameter with the <ENTER> key.
5. To run the programmed sequence, press the <START/STOP> key

The functions available with cycle '0' and their associated parameters are listed in the following table:

SERVICE CYCLE '0' - Function list			
Code	Function	Parameters	Description
0	Unload a substrate with the loader	no parameter	**Only with manual loader (p58=1)** See unloading sequence for loader option
1	Close or Open GYRSET Cover	no parameter	**case1: GYRSET Cover is open** Tests if automatic arm is out, otherwise an error oo9 is displayed (if option is fitted) Lift pins move down and chuck indexing is tested and corrected (if options are fitted) GYRSET cover closes **case2: GYRSET cover is closed** Chuck indexing is tested and corrected (if options is fitted) GYRSET cover opens Lift pins move up (if option is fitted)
2	Substrate Vacuum ON/OFF	no parameter	**Vacuum turns OFF if previously ON** **Vacuum turns ON if previously OFF** **(If vacuum failure is detected, error oo6 is displayed: clear it by pressing the <ENTER> key)**
3	Chuck Indexing and Lift pins control	no parameter	**Case1: Lift pins are up** Tests if automatic arm is out, otherwise error oo9 is displayed (if option fitted) Lift pins move down (if option fitted) Chuck indexing is tested and corrected (if option fitted). Indexing clutch is released. **Case2: Lift pins are down** Tests if automatic arm is out, otherwise error oo9 is displayed (if option fitted) Tests if GYRSET cover is open, otherwise error o14 is displayed (if option fitted) Chuck indexing is tested and corrected (if option fitted) Lift pins move up (if option fitted)
4	Nitrogen Blow Off	Time	**The arm stays at its rest position above the auxiliary drain. The nitrogen blow-off valve turns on for the time duration**
5/55 6/66	Solvent 1/3 dispense Solvent 2/4 dispense	Time	**The arm stays at its rest position above the auxiliary drain except if solvent #n is dedicated to the edge bead remover. For edge bead remover solvent, the arm moves to the arm servicing position. See machine parameter AH. Solvent #n turns on for time duration.**
7-77 8-88	Resist 1/3 Dispense Resist2/4 Dispense	no parameter	**The arm stays at its rest position above the auxiliary drain except if dispenser #n is dedicated to the swinging resist.** **For swinging resist, the arm moves to the Arm Servicing Position. See setup parameter AH. Start signal is sent to dispenser #n.** **Waits for the end of dispense #n signal. A 120 seconds time-out exits the cycle with error #13 if dispenser doesn't respond correctly. Then the arm moves back to the rest position.**
9	EBR or SR needle adjustment.	no parameter	**The arm moves to the Arm Servicing Position. See setup parameter AH. The nozzle rotates to bring the needles close to the substrate but no fluid is dispensed. Press the <ENTER> key when adjustment is finished. The arm returns to the rest position.**

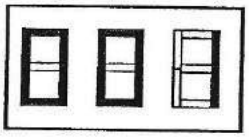
Note: The functions available in this cycle are mainly provided for checking purposes. Note that the Automatic Dispense Arm stays at the rest position, even if nitrogen blow-off, solvent dispense or fluid dispense is requested. Therefore we recommend using this function with great care, especially solvent dispense since solvent could be sprayed over the machine if the nozzle is not oriented towards the auxiliary drain.

10.5 PRESET SPIN CYCLE '1'

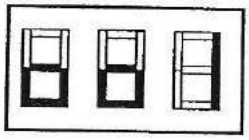
10.5.1 CYCLE '1' SELECTION

To select cycle '1', the system must be in standby mode.

Enter the program number by pressing the numerical key <1>, the display changes as illustrated below:



Press the <ENTER> key to validate the program number. The display changes as illustrated below, informing the user that cycle can be started:



10.5.2 PROGRAMMING

Cycle '1' is a very simple program which suits a large number of applications. Its content depends on whether the resist nozzle autoclean is fitted or not.

WITHOUT RESIST NOZZLE AUTOCLEAN

It consists of a single step spin with cover closed. The associated parameters are speed, acceleration and time. There is no dispense function. This cycle is mainly used on the very basic spin coaters with no fitted options. Programming procedure is as follows:

1. Press the <ENTER> key to enter parameter programming.
2. The green lamp 'Spin Close' lights up, and the yellow lamp 'Speed' blinks requesting the spin speed. Enter a three digit value and validate by pressing the <ENTER> key.
3. The green lamp 'Spin Close' remains on, and the yellow lamp 'Acceleration' blinks requesting the spin acceleration. Enter a three digit value and validate by pressing the <ENTER> key.
4. The green lamp 'Time' lights up, and the yellow lamp 'Time' blinks requesting the duration of the spin sequence. Enter a three digit value (1-999) and validate by pressing the <ENTER> key. The system returns to standby.

Note: If an entered parameter is out of range, the buzzer sounds briefly. The same parameter returns to zero and is requested again.

WITH RESIST NOZZLE AUTOCLEAN

When the resist nozzle autoclean is activated, cycle 1 is dedicated to the cleaning of the dispense nozzles. There are 3 parameters to be entered: the number of the dispense nozzle to be cleaned, the cleaning duration, and the cleaning reaction duration. Programming procedure is as follows:

1. Press the <ENTER> key to enter parameter programming.
2. The LED's 'Dispense1', 'Solvent1' and 'Solvent2' light up, and LED 'Dispenser2' blinks requesting the number of the dispense nozzle to be cleaned. Enter a value from 1 to 4 and validate by pressing the <ENTER> key.
3. The LED's 'Dispense1', 'Solvent1' and 'Solvent2' light up, and the LED 'Time' blinks requesting the duration of the autoclean. Enter a value in seconds from 0 to 999 and validate by pressing the <ENTER> key.

4. The LED's 'Dispense1', 'Solvent1', 'Solvent2' and 'Time' light up requesting the duration of the reaction of the solvent. Enter a value in seconds from 0 to 999 and validate by pressing the <ENTER> key.

Note: If this parameter is set to 0, there is no pre-dispense. The arm returns to home immediately after the autoclean.

When running, the cycle works as follows:

1. The arm aligns the dispense nozzle programmed in parameter 1 to the autoclean nozzle.
2. The solvent is dispensed from the autoclean nozzle to the dispense nozzle for the cleaning duration programmed in parameter 2.
3. The reaction duration programmed in parameter 3 counts down.
4. A pre-dispense is carried out.
5. The arm returns to home.

10.5.3 RUNNING THE CYCLE

With the system in standby on cycle '1' (oo1), press the <START/STOP> key once to run the cycle. The cycle is run according to the pre-set functions. The flag corresponding to the function being executed lights up and, if applicable, the elapsed time is displayed.

The machine stops automatically at the end of the cycle and the display returns to the cycle number. If there is a problem during the cycle, such as vacuum or air pressure failure, the buzzer sounds and the cycle is immediately stopped. Press <ENTER> to clear the error and return to standby.

The user can stop the cycle before completion by pressing the <START/STOP> key again.

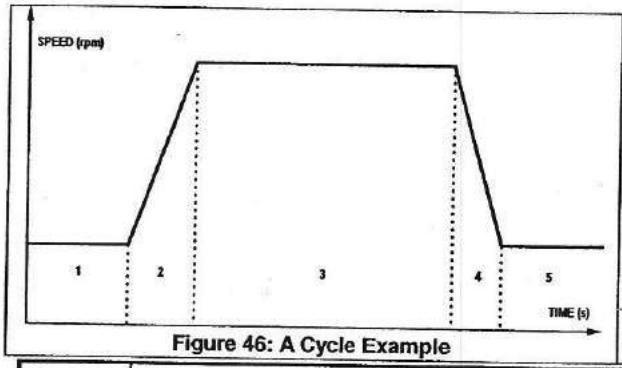


Figure 46: A Cycle Example

In standby, the cover is opened, the substrate lift pins are up waiting for a substrate to be loaded (if the machine is loaded manually, the lift pin option is not fitted).

Load and centre the substrate either on the chuck (manual loading) or on the lift pins (automatic loading with robotics arm). Press <ENTER> to start the cycle.

Sequence 1	1. Chuck vacuum turns on. 2. If the substrate lift-up option is fitted, the Lift-pins move down. If a malfunction is detected, an error message is displayed (a) 'o02' if pins stay in the upper position, (b) 'o05' if the pins do not reach the lower position. 3. Vacuum is tested prior to allowing continuation of cycle. If vacuum failure is detected, cycle stops and error message 'o07' is displayed. 4. If GYRSET cover lift option is fitted, GYRSET Cover closes. If a malfunction is detected, an error message is displayed: 'o15' if cover stays in Open position.
Sequence 2	Chuck accelerates to spin speed.
Sequence 3	Chuck spins at constant speed for the programmed duration
Sequence 4	Chuck decelerates until chuck comes to a complete stop.
Sequence 5	1. If the substrate lift-up option is fitted, the chuck is indexed to position the holes of the chuck above the pins. 2. GYRSET cover opens. If a malfunction is detected, an error message is displayed:'o17' if the cover does not reach the Open position. 3. Vacuum turns off. If the substrate lift-option is fitted, the pins move up. If a malfunction is detected, an error message is displayed: 'o03' if the pins do not reach the upper position. 4. System returns to standby.

10.6 CUSTOM CYCLES "2" - "8"

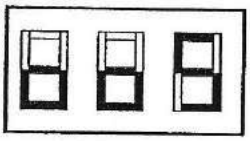
10.6.1 CYCLE SELECTION

If the program number being displayed does not correspond to the program you want to read, select another. To do so;

Enter the program number by pressing the numerical key corresponding to the program number (eg new program number 5): the display changes as illustrated below:



Press the <ENTER> key to validate the program number. The display changes as illustrated below, informing the user that cycle can be started:



10.6.2 PROGRAMMING

A cycle is a sequence of functions and their associated list of parameters. The length of a program is limited to thirty (30) steps. Programming is a very simple procedure:

1. The display shows (000) indicating that the cycle is empty. If the cycle is not clear, use the reset function to clear the memory for the current program.
2. Press the function key corresponding to the function to enter, then press the <ENTER> key to validate the function number.
3. Enter the requested parameters. Validate each parameter with the <ENTER> key (If the parameter is out of range, the buzzer sounds briefly and the same parameter is requested again).
4. After the required parameters have been entered, the display shows (000) again. Should the program be completed at this step, press the <ENTER> key again to terminate the programming sequence.
5. If another function is to be performed, proceed from step (2) to (4) again.

10.6.3 FUNCTION DESCRIPTION

Fourteen (14) different functions are available to program the system. Some functions are available only if the associated option is fitted to the system.

CUSTOM CYCLE '2' TO '8' - Function list			
Code	Function	Parameters	Description
1 CLOSE	Spin Cover Closed	Speed (y) Acceleration (y)	Arm Out position is checked GYRSET Cover Closes (if applicable) Spinning starts Moves to next function (chuck still spinning)
12 CLOSE with GYRSET up	Spin Cover Closed with GYRSET up	Speed (y) Acceleration (y)	Available only with indexed GYRSET and GYRSET type 1 Arm Out position is checked Cover Closes (if applicable) with GYRSET up Spinning starts Moves to next function (chuck still spinning)
2 OPEN	Spinning Cover Open	Speed (y) Acceleration (y)	Spinning starts Moves to next function (chuck still spinning)
3 TIME	Sequence duration	Time	Pre-set time elapses Moves to next function
33 TIME stopped by ENTER key	Sequence duration	No parameter	Wait ENTER key pressed Moves to next function
4 N2	Nitrogen Blow-Off	Time	Cover Opens Automatic Arm moves in Nitrogen Blow-Off Valve turns on Pre-set time elapses Nitrogen Blow-Off Valve turns off Automatic Arm moves out Moves to next function
5-SOLV1 6-SOLV2 55-SOLV3 66-SOLV4	Solvent Dispense1 (reserved for machine cleaning)	Time	Cover Up position is checked Solvent #n Valve turns on (the solvent dispense occurs on the outer ring of the chuck) Pre-set time elapses Solvent #n Valve turns off Automatic Arm moves out Moves to next function
7 - DISP1 8 - DISP2 77 - DISP3 88 -DISP4	Start Dispenser1 Start Dispenser2 Start Dispenser3 Start Dispenser4	no parameter	Cover Up position is checked Automatic Arm moves in Start signal is sent to Dispenser #n (the solvent dispense occurs at chuck centre) Waits for the end of dispense #n signal. (A time out of 120 sec. exits the cycle on error #13 if dispenser does not respond properly) Automatic Arm moves out Jumps to next function

Parameter ranges;

Speed (step 10 rpm) : 0 – 9 990 rpm (RC5 STD)
: 0 – 7 000 rpm (RC5 GYRSET 3)
: 0 – 5 000 rpm (RC5 GYRSET 5)
: 0 – 7 000 rpm (RC8 GYRSET 3)
: 0 – 5 000 rpm (RC8 GYRSET 5)

	:	0 – 3 000 rpm (RC8 GYRSET 8)
	:	0 – 3 000 rpm (RC13)
	:	0 – 2 500 rpm (RC16)
	:	0 – 2 000 rpm (RC22)
	:	0 – 1 000 rpm (RC33)
Acceleration (step 100 rpm/sec.)	:	100 – 20 000 rpm/s. (RC5 STD)
	:	100 – 5 000 rpm/s (RC5 GYRSET & RC8)
	:	100 – 2 000 rpm/s (RC13)
	:	100 – 1 000 rpm/s (RC16)
	:	100 – 500 rpm/s (RC22)
	:	100 – 300 rpm/s (RC33)
Time (step 1 sec.)	:	1 - 999 sec.

The parameter range is subject to modification according to the limitation introduced by the user in the software parameter configuration.

Note: with motorised arm, fluid functions need three parameters (substrate diameters and arm speed).

If substrate diameters are equal, the dispense is static. The arm speed parameter becomes the duration.

For the solvent dedicated to the edge bead remover, first parameter is the outer diameter, second parameter is the inner one.

For the swinging resist, first parameter is the inner diameter, second parameter is the outer one.

For the backside rinse, first and second parameter are equal to the rinse position, the third parameter is the rinse duration.

When the dispenser nozzle rinse option is enabled, dispense requires 4 parameters: nozzle rinse duration, dispense diameters and arm speed.

Code	Function	Parameters	Description
4 N2	Nitrogen Blow-Off	START DIAMETER	Cover Opens
5 SOLV1	Solvent Dispense1	END DIAMETER	Automatic Arm moves in to the programmedstart diameter
6 SOLV2	Solvent Dispense2	ARM SPEED	Fluid Valve turns on
55 SOLV3	Solvent Dispense3		Arm moves to the programmed end diameter at the programmed speed
66 SOLV4	Solvent Dispense4		Fluid Valve turns off
7 DISP1	Start Dispenser1		Automatic Arm moves out
8 DISP2	Start Dispenser2		Jumps to next function
77 DISP3	Start Dispenser3		
88 DISP4	Start Dispenser4		

10.6.4 CUSTOM CYCLE EXAMPLE1

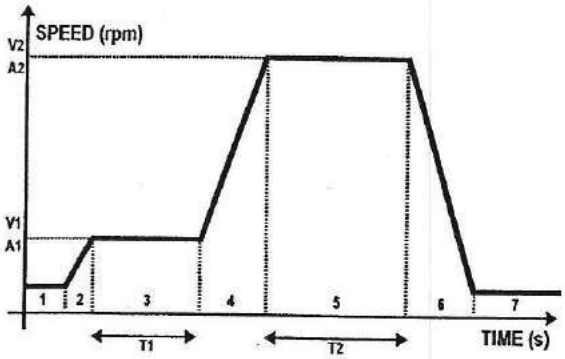


Figure 47: Graph of Custom Cycle Example1

Cycle '3'

1. Static dispense at substrate centre using dispense1 (DISP1)
2. Spin cycle phase 1 - acceleration
3. Spin cycle phase 1 - plateau
4. Spin cycle phase 2 - acceleration
5. Spin cycle phase 2 - plateau
6. Deceleration
7. End of cycle

Action	Display * blinks	Function Flags * blinks	Parameter Flags * blinks
Select cycle '3', reset and enter programming mode			
'3' then 'ENTER' (cycle selection)	oo3		
'RESET' (select reset function)	003 *		
'ENTER' (validate reset function)	oo3		
'ENTER' (enter programming mode)	000		
Step 1: Start dispense #1			
'7/DISP1' (select dispense 1 function)	007	DISPENSER 1 *	
'ENTER' (validate function, move to parameter setting)	000		SUBSTRATE SIZE (green)*
'0' '0' '0' (enter substrate external diameter = 0 mm)			SUBSTRATE SIZE (green)*
'ENTER' (validate external diameter, move to next parameter)			SUBSTRATE SIZE (green)*
'0' '0' '0' (enter substrate internal diameter = 0 mm)			SUBSTRATE SIZE (green)*
'ENTER' (validate internal diameter, jump to next step)	000		
Step 2: First Spinning sequence with cover closed			
'1/CLOSE' (select spin close function)	001	SPIN CLOSE *	
'ENTER' (Validate function, jump to parameter setting)	000	SPIN CLOSE	SPEED *
'1' '0' '0' (Enter speed 100)	100	SPIN CLOSE	SPEED *
'ENTER' (Validate speed & jump to next parameter)	000	SPIN CLOSE	ACC *
'1' '0' (Enter acceleration 0, 1 already in)	010	SPIN CLOSE	ACC *
'ENTER' (Validate acceleration & jump to next step)	000		
Step 3 : Duration of the first plateau			
'3/TIME' (select time function)	003	TIME (green) *	
'ENTER' (validate function, jump to parameter setting)	000	TIME (green)	TIME (yellow) *
'5' (set time to 5 seconds)	005	TIME (green)	TIME (yellow) *
'ENTER' (Validate time & jump to next step)	000		
Step 4: Second Spinning sequence with cover closed			
'1/CLOSE' (select spin close function)	001	SPIN CLOSE *	
'ENTER' (Validate function, jump to parameter setting)	000	SPIN CLOSE	SPEED *
'3' '0' '0' (Enter speed 100)	300	SPIN CLOSE	SPEED *
'ENTER' (Validate speed & jump to next parameter)	000	SPIN CLOSE	ACC *
'5' '0' (Enter acceleration 50)	050	SPIN CLOSE	ACC *
'ENTER' (Validate acceleration & jump to next step)	000		
Step 5: Duration of the second plateau			
'3/TIME' (select time function)	003	TIME (green) *	
'ENTER' (validate function, jump to parameter setting)	000	TIME (green)	TIME (yellow) *
'12' (set time to 12 seconds)	0012	TIME (green)	TIME (yellow) *
'ENTER' (Validate time & jump to next step)	000		
Step 6 : End of cycle			
'ENTER' (Validate end of cycle, return to standby)	oo3		

10.6.5 CUSTOM CYCLE EXAMPLE2

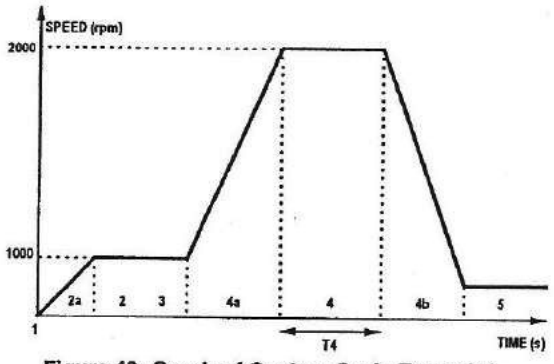


Figure 48: Graph of Custom Cycle Example2

CYCLE '6'
1. Enter cycle
2a. Acceleration Phase1
2 Spin cover open
3 Edge bead remover with spin cover open
4a Acceleration Phase2
4 Spin with cover open
4b Deceleration
5 End of cycle

Substrate OD = 120mm, Substrate ID = 100mm
The time 2+3 taken to carry out the step depends on the set up parameter t "Arm speed for the edge bead remover"

Action	Display * blinks	Function Flags * blinks	Parameter Flags * blinks
Step 1: Select cycle '6', reset and enter programming mode			
'6' then 'ENTER' (cycle selection)	oo6		
'RESET' (select reset function)	006 *		
'ENTER' (validate reset function)	oo6		
'ENTER' (enter programming mode)	000		
Step 2: Spin cover open			
'2/OPEN' (select spin open function)	002	SPIN OPEN *	
'ENTER' (Validate function, move to parameter setting)	000	SPIN OPEN	SPEED *
'1' '0' '0' (Enter speed 100 = 1000 rpm)	100	SPIN OPEN	SPEED *
'ENTER' (Validate speed & move to next parameter)	000	SPIN OPEN	ACC *
'1' '0' (Enter acceleration 0, 1 already in = 1000 rpm/s)	010	SPIN OPEN	ACC *
'ENTER' (Validate acceleration & move to next step)	000		
Step 3: Edge bead remover			
'6/SOLV2' (select edge bead remover function =6)	006	SOLV2*	
'ENTER' (validate function, move to parameter setting)	000		SUBSTRATE SIZE (green)*
'1' '2' '0' (enter substrate external diameter = 120 mm)	120		SUBSTRATE SIZE (green)*
'ENTER' (validate function, move to parameter setting)	000		SUBSTRATE SIZE (green)
'1' '0' '0' (enter substrate internal diameter = 100 mm)	100		SUBSTRATE SIZE (green)
'ENTER' (Validate substrate diameter & move to next parameter)	000		ARM SPEED (green)*
'1' '0' (Enter arm speed = 10 mm)	10		ARM SPEED (green)*
'ENTER' (Validate substrate as & move to next step)	000		
Step 4: Spin cover open			
'2/OPEN' (select spin open function)	002	SPIN OPEN *	
'ENTER' (Validate function, move to parameter setting)	000	SPIN OPEN	SPEED *
'2' '0' '0' (Enter speed 200 = 2000 rpm)	200	SPIN OPEN	SPEED *
'ENTER' (Validate speed & move to next parameter)	000	SPIN OPEN	ACC *
'1' '0' (Enter acceleration 10 = 1000 rpm/s)	010	SPIN OPEN	ACC *
'ENTER' (Validate acceleration & move to next parameter)	000	SPIN OPEN	TIME *
3/TIME (select time function)	003	TIME (green) *	
'ENTER' (validate function, jump to parameter setting)	000	TIME (green)	TIME (yellow) *
'5' (Enter time = 5s)	005	TIME (green)	TIME (yellow) *
'ENTER' (Validate time & move to next step)	000		
Step 5: End of cycle			
'ENTER' (Validate end of cycle, return to standby)	oo7		

10.7 AUTOMATIC MACHINE CLEANING CYCLE '9'

10.7.1 CYCLE DESCRIPTION

Note: This cycle only functions with a motorised arm.

Cycle '9' schedules a cleaning cycle, automatically and at regular intervals. The interval between two successive cleaning cycles can be either a given number of spin cycles, or a given pre-set time. Both the number of spin cycles and the given time can be programmed together. In this case, the first condition that is met runs the cleaning cycle and clears the other condition. The machine cleaning cycle can also be started manually by pressing the <START/STOP> key when the system is in standby on cycle 'oo9'.

Two conditions are required to allow an automatic cleaning cycle to run:

1. One of the conditions described above must be fulfilled (Pre-set time elapsed or number of spin cycles reached).
2. The machine must be in standby mode (no substrate being processed).

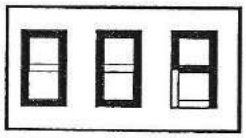
Once these two conditions are met, the cycle starts:

1. The chuck rotates at slowly with no substrate on it.
2. The arm moves in and solvent dispense1 is done at low pressure. The nozzle of solvent1 line is oriented in such a way that the dispensed solvent is spread onto the outer ring of the chuck. No solvent is spread on the central chuck ring, which is therefore not contaminated by resist or other fluids during the spin cycle.
3. Solvent dispense stops and the arm moves out.
4. The GYRSET cover closes, trapping the solvent inside the confined enclosure formed by the chuck and the GYRSET cover.
5. The chuck spins at low speed to spread the solvent over the chuck. Since the spin speed is low, a large amount of solvent remains on the outer chuck ring, forming a meniscus.
6. After the programmed time, the chuck speed increases.
7. The chuck spins at high speed to dry the solvent on the chuck.
8. After the programmed time, the chuck stops spinning, and the cover is opened.
9. Since the GYRSET cover is closed in contact with the outer chuck, it is also wet by solvent and is cleaned during the same sequence. The last high-speed spin cleans and dries the outer chuck and the GYRSET cover at the end of the cycle.

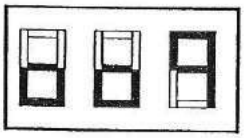
10.7.2 CYCLE '9' SELECTION

To select the machine cleaning cycle (number 9), the system must be in the standby mode.

Enter the program number by pressing the numerical key <9>, the display changes as shown below:



Press enter key to validate the program number. The display changes as illustrated below, informing the user that cycle can be started:



10.7.3 PROGRAMMING

Cycle '9' is a pre-set sequence of functions. It consists of a two step sequence including solvent dispense and spin. The programming procedure is as follows:

	1. Press the <ENTER> key to enter parameter programming.
Cleaning frequency	2. The green lamp 'AUTOCLEAN' lights on and the yellow lamp 'Time' blinks requesting for the time between two cleaning cycles. Enter a three digit datum and validate by pressing the <ENTER> key.
	3. The yellow lamp 'Time' lights on (not flashing) requesting for the number of spinning cycles between two cleaning cycles. Enter a three digit datum and validate by pressing the <ENTER> key.
Spin at low speed (cover opened) for solvent dispense on outer chuck	4. The green lamp 'Spin Open' lights on, and the yellow lamp 'Speed' blinks requesting for the spinning speed during solvent dispense. Enter a three digit datum and validate by pressing the <ENTER> key.
	5. The green lamp 'Spin Open' lights on, and the yellow lamp 'Acceleration' blinks requesting for the spinning acceleration. Enter a three digit datum and validate by pressing <ENTER> key.
Solvent dispense on outer chuck	6. The green lamp 'Solvent1' Lights on, and the yellow lamp 'time' blinks requesting for the duration of the solvent dispense. Enter a three digit figure (1-999) and validate by pressing the <ENTER> key.
Spin at low speed (cover closed) for solvent spreading	7. The green lamp 'Spin Close' lights on, and the yellow lamp 'Speed' blinks requesting the spin speed for cleaning. Enter a three digit figure and validate by pressing the <ENTER> key.
	8. The green lamp 'Spin Close' lights on, and the yellow lamp 'Acceleration' blinks requesting the spin acceleration. Enter a three digit figure and validate by pressing the <ENTER> key.
	9. The green lamp 'time' lights on and the yellow lamp 'time' blinks requesting the delay before moving to the next sequence. Enter a three digit figure (1-999) and validate by pressing the <ENTER> key.
Spin at high speed (cover closed) for solvent centrifugation and cleaning	10. The green lamp 'Spin Close' lights on, and the yellow lamp 'Speed' blinks requesting the spin speed for cleaning. Enter a three digit figure and validate by pressing the <ENTER> key.
	11. The green lamp 'Spin Close' lights on, and the yellow lamp 'Acceleration' blinks requesting the spin acceleration. Enter a three digit figure and validate by pressing the <ENTER> key.
	12. The green lamp 'time' lights on and the yellow lamp 'time' blinks requesting the duration of the centrifugation. Enter a three digit figure (1-999) and validate by pressing the <ENTER> key.

Note: When attempting to enter a parameter that is out of range, the buzzer sounds briefly. The same parameter returns to zero and is requested again.

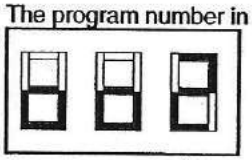
10.8 MODIFYING A CYCLE

10.8.1 INSERTING ONE STEP

The <INS> (Insert) key adds a new step in between two existing steps of the program. The new function is inserted before the current step. To insert a new step, proceed as follows:

(1) Select the program number. Press the key corresponding to the program to be modified (eg: <2>), then the <ENTER> key to validate the program number and return to standby.

The program number in standby is displayed as illustrated below:



(2) Press the <ENTER> key to enter parameter programming and to display the first function of the cycle. If the new function is to be inserted at the beginning of the cycle, proceed to step (3). Otherwise, press the <ENTER> key as many times as is necessary to display the code corresponding to the function before which a new step is to be added. The display shows the function code, and the green lamp corresponding to the function blinks.

(3) Press the <INS> key to add the new step. Immediately after having pressed the <INS> key, the function number disappears and the green lamp goes out. The display shows three zeros ('000') awaiting the new function code:



(4) Enter the function code corresponding to the new function to be inserted.

Caution

Once the above display is shown, a function code must be entered. If the <ENTER> key is pressed at this step of the modification procedure, the rest of the cycle will be deleted.

(5) If the programmed function requires parameters, enter the requested parameters and validate each time with the <ENTER> key.

(6) After the requested parameters have been entered, the display shows the next function code previously programmed and the corresponding green lamp blinks. Should another step need to be inserted before this function, proceed from step (2) or (3) again.

(7). To exit the program, press the <ENTER> key until the end of the cycle is reached and the display returns to standby, or press the <START/STOP> key to return immediately to standby.

Note: To add a function to the end of the cycle, press <ENTER> until the end of cycle ('000') is displayed. Then, a function can be entered without needing to press the <INS> key.

10.8.2 DELETING ONE OR SEVERAL STEPS

The <DEL> (Delete) key removes one step from the program. To delete one or several steps, proceed as follows:

(1) Select the program number. Press the key corresponding to the program to be modified (eg: <2>), then the <ENTER> key to validate the program number and return to standby.

The program number in standby is displayed as illustrated below:

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