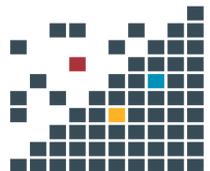




**SPRITE HR2/3/4/5
STAGECONTROLLER
JOYSTICK**

Operation Manual V3.01
Part Number: 3005-0007



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Contents

1.0 INTRODUCTION	1
2.0 GENERAL OPERATION	3
3.0 STAGE MOVEMENT	4
4.0 SPEED SELECTION	5
5.0 SETTING CO-ORDINATES TO ZERO	6
6.0 STORE/BACKLASH (saving coordinates).....	7
7.0 RECALL (recalling co-ordinates)	8
8.0 GoTo (go abs) ABSOLUTE MOVE	9
9.0 GoTo EXCHANGE OR HOME POSITION (exch)	9
10.0 GoTo (go rel) RELATIVE MOVE.....	10
11.0 SEQUENCE (seq)	11
12.0 SCAN PATTERNS (Snake/Raster/Random)	12
12.1 SCAN – SNAKE & RASTER.....	13
12.2 SCAN - RANDOM.....	14
13.0 SCAN MODE SETUP.....	15
14.0 CALIBRATE FUNCTIONS	16
15.0 PROBLEM SOLVING	20
16.0 RESET	22
17.0 RS-232 - REMOTE OPERATION.....	23
17.1 RS-232 CONTROL PARAMETERS	24
17.2 COMPUTER TO CONTROLLER	25
17.3 CONTROLLER TO COMPUTER.....	26
17.4 RS-232 DEMONSTRATION/TEST PROGRAM	26
APPENDIX 1 – CHINESE ROHS DECLARATION.....	29

SOFTWARE VERSION

To see which software version is installed in your system press cal, 6.

1.0 INTRODUCTION

The new SPRITE version III joystick controller offers unrivalled features packaged in a control box which has been ergonomically designed especially for the SEM and TEM user.



The co-ordinate display is angled at 15° to ensure that it may be viewed at a distance. A speed proportional analogue joystick is used for accurate movement of X/Y axes and independent keys are provided for control of Z (working distance), Tilt and Rotate of the specimen sample.

The joystick is mounted on the left of the control box for use with the operators' left hand, leaving the right hand free for adjustment of the microscope controls.

At the rear of the control box two connectors are provided for the power cable connection. If the controller is used on the microscope console the left connector can be used or if the controller is used on the column plinth then the right connector can be used.

Especially important for the SEM user is the requirement to return to specimen exchange position, this can be initiated easily by pressing the exchange button (**exch**), the stage will then travel to the user programmable specimen exchange or centre of stage position.

A display power down function (screen saver) is provided to conserve energy and lengthen the life of the co-ordinate display when the system is not in use. After the system has not been used for thirty minutes the display brightness will dim to 50% of maximum. Pressing any key or using the joystick will automatically switch the display brightness back to maximum.

2.0 GENERAL OPERATION

All functions of the system are operated from the joystick controller. A typical display appears below, indicating stage coordinates X,Y and Z in mm, Tilt and Rotate are displayed in degrees. Speed range is displayed with three small arrows to the left of the display, 3 = FAST, 2 = MEDIUM and 1 = SLOW. The disp button toggles the third co-ordinate between Z, Tilt and Rotate.



X/Y stage movement is controlled from the joystick and for Z, Tilt and Rotate movement, the labeled keys above the joystick are used. Z up will move the stage up ie. decrease working distance. Tilt up will increase the Tilt angle and Rotate up will rotate the stage in a clockwise direction (on the visual monitor).

Many additional functions and set-up parameters are embedded in the software, when the display is not wide enough to display a complete message the text may be scrolled using the speed left/right buttons. These buttons are also used to increment numbers when using the store, recall and scan functions. After selecting a function always press enter to move on to the next command, if a mistake is made the delete del key may be used to erase the entry and you may then re-enter the required figure.

3.0 STAGE MOVEMENT

The joystick is used to move the stage in X and Y directions, diagonal movements (X and Y together) are also possible. Speed of motors is proportional to the distance the joystick is moved, ie. Further you move the joystick the faster the motors will move.

Z, Tilt and Rotate movements (if applicable) are effected by the appropriately labeled keys above the joystick.

Only three sets of co-ordinates are displayed simultaneously, the third co-ordinate display can be toggled between Z, Tilt and Rotate by pressing **Disp**.

Motors can also be moved by hand using the motor handwheels (where fitted), position is automatically updated as long as system power is switched on. If handwheels are moved when power is switched off then position will be lost and origin will have to be reset.

To move automatically to the exchange position press **exch** and then **enter**. If a stage lock interface is installed and switched on you will not be able to move the Z or Tilt motors either from the labeled keys or from the exchange function. Switch off the stage lock on the microscope to enable movement.

On XY systems only, the R, Z and T keys can be used to move individual X or Y axes as indicated in the picture below. This can be useful when you need to move a small distance in only one axis. Speed is set in the normal way with the speed up/down keys.



4.0 SPEED SELECTION

When moving X or Y with the joystick, speed of movement is proportional to movement of the joystick, ie. Further you move the joystick faster the stage will move.

There are three speed ranges (FAST, MEDIUM, SLOW) controlled by the keys labeled speed; the left key decreases speed range while the right key increases speed range. Speed range is indicated by three small arrows to the left of the display, 3 = FAST, 2 = MEDIUM and 1 = SLOW.



Typical speeds for the FAST speed range lie between 25 μ /s and 2.5mm/s, for the MEDIUM speed range 1 μ /s and 100 μ /s and for the SLOW range 25n/s and 2.5 μ /s. The step size is 10nm for a scale factor of 0.5mm (typical for many SEM stages.)

The speed keys will also change Rotate, Z and Tilt speed, but you may find that the slow setting is extremely slow.

5.0 SETTING CO-ORDINATES TO ZERO

The display gives a read-out of the current co-ordinate values (X,Y,Z,T,R) scaled according to the current scale factor.

Pressing the zero key allows the co-ordinate display to be zeroed, ie. the current position becomes the origin. Pressing offset then 1 will origin X to zero, 2(Y), 3(Z), 4(Rotate) and 5(Tilt), pressing offset then 0 will set all axes to 0.

If offset is pressed twice the current stage co-ordinates may be entered as displayed on the SEM mechanical readout. If there is no mechanical read-out on the SEM, drive the motors in the negative direction until they stop at the negative limits, then set the X/Y coordinates to zero as described above.

Setting axes other than X, Y to the correct position is more difficult. To set Z you can take the position reading from the SEM working distance display. To set Tilt and Rotate (if there is no mechanical position read-out) the chamber would normally need to be opened to ensure that the stage was correctly positioned.

6.0 STORE/BACKLASH (saving coordinates)

The Current stage co-ordinates (X,Y,Z,T,R) can be stored in controller memory for subsequent recall, this is accomplished by pressing store.



The display will show a store location (1 if this is the first store operation since the unit was switched on).

Before storing a set of co-ordinates it is normally necessary to apply a backlash move to compensate for unwanted slack in the stage mechanics this is performed by pressing the backlash (bkLsh) key.

After power has been switched on, only X and Y will move when the bkLsh key is pressed. If you have moved Rotate for example, then Rotate repositioning should be switched on by using Cal, 2.

For best possible accuracy, only apply backlash correction to axis which have been moved, ie. if you only move X and Y ensure that the other axes are switched off.

When the backlash key is pressed the stage moves a pre-defined distance away from the current position and then back again. Default backlash move distance is 0.5mm for X,Y,Z, 5° for Rotate and 2° for Tilt.

After using backlash the joystick can be used for fine adjustment of stage position and the backlash move repeated. Once you are happy with stage position, store can be used.

To store the displayed co-ordinates press store then enter, if you wish to store the coordinates at another location, use the speed up/down keys to select a new store location (1-99) and press enter. The Controller will then return to normal operation.

The displayed store location automatically increments following each store operation. To store another position press store again. The store location indicated will now be 1+ the previous value. Press enter to accept this location.

New values will overwrite any existing values in memory locations. The stored values are saved when power is switched off.

7.0 RECALL (recalling co-ordinates)

To display stored co-ordinates press **recall** and then use the speed up/down keys to select the required location, if you then wish to move to that location press **enter**, if you wish to return to normal operation press **stop**.

If you pressed **enter**, the stage will drive to the displayed co-ordinates, movement can be stopped at any time by pressing the **stop** key.

After power is switched on the stagecontroller will default to repositioning only X and Y axis, Z, Tilt and Rotate axis will not reposition automatically unless switched on using **Cal 2**.

To **recall** sequential positions automatically the sequence (**seq**) command should be used.

8.0 GoTo (go abs) ABSOLUTE MOVE

The **go abs** key allows the stage to be moved to absolute co-ordinate values. Press **go abs** then enter X,Y,Z,T,R values.

GoTo	XY	Z
1.234	5.678	15.0

The stage will move to the requested co-ordinates automatically after the last co-ordinate has been entered. Use the "-" key for negative values.

If you have a 3, 4, or 5 axis system but only wish to move X and Y then just press **enter** instead of co-ordinates for subsequent axes.

Z, Tilt and Rotate will only be moved by this command if switched on from the **Cal 2** command.

Pressing **enter** twice after the first value will abort this routine.

9.0 GoTo EXCHANGE OR HOME POSITION (exch)

To send the stage automatically to the specimen exchange position press **exch**. If the stored exchange position is incorrect it can be modified by pressing **cal 1, 7** and entering the correct figures.

When **exch** is pressed not all of the motors will move to the exchange position at once, first Z, and Tilt will move to position then X, Y and Rotate will move. This procedure is to ensure that specimens cannot be driven into the final lens when moving to the exchange position.

If the stage-lock option is fitted and switched on then **exch** will not work until stage-lock has been released.

Note: Z, Tilt and Rotate motors will move to exchange position even if not switched on from **cal, 2**.

10.0 GoTo (go rel) RELATIVE MOVE

The **go rel** command is used for relative moves, ie. if you wish to travel 1mm in X and Y from the current position. Press **go rel** and you will be prompted to enter the relative move distance in mm. You can move in a positive or negative direction by any amount.

On five axis systems it is only necessary to enter X and Y co-ordinates then press **enter** if you wish to move only X and Y. Remember to switch the other axis on if you wish to move axes other than X and Y.

When using this command for continuously stepping in the same direction it is better to switch the auto backlash move off. Press **cal 1, 6** then enter **0.000** for X/Y backlash move distance, now when the motors move to a new position backlash will not be automatically applied.

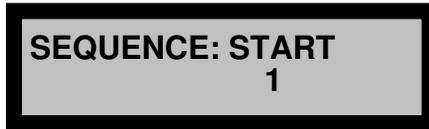
Remember to switch backlash move back to 0.5mm when you have finished using this function otherwise backlash will not be applied when pressing the backlash key.

11.0 SEQUENCE (seq)

The controller can be programmed to perform various sequential moves between positions on the sample under observation.

Sequence allows the operator to sequentially step between positions stored in the controller memory from the **store** command.

The required positions must be stored in successive memory locations. The procedure allows for a wait of up to 99 seconds at each position and can be repeated upto 99 times if required.



The operation is initiated by pressing **seq**.

The display first requests Start location then Stop location, delay in seconds and the number of cycles. Start/stop positions etc. are incremented or decremented using the speed up/down keys.

A value for the starting location (**1..99**) should be entered. Next; enter a value for the last location (**1..99**). The last location need not be positive with respect to the start location, i.e. the sequence can run in reverse. Now enter a waiting time (**1..99**) and the number of cycles (**1..99**).

If you enter **0** for a wait time then the controller will wait until **enter** is pressed before moving to the next sequential point. This function is useful if you wish to take photographs of the stored locations.

The stage will now move to the start location wait the programmed number of seconds, then move to the second location, and so on. The cycle of movements will repeat the set number of times.

To stop the sequence press the **stop** key.

12.0 SCAN PATTERNS (Snake/Raster/Random)

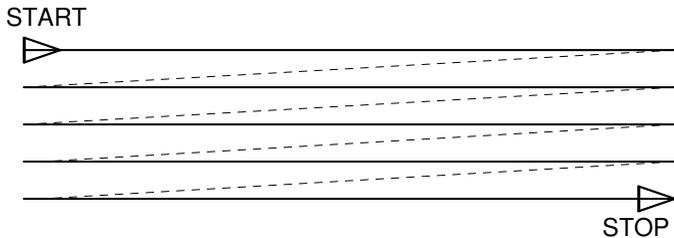
SCAN allows the operator to automatically scan an area of interest on the sample. To initiate press **scan**.

Three different scan patterns are available, Snake, Raster or Random.

SNAKE - will move backwards and forwards across the sample like a snake:



RASTER - scans horizontally across the sample in the positive direction only, then returns to start the next line at high speed:



RANDOM - will move to a set number of random positions within the chosen field area.

Press **1** for **SNAKE**, **2** for **RASTER** or **3** for **RANDOM**.

12.1 SCAN – SNAKE & RASTER

Press **scan, 1** to initiate snake move or **scan, 2** to initiate raster move.

Two different movements are available, **Smooth** - to continuously move across the sample or **Step** - which will stop at each frame and wait for a set number of seconds.

To select **Smooth** press **1**, to select **Step** press **2**. It is possible to change the X/Y frame overlap in step mode, see **Scan Mode Setup** on page 19.

If you entered step you will now be requested to enter a wait time in seconds (0-99), if you enter 0 the controller will wait at each point until enter is pressed before moving to the next position.

Magnification should now be entered, the controller will then scale the scan speed so that whatever the magnification is, the image on the visual monitor will travel at the same speed - this means that it is not necessary to adjust the speed value every time you change magnification. Enter magnification and press enter. It is possible to adjust the relative scan speed, see **Scan Mode Setup** on page 20.

You will now be requested to enter **1** for a new scan field or **2** for an old scan field (ie. the previously used field which is stored in memory).

To set up a new scan field press 1 and you are given two options, **Corner (1)** or **Centre (2)**,

Pressing **1 (corner)** allows you to select the top left and bottom right corners of the area to be scanned.

Pressing **2 (centre)** allows you to select the centre of the area to be scanned and then select the number of frames in X and Y.

The motors will now traverse the selected field in the required manner from top left to bottom right.

While the scan is in progress **stop** can be pressed at any time to pause the scan, if **stop** is pressed twice the scan will be aborted. While the scan is paused **store** can be used to save the current co-ordinates in a memory location, pressing **enter** twice will continue the scan. If you store a number of areas of interest they can then be reviewed using **SEQUENCE**.

12.2 SCAN - RANDOM

Press **scan, 3** to initiate random move.

You will now be requested to enter **1** for a new scan field or **2** for an old scan field (ie. the previously used field which is stored in memory).

To set up a new scan field press **1** and you are given two options, **Corner (1)** or **Centre (2)**,

Pressing **1 (corner)** allows you to select the top left and bottom right corners of the area to be scanned.

Pressing **2 (centre)** allows you to select the centre of the area to be scanned and then select the number of frames in X and Y.

You will then be requested to enter the number of random points using the speed up/down keys.

Next you are requested to enter a wait time in seconds (**0-99**), if you enter 0 the controller will wait at each point until **enter** is pressed before moving to the next position

When the stage is at position, **store** can be pressed to save the current co-ordinates in a memory location. Pressing **enter** will continue the scan. If you store a number of areas of interest they can then be reviewed using **SEQUENCE**.

13.0 SCAN MODE SETUP

Scan Mode Setup allows you to change speed settings for scan mode (smooth) and overlap amounts for scan mode (step).

To activate Scan Mode Setup press **cal**, **scan**.

X and Y scan move will change the amount of picture overlap achieved when using scan in step mode. The main reason for this function is so that when taking a montage of pictures you can adjust the picture overlap to match the scanning system of your microscope. Default is 100 with a range from 20 to 200, with 20 being minimum and 200 being maximum overlap. To adjust, change the value in units of 10 to start with and then when close set it exactly with units of 1.

You will then be prompted to enter a new scan speed. The default speed is 100 with a range from 20 to 200. Higher numbers give faster speeds, and lower numbers lower speeds. Choice of speed will depend on your application but we advise changing the speed in units of 10 initially, so if the scan goes too fast then change the speed to 90 and see if this is acceptable, if not then change again to 80 until the correct speed is found.

These values will be saved at power down and should not need to be adjusted again once set up correctly.

14.0 CALIBRATE FUNCTIONS

The calibrate (Cal) function is used to modify setup parameters for the Sprite system. To access calibrate functions press Cal followed by a number, functions are listed below:-

Cal 0 - (POWER) toggles motor holding current on and off

Motors are supplied with a holding current when stationary, this keeps the motors held accurately at the current position. When moving the motor handwheels by hand the holding current limits the minimum step size to approximately 5 microns and makes movement very notchy.

By switching holding current off, the motors can be moved smoothly by hand with a minimum movement of approximately 0.5 μ . When recalling stored co-ordinates the power should be switched on, to ensure accurate repositioning.

When you press **cal 0** to switch power back on, power will not be re-applied to the motors until a motor is moved from the controller.

Cal 1 (SETUP) - changes the setup parameters on your stagecontroller

To select a SETUP function press **cal, 1** then a number from **1 to 8** to select the required setup parameter

Cal 1, 1 (SEM) - sets the SEM and stage you are using.

If you select this function then any user programmed parameters will be lost and default parameters will be loaded. Use the Z up/down keys to select the SEM and stage you are using then press enter to accept, if your SEM is not shown select OTHER and enter the setup values manually, see later in the manual for setup values available.

Cal 1, 2 (AXES) - sets the number of axes on your system

press:	1 for XY	2 for XYZ
	3 for XYR	4 for XYT
	5 for XYZR	6 for XYZT
	7 for XYRT	8 for XYZTR

Cal 1, 3 (SCALE) sets scale factor for display

The scale factor is used to correctly scale the displayed co-ordinates so that the coordinates relate to the correct position in millimeters. Each axis will have a different scale factor because the gearing and leadscrews are different for each drive.

The scale factors will be set to the correct values when the stage is initialized and should never be adjusted by the user.

Cal 1, 4 - (SPEED) changes motor speed settings

Maximum speed is 255 which relates to approximately 2.5mm/second, 150 is sufficient for most stages.

Minimum speed is 1, but normally this is set to 5 or 10, if set too high the motors will reach position quicker but may overshoot resulting in inaccurate positioning.

Ramp up sets the time it takes for the motor to reach maximum speed.

Ramp down is the opposite of ramp up and sets the time it takes to reach minimum speed.

These settings are pre-set and should not be adjusted by the user, except for maximum speed which may be decreased if the stage is too stiff for the motors to drive without stalling.

Cal 1, 5 - (DIR) changes direction of coordinate display and motor movement

Joystick direction changes the direction a motor moves when the joystick or relevant keys are pressed. The direction may need to be changed if your detector is not in the standard position or if you are using scan rotation.

Scale changes the direction the co-ordinates change without altering the motor direction. ie. if the co-ordinates increment as the stage moves from left to right and you would like them to decrement.

The format used is 1 or -1, if you wish to reverse the X joystick direction and it is currently set to 1 then enter -1 and it will reverse.

Cal 1, 6 - (BACKLASH) changes backlash move distance.

Backlash for X, Y and Z is set to 0.5mm and 5 degrees for Tilt and Rotate. This can be changed to another value if required.

When Z, Tilt or Rotate are switched on from **Cal 2** a backlash move will be applied to these motors as well as X and Y, when you press the backlash button or recall co-ordinates.

When using the **LOAD** command to move the stage by a specific amount it is useful to enter a backlash value of 0.000 for X and Y so that a backlash move is not made after every step, especially if the step is quite small. Always remember to switch the backlash back to 0.5mm if you ever change it.

Cal 1, 7 - (EXCHANGE) changes the programmed exchange position

Enter new values here, if the pre-programmed exchange position is not correct.

Cal 1, 8 - (RS-232) changes RS-232 protocol

There are three different RS-232 protocols available to select. The standard protocol is used by every EDX and analysis company except Oxford Instruments / LINK. These include PGT, NORAN, EDAX, KEVEX and RAITH. Oxford Instruments have their own protocols, one for ISIS and one for all other systems such as the older AN10000 and eXL.

If you are trying to control the stage from a system not listed above, select the standard protocol not one of the Oxford versions. The format for the standard protocol is listed at the end of this manual.

Cal 2 - (REPOSITION AXES) selects axis to be positioned

When power is switched on only X and Y motors will be positioned from **goto** or **recall** commands.

To switch Z, Tilt or Rotate repositioning on, press **1**. When axes are switched on a backlash move will be also be applied. Ensure that axis are only switched on if a backlash move is required as applying backlash when not required will affect accuracy of re-positioning.

Cal 3 - SCAN MODE SETUP

Scan Mode Setup allows you to change speed settings for scan mode (smooth) and overlap amounts for scan mode (step).

To activate Scan Mode Setup press **cal, 3**.

X and Y scan move will change the amount of picture overlap achieved when using scan in step mode. The main reason for this function is so that when taking a montage of pictures you can adjust the picture overlap to match the scanning system of your microscope. Default is 100 with a range from 20 to 200, with 20 being minimum and 200 being maximum overlap. To adjust, change the value in units of 10 to start with and then when close set it exactly with units of 1.

You will then be prompted to enter a new scan speed. The default speed is 100 with a range from 20 to 200. Higher numbers give faster speeds, and lower numbers lower speeds. Choice of speed will depend on your application but we advise changing the speed in units of 10 initially, so if the scan goes too fast then change the speed to 90 and see if this is acceptable, if not then change again to 80 until the correct speed is found.

These values will be saved at power down and should not need to be adjusted again once set up correctly.

Cal 4 - (LIMITS) selects software limits

Travel of the stage can be limited to cater for different sized samples in order to protect samples from being crashed into the final lens, the side of the chamber or detectors.

Although maximum travel of each axis is protected by mechanical limit switches, the software limits offer extra protection when looking at samples larger than 25mm sample stubs, such as semiconductor wafers.

Depending on the working distance, maximum Tilt angle should be set so that it is not possible to tilt the sample into the final lens and certainly not more than 45°. X and Y software limits should be set so that it is not possible to crash a large sample into the inside wall of the chamber, this is necessary when observing a 6" (or larger) wafer.

Supplied within some SEM manuals there are tables of maximum and minimum travel for the stage depending which size wafer is being observed. These figures can be entered as software limits to protect the wafer from being crashed into the inside of the chamber.

We recommend that you install an infra-red chamber scope to observe specimen position to protect against crashing the sample into detectors and the final lens.

Cal 5 - (CENTRE) performs stage auto centre

X and Y axis will move to positive and negative limits (software or hardware, which ever comes first) and then move to the position halfway between each limit ie. the centre of travel for each axis.

Cal, 6 - Will display the software version in use**Cal DEL - (CLEAR) resets the co-ordinate store to zero**

To activate press **Cal, del** then **enter**.

All co-ordinate store locations will now be set to 000.000

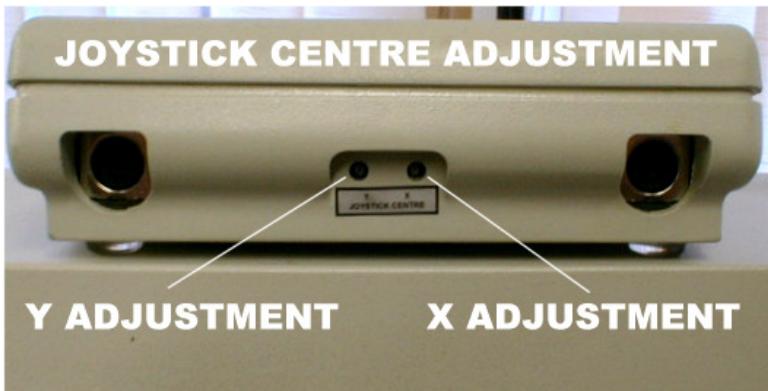
15.0 PROBLEM SOLVING

Listed here are the answers to commonly asked questions. Before calling your local service representative, check that the problem can not be resolved by reading the next few pages.

Q – Motors creep, or move by themselves, moving the joystick slightly will stop the motor moving and apart from this the system works normally.

A - The joystick operates by using an infra-red source and a set of four infra-red detectors. Over a period of time the sensitivity of detectors will decline, which will cause the centre position of the joystick to move. If the centre position moves far enough then one or both of the motors may start slowly moving by themselves.

To correct this problem two trim-pots are positioned on the rear of the Joystick case for re-centering of the joystick. The trim-pots should be adjusted until the motor stops and then centered so that an equal movement of the joystick in each direction will start moving the motor. You should only need to turn the pots by one or two turns to center them.



Q - When I move the motor handwheels by hand they seem very notchy and are difficult to position accurately.

A - The motors are supplied with a holding current when stationary, which holds them in position. This can be switched off by using **Cal, 0** - remember to switch it on again when you use the GOTO or recall function.

Q - When I select GOTO or recall only X and Y motors move Rotate, Z and Tilt will not reposition.

A - You have to switch on the axis that you wish to reposition, only X and Y will reposition after power is switched on. To switch on other axes press **Cal, 2** and select the required axis.

Q - When the motors are moving they seem to stall or stutter sometimes.

A - The maximum speed setting for that axis should be reduced by pressing **Cal, 1, 4**. The speed code is 8 bit from 1 to 255 (1 for minimum, 255 for maximum).

Q - The motors will not traverse the whole travel of the stage before stopping.

A - Check that the software limits are not restricting travel press **Cal, 4** and enter -99 (min), 99 (max) for X,Y,Z,T, there are no limits on Rotate as it is continuous

Q - When I press **exch** for the motors to move to exchange position they go to the wrong position.

A - Check that the stage origin is correctly set, see page 3.

Q - When I press **exch** for the motors to move to exchange position they go to the wrong coordinates.

A - Press **Cal, 1, 7** and enter the correct exchange position coordinates.

Q - When I try to communicate with the stage controller from my EDX system I get the message "RS-232 timeout" or "stage not responding".

A - Ensure that the stagecontroller is set up with the correct protocol by pressing **Cal, 1, 8**. There are three different protocols, the default protocol is for every system except Oxford/LINK, the second and third protocols are for Oxford/LINK systems only. The BAUD rate should normally be set to 9600.

Q - When I move the joystick the image seems to move the wrong way on the visual monitor.

A - Change the Joystick direction by pressing **Cal,1,5** the direction will be 1 for positive or -1 for negative, to change direction enter either 1 or -1

Q - When I move the motors the coordinates move the wrong way, ie. Positive instead of negative.

A - Change the display scale by pressing **Cal,1,5** the direction will be 1 for positive or -1 for negative to change direction enter either 1 or -1.

Q - When I recall stored coordinates, the motors only reposition to about 10-15 microns.

A - Are you pressing the backlash key before storing the coordinates?, are axes other than X and Y switched on from **Cal,2**? Is the holding current switched on from **Cal, 0**?

16.0 RESET

In the unlikely event of the system software becoming corrupted because of the wrong figures being entered within the calibrate routines it may be necessary to reset the system.

To reset the system completely, press the **STOP** button while switching the power on - you will have to select the stage you are using with the up/down keys. Default settings will then be loaded into memory.

Remember - Default settings will be loaded, which may not be correct for your system - be prepared to load the correct values if this is the case.

If you are still having operation problems then call your local service helpline on the number below - where a member of staff will be glad to assist you.

Tel: +44(0) 1359244870

Fax: +44(0) 1359244879

17.0 RS-232 - REMOTE OPERATION

The SPRITE stage controller can be controlled from another computer using the RS-232 interface.

Commands sent down the RS-232 link are treated in exactly the same way as if entered from the keyboard.

The keyboard and RS-232 are active at the same time, and the display will indicate the progress of any RS-232 command.

The standard transmission protocol (used by PGT. NORAN EDAX PEAK KEVEX) consists of 8 data bits, 1 stop bit and no parity. The default baud rate is 9600. Alternative baud rates can be set by the Cal, 1, 8 function. Enter one of the following values - 300, 600, 1200, 2400, 4800, 9600.

No hardware or software handshaking is needed or supplied when communicating with the SPRITE. The controller has a built-in 2K buffer, sufficient to store a full set of co-ordinates should this be transferred from the host computer. Simply connect the transmit data (TXD) line on the SPRITE controller to the receive data (RXD) line on the computer, and vice-versa. Connect any other lines on the computer RS-232 so that they are permanently enabled, e.g. RTS to CTS and DTR to DSR and DCD.

The commands are listed overleaf. The first set of commands correspond directly to keys on the keypad, and are concerned with transferring information from the computer to the SPRITE controller. The second set deal with transferring information (position status etc.) from the controller to the computer and do not have keypad equivalents. Numeric input for the commands should be sent in ASCII terminated by a carriage return (ASCII OD).

This is our standard/default RS-232 protocol (PGT/ NORAN/EDAX). However it should be noted that special protocols are available for specific EDX systems and SEMs.

17.1 RS-232 CONTROL PARAMETERS

	ASCII	Hex	Function
Write	[5B	Decrease speed range
functions	[5D	Increase speed range
	S	53	Store
	B	42	Recall
	N	4E	Next
	M	4D	List
	O	4F	Zero
	OO	4F 4F	Origin
	A	41	Stop
	G	47	Goto
	R	52	Load (GO relative)
	Q	51	Sequence
	F	46	Cal (Calibrate)
0-9	30-39		Numerals
.	2E		Period
-	2D		Minus
~	7E		Delete
(CR)	0D		Enter
Read	H	48	Any axis moving?
Functions	?	3F	Request coordinates

17.2 COMPUTER TO CONTROLLER

Commands from the computer to the controller are handled identically to those entered from the keypad with the controller display indicating the commands being executed.

For example, sending the character string:

B 2 3 (CR)

Where (CR) is the carriage return (HEX OD) will RECALL the coordinates stored in location 23 and move the stage to that position. Transmitting the single character N will then activate the NEXT command, moving the stage to location 24, and so on. The stage can be driven to any position by remotely executing the GOTO command. For example, to position the stage at X=1.234, Y=5.678, Z=34.5, R=360.0, T=45.0 send the following string:

G 1.234(CR)5.678(CR)34.5(CR)360.0(CR)45.0(CR)

In general the format is XX.XXX(CR) YY.YYY(CR) ZZ.Z(CR) RRR.R(CR) TT.T(CR)

Leading blanks or trailing zeroes are not required for coordinate input to the controller. However they are included in the transmission of coordinate information from the controller to the computer.

There should be no symbols except the carriage return between coordinate values.

17.3 CONTROLLER TO COMPUTER

Following the receipt of one of the commands in the second group the controller will transmit information back to the computer.

The H command will return a single character which defines the move status of the stage as per the table below. The characters transmitted from the SPRITE to the computer are:

ASCII	HEX	Description
Y	59	All axis stationary
N	4E	Any axis moving
L	4C	Any axis at limit

The computer must read a single character following the transmission of the H command or subsequent transmitted data may be corrupted.

The ? command is a request for the current position The position is transmitted in the format X,Y,Z,R,T as detailed above. Note that leading blank characters and trailing zeroes are incorporated. As above, all characters must be read following the transmission of the position request command (?).

To temporarily halt transmission by the controller, the computer should transmit the XOFF character (HEX 11) to the controller data transmission from the controller will be resumed following tile transmission of the XON character (HEX 13) from the computer. The transmission of any other character from the computer will abort the data transfer.

17.4 RS-232 DEMONSTRATION/TEST PROGRAM

For those users who wish to write their own control programs, Deben Research can supply a test program which demonstrates many of the functions. A source code listing of the test program is also available - written in Microsoft C.

This program is also useful for diagnostic testing of the RS-232 connection, as it will work from COM1 on any PC.



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EC DECLARATION OF CONFORMITY

THIS IS TO CERTIFY:

Sprite Stagecontroller

MANUFACTURED BY:

Deben UK Limited

CONFORMS WITH THE PROTECTION REQUIREMENTS OF
COUNCIL DIRECTIVE 89/336/EEC, RELATING TO
ELECTROMAGNETIC COMPATIBILITY

BY APPLICATION OF THE FOLLOWING STANDARDS:

EN55011	EMISSIONS - ISM EQUIPMENT
EN50082-1	IMMUNITY - HEAVY INDUSTRIAL
EN61000-4-4	IMMUNITY - FAST TRANSIENT BURSTS
EN61000-4-11	IMMUNITY - VOLTAGE DIPS, SHORT NTERRUPTIONS & VOLTAGE VARIATIONS
ENV50140	
ENV50141	
EN61000-4-5	IMMUNITY - SURGES
EN60555	

Signed: .....
MANAGING DIRECTOR

Date: 5/1/97.....

On Behalf of Deben UK Limited.



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EC DECLARATION OF CONFORMITY

THIS IS TO CERTIFY:

Sprite Stagecontroller

MANUFACTURED BY:

Deben UK Limited

CONFORMS WITH THE SAFETY REQUIREMENTS FOR ELECTRICAL
EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY
USE.

BY APPLICATION OF THE FOLLOWING STANDARD:

EN 61010-1 : 1993

Environmental conditions:

- indoor use in laboratory environment
- altitude up to 2,000m
- temperature 5°C to 40°C
- maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C
- mains supply voltage fluctuations not to exceed +/-10% of the indicated voltage
- transient over/under voltages not to exceed 2Kv/20mS
- pollution degree 1 or 2 in accordance with IEC 644

Signed:
MANAGING DIRECTOR

Date: 5/11/97

On Behalf of Deben UK Limited.

APPENDIX 1 – CHINESE ROHS DECLARATION

零件项目(名称) (Component Name)	有毒有害物质或元素(Hazardous Substances or Elements)					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Chromium VI Compounds (Cr6+)	多溴联苯 Poly- brominated Biphenyls (PBB)	多溴二 苯醚 Poly- bromina ted Dipheny l Ethers (PBDE)
Module (Stage)	O	O	O	O	O	O
Controller	O	O	O	O	O	O
Cables	O	O	O	O	O	O
Accessories	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006标准规定的限量要求以下。

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006标准规定的限量要求。

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

除非另外特别的标注,此标志为针对所涉及产品的环保使用期标志。
此环保使用期限只适用于产品是在产品手册中所规定的条件下工作。

The Environmental Protection Use Period (EPUP) for all enclosed products and their parts are per the symbol shown here, unless otherwise marked. The Environmental Protection Use Period is valid only when the product is operated under the conditions defined in the product manual.



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