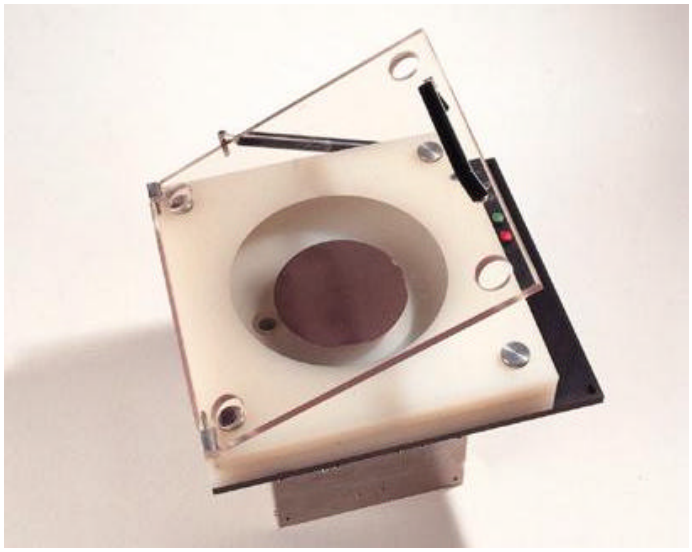
Electronic Micro Systems

Photo Resist Spinner Model 5000-1



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Instructions

The Photo Resist Spinner Model 5000-1 from Electronic Micro Systems provides a simple and economical means of applying highly accurate resist coatings to silicon wafers and ceramic substances. Spinning the wafers between 100 and 9,500 rpm using computer control ensures precise repeatability for production of batch wafers.

The Model 5000-1 consists of three parts: a bench top spinner unit, a separate control unit and a means of loading user programmes via an RS232C serial link. Currently, this is in the form of an Epoc based personal organiser such as the Psion Series 5 or the Oregon Scientific Osaris. The control unit is connected by a flexible cable and can be located outside the immediate working area.

Bench Top Spinner

Wafers of up to 6" inches in diameter are held by vacuum on a chuck and spun inside a polypropylene bowl. The bowl has an aperture to allow an external pump to extract fumes and is easily removed for cleaning.

An interlock switch ensures that the chuck will not spin unless the vacuum is sufficient to hold the wafer securely. A vacuum receiver in series with the vacuum line prevents resist from entering the vacuum system.

Control Unit

The following parameters can be set using the personal organiser based programming tool:

- number of spin periods - between 1 and 8
- start & stop delay periods - between 1 and 100 seconds
- spin speed - between 100 and 9,500 rpm
- spin periods - between 0 and 999 seconds
- acceleration control - between 1 and 1000 units.

When a sequence starts, the chuck vacuum is switched on and after a programmed number of seconds the program (of up to eight spin periods) runs. At the end of the program, a programmed deceleration occurs, followed by a programmed pause and the chuck vacuum is switched off. (See Fig. 1).

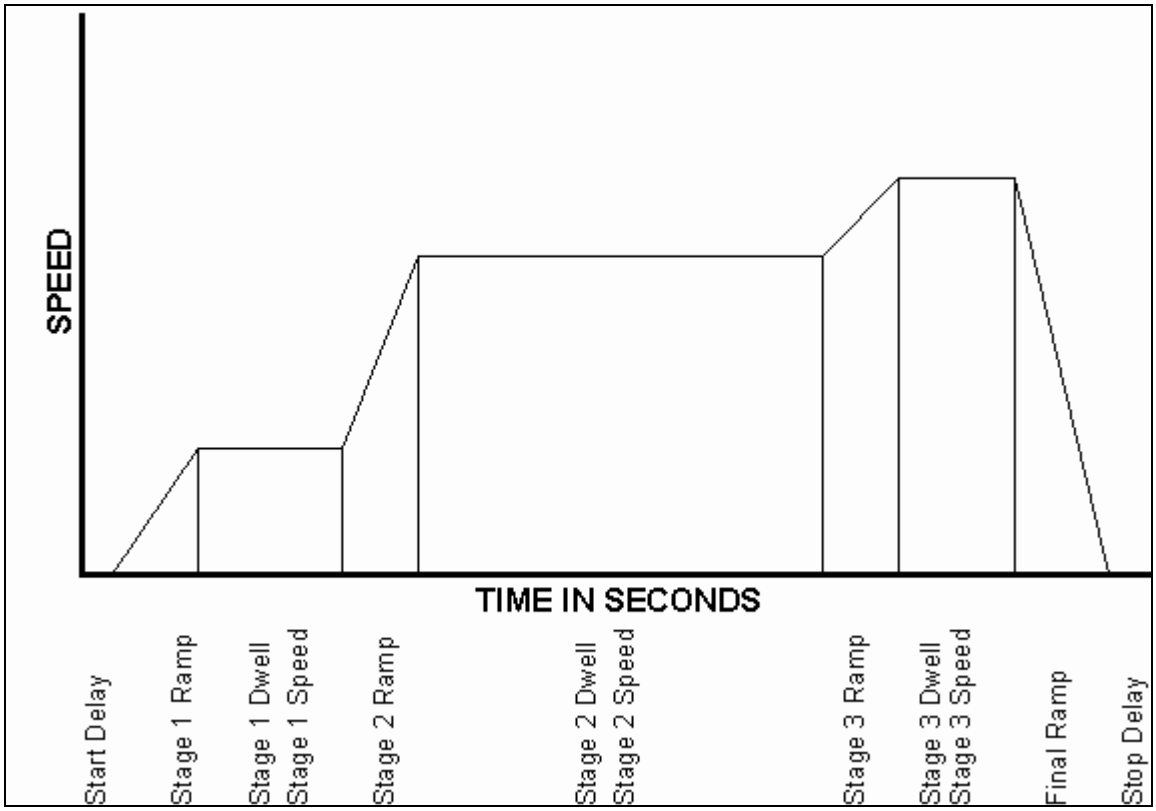


Figure 1 - An Example Three Stage Program

Apart from the mains power switch, there is only one control on the EMS 5000-1 and that is the Manual Vacuum button. This is used to manually turn the vacuum when the programmed sequence is not running. There is an LED to indicate the state of the vacuum output.

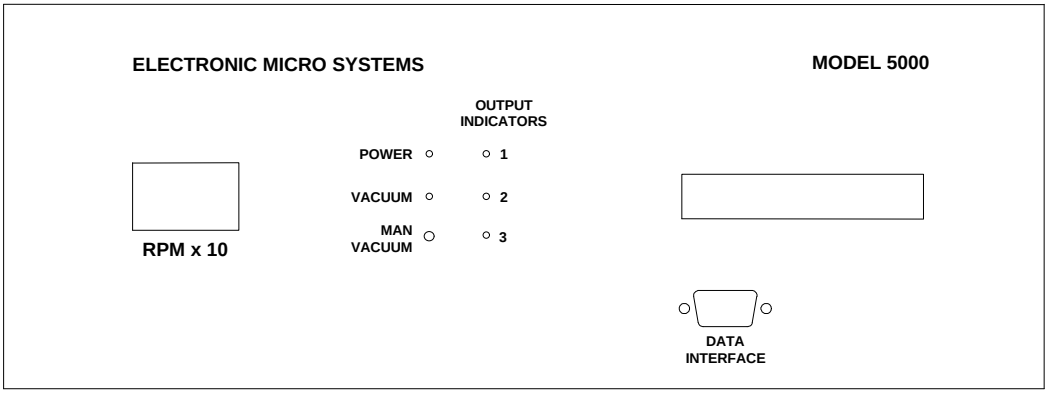


Figure 2 - EMS 5000-1 Front Panel

The output indicators 1, 2 and 3 can be programmed by the user and may be used to indicate any thing at all such as progress etc.

Starting Up

1. Make sure that the Spinner is correctly connected to the Control Unit.

2. Turn on the power switch, located at the rear of the Control Unit. The display shows the latest software release identifier which may differ from that shown here.

3. After the self test is complete, the unit will attempt to retrieve the last program used from the memory. If no valid program can be retrieved, default values will be placed in the memory and the display will read:

4. When a valid program is loaded into the memory the unit is ready for use and the display reads:

Where PROG001 is the program name decided by the user. If no name is available (such as the default setting) the number one will be displayed. The message "PRESS STEP TO SET" is there to maintain compatibility with the EMS 5000 (stand alone) software version and should be ignored.

Programming The Model 5000-1

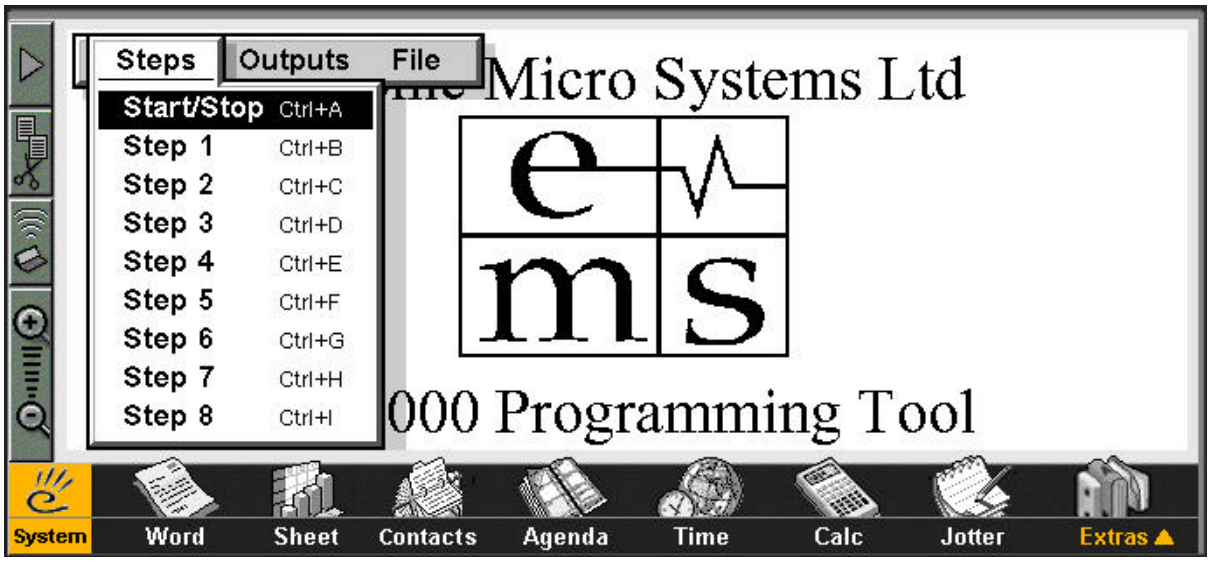
The model 5000-1 is programmed on an Epoc based personal organiser using software that has been specially written for Electronic Micro Systems Ltd.

It uses drop down menus and dialog boxes in a simple and familiar fashion to make changes to the program for the EMS 5000-1. When you are happy with the settings the program can be down loaded to the Model 5000-1. The program uses the file name on the organiser to help you identify and organise your data. The data files can also be backed up using software which is available from the Organiser vendor.

Note that the organiser uses the RS232 serial port for synchronising and backing up data on to a PC and this function will need to be switched off before data transfer can be successfully completed. On a Psion Series 5 this can be achieved by holding down Ctrl button and pressing L. This will display a dialog box allowing you to select the Link Off mode. This has made the serial port available for use by EditEMS.

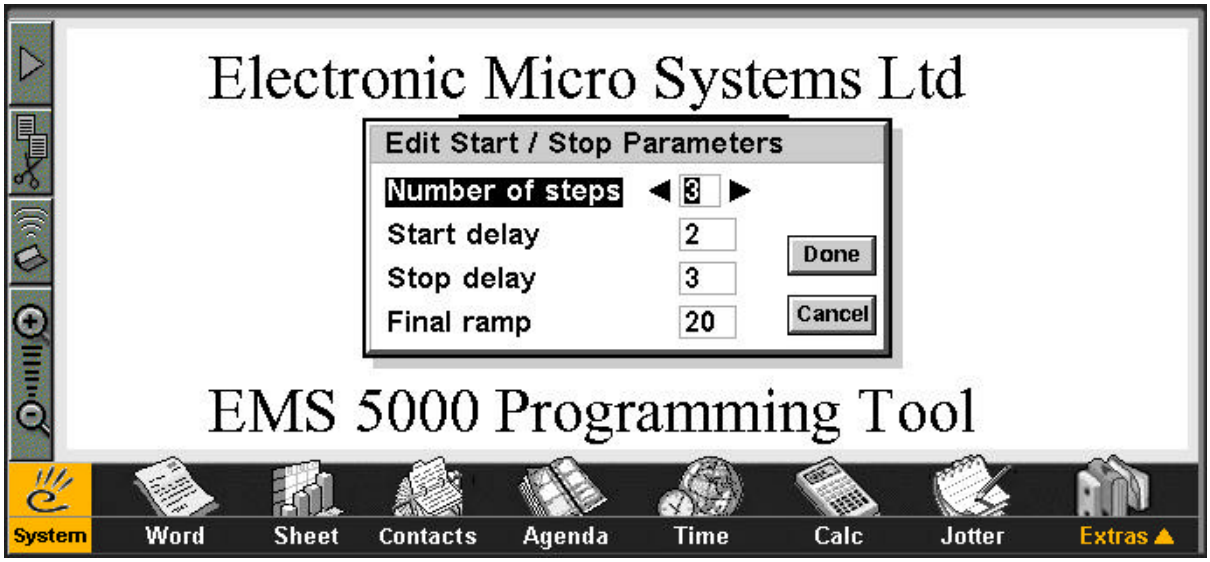
Note also that different models of organiser have different format displays and so the screen may appear slightly different from those shown here. It is exactly the same software though so the operation should be identical.

To start the EditEMS software, you will need to use the pointing device and 'click' on the Extras icon. This will offer various extra programs including EditEMS. Select the EditEMS program and you will see the following screen.



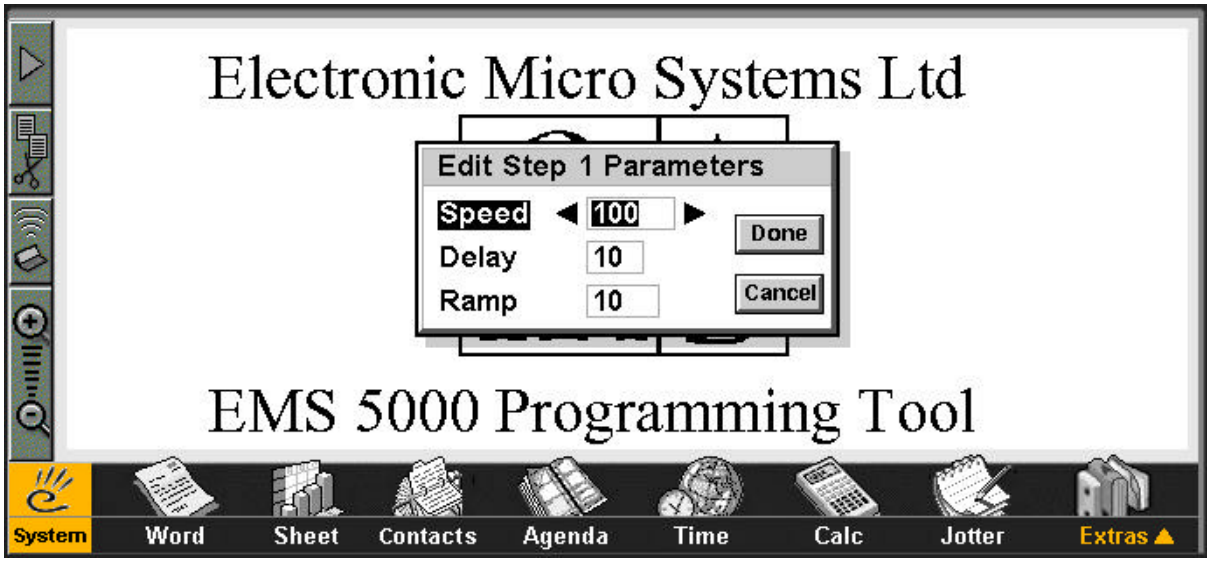
For a full understanding of the parameters refer to Figure 1.

You can set up the Start/Stop parameters by selecting that option, in which case a dialog will appear as follows. The software will not allow you to enter an invalid value!

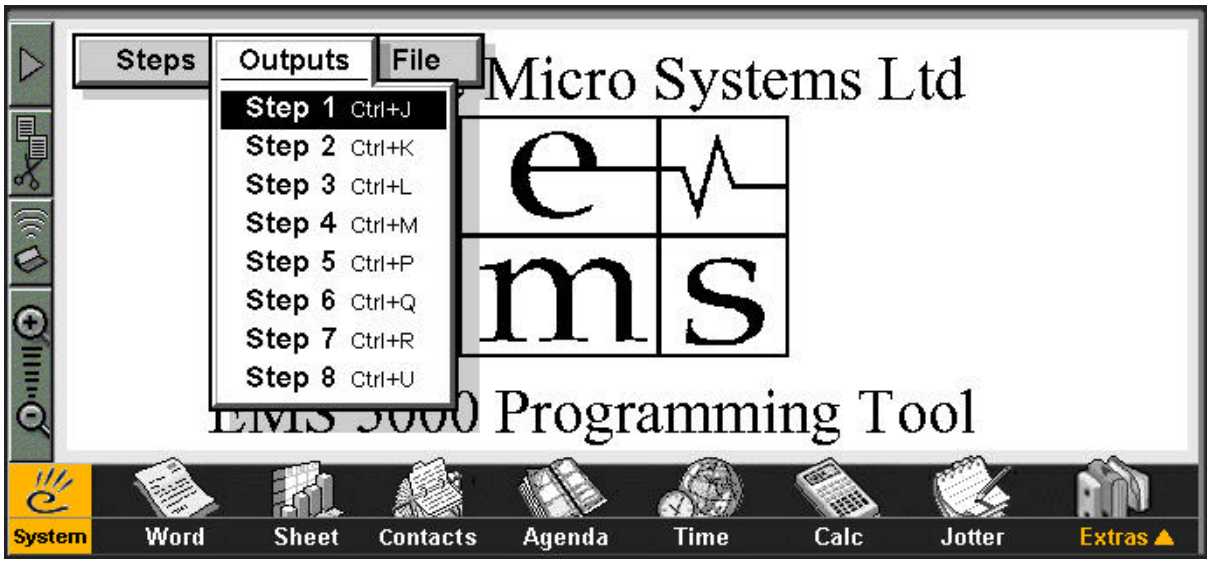


When you have set the parameters as you require them then 'click on' Done to return to the drop down menu. If you want to abandon your changes then select Cancel.

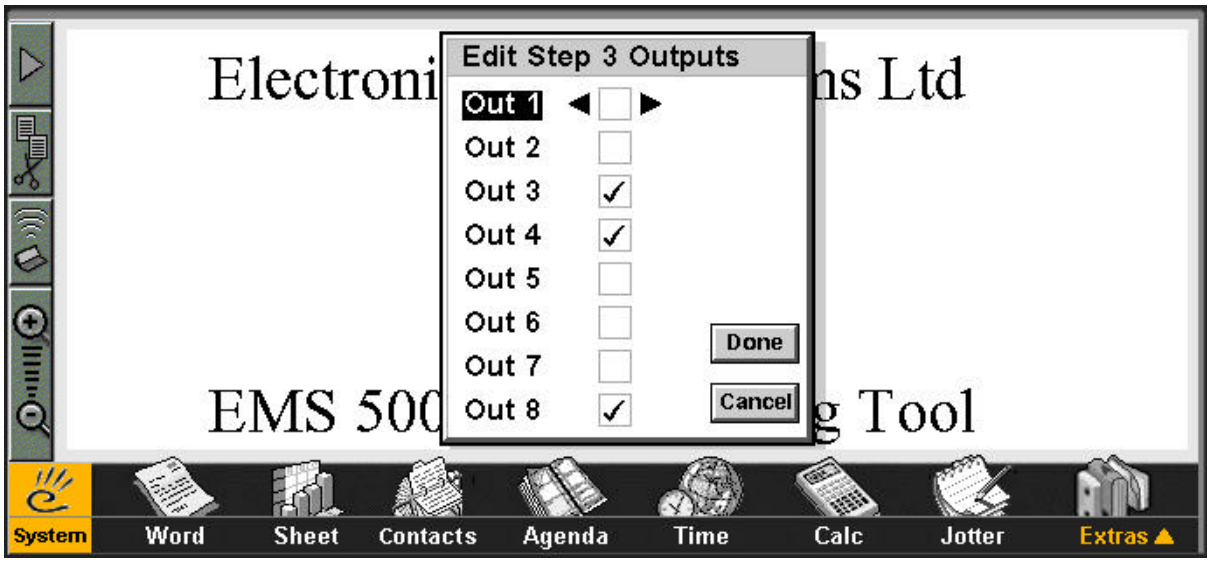
You can set up each step by selecting the appropriate option from the Steps menu, in which case a dialog will appear as follows. Again, the software will not allow you to enter an invalid value!



To set up the outputs for each Step you must first 'click on' the Outputs drop down menu.



You can set up the outputs for each step by selecting the appropriate option from the Steps menu, in which case a dialog will appear as follows.

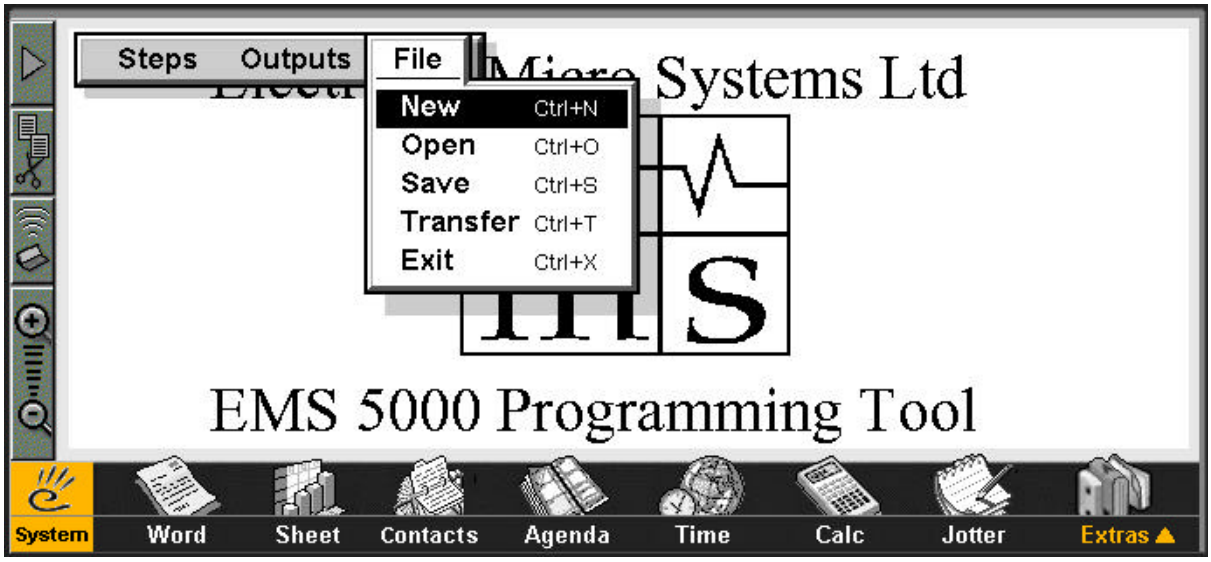


When you have set the parameters as you require them then 'click on' Done to return to the drop down menu. If you want to abandon your changes then select Cancel.

NOTE: Out 4 and Out 8 are associated with the Vacuum output and LED and are controlled independently by the EMS 5000-1 Control Software. Any settings made here will be ignored by the Controller.

Outputs 1, 2 & 3 operate switched contacts which can be found on the 9 way D type connector on the rear panel. The pin out for that connector can be found in Appendix B. Outputs 5, 6 & 7 drive output indicators 1, 2 & 3 on the front panel.

To following functions can be accessed when 'click on' the File drop down menu.



Each of these functions is self explanatory and appropriate messages appear of the display to help you complete the operation. Interlocks have been included to prevent you from exiting the program without saving your data.

Your organiser must be connected to the EMS 5000-1 before you 'click on' the Transfer option because the transfer will begin as soon as the option has been selected (providing the serial port is available and the program has a name (i.e. has been saved).

Spinner Unit Operation

1. Position the appropriate size chuck on the spindle of the spinner unit. The top surface of the chuck should be smaller than the wafer/substrate to prevent resist from contaminating the top surface of the chuck.

2. Switch on the power to the remote control unit and ensure that the correct speed and time values for your process have been downloaded to the controller.

3. Place the wafer/substrate centrally on the chuck.

4. Press the Green start button on the spinner unit.

NOTE: If the wafer/substrate is not central on the chuck, press the Red reset button on the spinner unit. This stops the program. Re-position wafer/substrate and press the Green button on the spinner unit to restart the program.

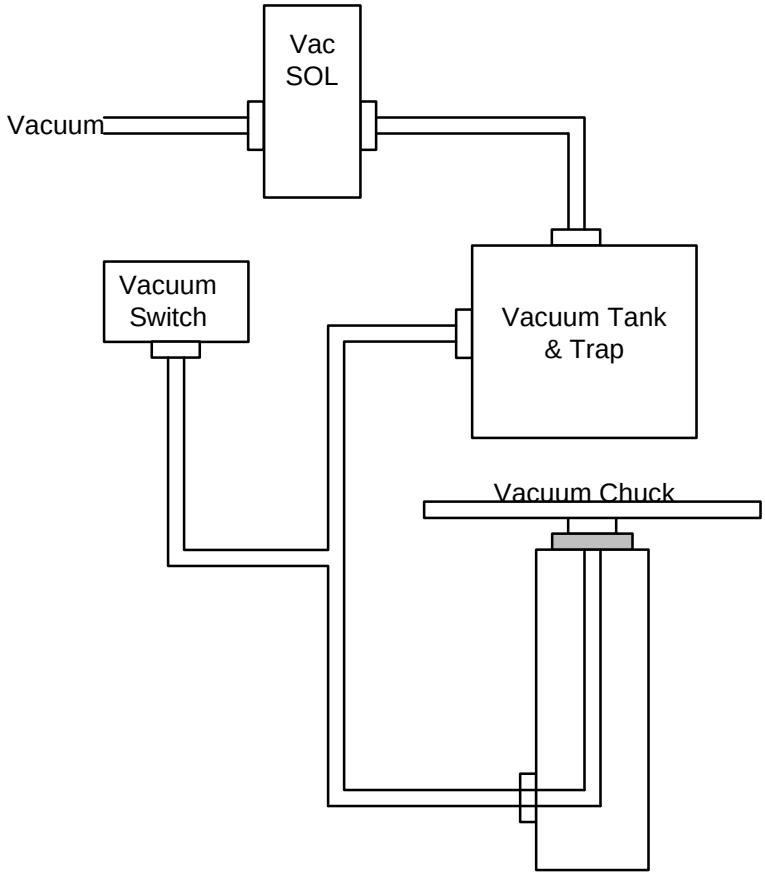
During the operation of the programmed sequence, the left hand display shows the actual speed while the right hand display shows which step of the sequence the unit is processing and the programmed speed.

5. Apply the photo resist to the centre of the wafer/substrate.

6. The remote control unit will control the spinner unit until the end of the program.

APPENDIX A

Pneumatic Diagram



APPENDIX B

Connector Details

Pin Number	Function
1 & 2	Motor Positive Connection
3 & 4	Motor Negative Connection
5	System 0 Volts
6	Start Button Input Signal (connect to System 0 Volts to assert)
7	Lid Input Signal (connect to System 0 Volts to assert)
8	Vacuum Input Signal (connect to System 0 Volts to assert)
9	Stop Button Input Signal (connect to System 0 Volts to assert)
10	Vacuum Output (Connects to +12 Volts when switched on)
11	Tacho Positive Input
12	Tacho Negative Input
13	Not Used
14	Not Used
15	Chassis Earth

Table 1 - Main Connector Details

The outputs that can be programmed to operate during the spin sequence are identified as follows:

Out 8	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1
Not Available	Not Available	LED 3 on Front Panel	LED 2 on Front Panel	LED 1 on Front Panel	Pins 8 & 3 on 9 Way 'D' Type	Pins 7 & 2 on 9 Way 'D' Type	Pins 6 & 1 on 9 Way 'D' Type

Programming a 1 turns the output ON (contacts closed) during the step.
Programming a 0 turns the output OFF (contacts open) during the step.
Pins 9 & 4 on 9 Way 'D' Type are closed when the Vacuum is ON.

Pin Number	Function
1 & 6	Contacts for Out 1
2 & 7	Contacts for Out 2
3 & 8	Contacts for Out 3
4 & 9	Contacts for Out 8
5	Chassis Earth

Table 2 - Auxiliary Outputs