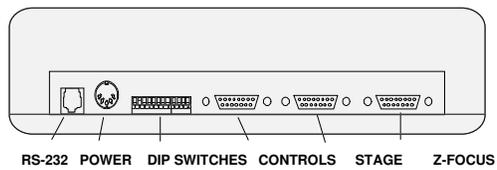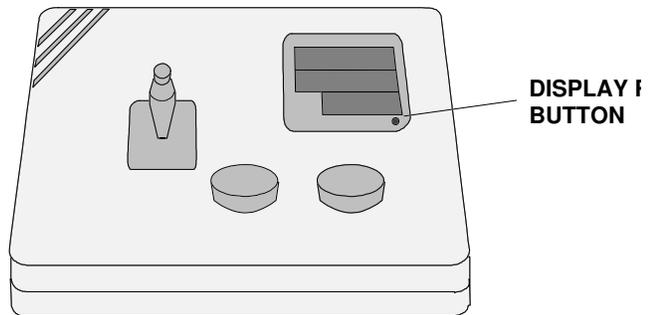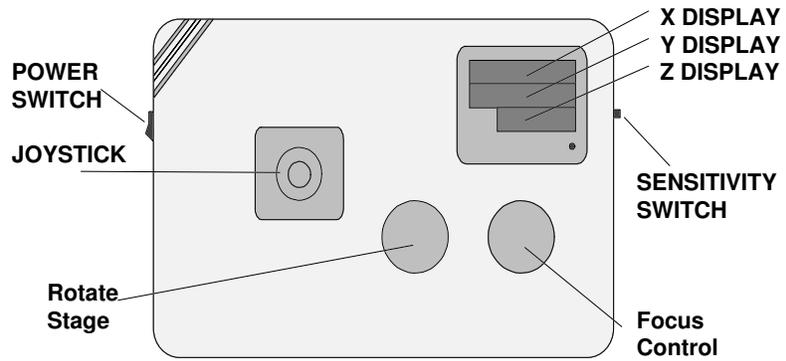**Motorized Rotary Stage 4360**

Contents

Introduction

The Conix Motorized Rotary Stage 4360 is designed to allow the electronic control of the stage and a Z-focus system.

FEATURES OF THE MOTORIZED STAGE 4360:

- **-** Natural feeling joystick control of speed, with speed proportional to joystick deflection. This permits easy selection of speeds from as slow as single-step "jogging" to full turbo traverse speed

- **-**Three user-selectable joystick speed sensitivities

- **-** Cast aluminum controller case shields against RFI radiation from internal microprocessor

- Table-top control unit size is 7"D x 10.5"W x 3"H

- LED display of X, Y, and Z Coordinates

- RS232-C serial communications

- Maximum speed is in excess of 25 mm/sec

- 3 Axis coordinated motion.

- 15 micron acuracy with submicron resolution.

- Remote focus of the Z-Ax is via rotary knob on controller

- Adjustable limit stops.

<u>Control Unit</u>

X DISPLAY
Y DISPLAY
Z DISPLAY

POWER
SWITCH

JOYSTICK

SENSITIVITY
SWITCH

Rotate
Stage

Focus
Control

DISPLAY F
BUTTON

RS-232   POWER   DIP SWITCHES   CONTROLS   STAGE   Z-FOCUS

Installation

Installation of Motorized Stage 4360:

Install the stage onto your microscope stand. Hook up the stage cable by plugging it into back of the controller. Plug one end of the Z-Focus cable into the back of the controller and the other end into the Motor Mount Unit.

Check to see if stage hits the neck of the stand when pushed to the extreme rear limit. If it hits, adjust the rear limit stop so the stage engages the stop before hitting the neck. To adjust the limit stop, use the 0.05" allen wrench to loosen the set serew on the stop. Slide the stop to the desired position and retighten the set screw.

CAUTION: If a limit stop is moved too close to the outside edge of the stage, the physical limit may be reached before the limit stop is encountered. If that happens, a racheting noise will be heard and an error will occur. Readjust the limit stop in, toward the center of the stage, until limit stop is encountered.

Connect power cables.

Plug power supply cable into the round power connector on back panel of stage controller. Be sure to connect the power supply to the controller prior to plugging it into the wall and prior to turning on the unit. Plug the power supply into a 120VAC 60Hz receptacle.

Installation of the Motor Mount Unit

(1) Remove the fine focus knob that has the looking ring (may be on either side depending on microscope) from the microscope using the shorter of the two allen wrenches included in the parts package. Retain the spring washer on the fine focus shaft.

(2) Attach the pulley to the fine focus shaft with the pulley groove toward the microscope stand. Align pulley set screw to bear on the flat portion of the fine focus shaft. Use the longer of the two allen wrenches supplied in the parts package. Be sure to press the right fine focus knob and pulley towards each other while securing the pulley to compress the spring washer and ensure proper pulley position.

NOTE: Pulley must be installed with pulley groove towards the microscope stand for correct operation of the accessory.

(3) Attach the Motor Unit to the Coarse Tension Adjusting Ring of the coarse focus knob with the two thumb screws.

NOTE: Some models microscope stands have a small access plate near the Coarse Focus Knob, toward the rear of the stand. This access plate and screws must be removed as it will prevent the Motor Unit from mounting flat against the microscope stand.

NOTE: Make sure you plug the power connector into the control unit prior to plugging the supply into a wall receptacle.

Operation

Motorized Operation of the Stage 4360.

1) Turn on Motorized Stage Controller by flipping power-on switch on left side of controller.
2) The 3-position Speed Select Switch (located on right side of controller) allows you to change the speed of the stage relative to the deflection of the joystick, slow, medium, fast.
3) Moving the joystick to the right moves the stage rightward, and moving the joystick to the left moves the stage leftward, etc. If the direction of the stage is opposite of what you desire, you can change the dip switch setting (refer to Dip Settings section of this manual) to invert the orientation of either the X-joystick or Y-joystick motion.
4) Pushing the joystick to an extreme position in one direction causes the stage to move quickly, while pushing gently on the joystick causes the stage to move relatively slowly. The speed of the stage is proportional to the deflection of the joystick.
5) Pressing the button on the joystick causes the stage to move many times faster. You can still control the speed by the amount of deflection from the center of the joystick.

NOTE: On power up the computer senses the position of the joystick, this location becomes the 'dead zone'. Do not deflect the joystick during power up.

Computer Control

Communication Specifications

The Stage 4360 Communications interface is a interface between a host computer and the controller. The communications is established through an RS-232C serial connection. The programming protocol is with text (standard ASCII alpha-numeric characters), along with some special control characters such as carriage returns, spaces and tabs. The controller responds to a set of built-in commands with unique names. The commands can be executed by simply sending the command name with some parameters (if required). the controller will respond in ASCII and may include the result requested.

General Format Of Commands

Each line sent to the Controller should have a command and be terminated with a carriage return character. The first item on the line should be the command. Each line can contain only one command and the Controller's commands are not case sensitive. The allowed commands are listed below. After the command are the parameters, some commands have no parameters. And finally, each command must be terminated with a carriage return character. The carriage return indicates to the Controller the end of a command. The specific items can be separated with white space characters (such as spaces, tabs). The entire command string cannot exceed 40 characters.

(command) [*data*] <cr>

where:

(command)	any valid ASCII command.
[data]	ASCII numeric data (if applicable).

For Example:

Command:	**Where Z<cr>**
	or W Z<cr>
Response:	**:A 1002<cr>**

For Example:

Command:	**Where X<cr>**
	or W X<cr>
Response:	**:A 6000<cr>**

Response

:A *<DATA>*<cr>	Everything is ok *<returned data>*
:N <ERROR CODE><cr>	Error.

Every command returns a response: The response is in the form of a colon followed by a status character (either an A or N). The colon is sent by the Controller as soon as the command is received. The status character is not sent until the function has completed (i.e. after the motor has moved/stopped). Do not send another command until the last function has been completed and returned a response. If for some unknown reason the Controller does not respond with a colon, then the command was not received properly (due to communications problems) and the command must be resent. In this case, the Controllers internal buffer must be emptied by sending an ESC character (ASCII 27). This is necessary since your last command may have been partially received and may still reside in the controller's internal buffer. It is not a bad idea to send an ESC character before every command, but it is not necessary.

Examples:

command:	**M Z=1001<cr>**	(move to location 1001)
response:	**:A <cr>**	(everything is okay)
command:	**W Z <cr>**	(where is z-axis?)
response:	**:A 1001 <cr>**	(z-axis position is 1001)

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command:	**AQRST\<cr>**	(an illegal command)
response:	**:N -1 \<cr>**	(error code -1)

PRESENTLY ASSIGNED ERROR CODES
-1   unknown command

ASCII Commands

Halt Motor: (Special Interface requirements)

format (ASCII Only):
>
> **HALT**
>
> The ASCII version of this command behaves differently then the hex code version. The ASCII version like all other ASCII commands is only interpreted after the previous command is completed. This makes the ASCII form of the command less useful then the hex code version. It still may be used.

Response (ASCII Only):
>
> A positive response is sent back immediately after the command is completed.
>
> **:A**

Hex code: 0x7D (HEX Only)

> The hex code version of this command is interpreted differently then standard commands. The moment the processor receives the hex code it stops the motors. DO NOT SEND a line terminator, it is then interpreted as an empty string, which results in an ':N -1 Unknown Command' ERROR. This command also flushes the internal receive buffer.
>
> There is no response from this command itself, and if a previously entered command has been halted the normal response from that command will be returned.

ASCII Commands

Set Current Location:

format: **HERE R=? T=? Z=?<cr>**
    or   **H R=? T=? Z=?<cr>**
         HERE R T Z

This command will change the internal (to the controller) location of the R-axis, T-axis, and Z-axis, respectively. This will effectively adjust the location of the origin.

Response:

 A positive response is sent back immediately after the command is received.
:A<CR>

Example:

HERE R=1000 T=1500 Z=2000 <cr>

The current locations of the R-axis, T-axis, and Z-axis become the 1000 position, the 1500 position, and the 2000 position, respectively. the actual location depends on the setting of units (which Units the system is currently using).

This command can also take the form of simply adjusting any one or two of the axes.

Example:

HERE R=1000 T=1500<cr>

The current locations of the R-axis and T-axis become the 1000 position, and the 1500 position, respectively.

ASCII Commands

Move to limit switches:

format: **HOME <cr>**

This command will move the stage to the upper limit switches. (This command only works with stages that have limit switches). Then the system position is set to Zero. This command moves quickly to the limits, hits them, backs off slightly and reapproaches them at a slower velocity. the slower velocity helps ensure the position is as acurate as possible.

Response:

A positive response is sent back immediately after the command is complete.
:A<CR>

Example:

HOME <cr>   The stage moves to the limit switches.

ASCII Commands

Enable/Disable the joystick:

format: **JOYSTICK ENABLE/DISABLE<cr>**

This command will enable or disable the joystick from operation. if the joystick is disabled, any movement of the joystick will be ignored by the system (The Rotation is also Disabled / Enabled by this command).

Response:

A positive response is sent back immediately after the command is received.

:A ENABLE<CR>   The current status of the joystick is ENABLE.

ASCII Commands

Change the Joystick sensitivity:

format: **JSScale XX**   **XX in the range of {1..255}**

This command will change the speed/sensitivity of the joystick . The default is 1. The smaller the number the faster the stage moves. This allows more control of the sensitivity than just the side slide switch. The side slide switch still will function properly, but the fastest motion will be smaller as this setting increases. Each position of the side slide switch is always a factor of two different. This command also changes the sensitivity of the rotatary knob.

Response:

A positive response is sent back immediately after the command is received.

:A 1<CR>   The current setting of the joystick sensitivity.

ASCII Commands

Set Min Speed:

format: **MINSPEED<cr>**

This command sets the start up speed for movement of the
stage. The operator can choose a value from 50 to 60,000,
where a larger number signifies a slower MINSPEED.

Response:

A positive response is sent back when the command is
complete with the current setting.
:A XXX<CR>

Example:

MINSPEED 1000<cr>   This will set the MINSPEED to
:A 1000

This command can also be used to simply view the current
MINSPEED setting.

Example:

MINSPEED<cr>

Response:

:A 1000<cr>

ASCII Commands

Move Absolute:

format:

    or   **MOVE R=? T=? Z=?<cr>**
M R=? T=? Z=?<cr>
MOVE R T Z

This command will move the R-axis, Theta-axis, and Z-axis to the respective locations in the current units. The current units may be steps, millimeters, or inches.

Response:

A positive response is sent back when the command is complete.
:A<CR>

Example:

MOVE R=1000 T=1500 Z=2000<cr>

This will move the R-axis, T-axis, and Z-axis to +1000, +1500, and +2000 steps from the origin, respectively.

The order of the R=? T=? Z=? is irrelevant. For example an alternate command would be MOVE R=1500 T=2000 X=1000.

This command can also take the form of simply moving any one or two of the axes.

Example:

MOVE Z=1000 <cr>

This will move the Z-axis to +1000 steps from the origin.

ASCII Commands

Rampslope:

format: **RAMPSLOPE<cr>**   Range (1-255)

This command will set the rate at which the velocity changes.
the larger the number, the slower the change in velocity.

Response:

A positive response is sent back when the command is
complete.
:A<CR>

Example:

RAMPSLOPE 100 <cr>

This command will set the current RAMPSLOPE to 100.

Response:

:A 100<cr>   The current RAMPSLOPE is 100

ASCII Commands

Move Relative:

format: **RELMOVE R=? T=? Z=?<cr>**
   or   **RM R=? T=? Z=?<cr>**
               RELMOVE R T Z

This command will move the R-axis, T-axis, and Z-axis a relative
amount of ?,?,? from the current location in number of units.

Response:

A positive response is sent back when the command is
complete.
:A<CR>

This command can also be used to relatively move any one or
two of the axes.

Example:

RELMOVE Z=1000 <cr>

This command will move the focus (Z-axis) 1000 units from the
current location.

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ASCII Commands

Reset the system:

format: **RESET\<cr>**
hex code: 0x7f

This command will reset the system, as if the power had been turned off. When the hex code is used this command does an automatic power on reset regardless if a command is being executed. No response is given if hex code is used.

Response:

A positive response is sent back prior to the command being completed; The command responds prior to reset.
:A\<CR>

Example:

RESET\<cr>

ASCII Commands

Speed XY axis only:

format: **SPEED\<cr>**

This command will tell the operator the current value of the maximum speed of movement for the HOME and MOVE commands. The range of speed is 1 to 65535, with a larger number representing a slower speed.

Response:

A positive response is sent back immediately after the command is received.
:A\<CR>

Example:

SPEED\<cr>

Response:

:A 100\<cr>   The maximum speed is set at 100.

ASCII Commands

Change Units:

format: **UNITS ??<cr>**

This command will change the current units that are dis-
played on the controller. The units can be changed to
millimeters, inches, or steps. The Inch/mm selection only
effects the R-axis. The Theta axis is always in one one
thousands of a degree.

Response:

A positive response is sent back immediately after the
command is received.
:A<CR>

Example:

UNITS MM<cr>	The units are changed to millimeters.

Example:

UNITS STEPS<cr>	The units are changed to steps.

Example:

UNITS INCH<cr>	The units are changed to inches.

NOTE: All of the commands return and accept responses in current units.
The dip switch settings determine the initial power up units, but may be
overridden by this command.

ASCII Commands

Get Version:

format: **VERSION<cr>**
Hex Code: 0x7c

          This command returns the current version code of the firmware.

Response:

          A positive response is sent back when the command is complete.
:A version j.x.x<CR>

ASCII Commands

Get Current Location(s):

format: **WHERE RTZ<cr>**
       or   **W R T Z <cr>**

          This command will query the controller for the current location
of the axes.

Response:

          A positive response is sent back immediately after the
command is received.

          :A ????<CR>   The current location in
                               number of units.

Example:

          WHERE RTZ<cr>   The current location is sent
                               back from the controller.

Response:

          :A 500 4000 300<CR>   The current location in
                               number of units.

          This command can also be used to query the controller for the
location of any one or two of the axes.

Example:

          WHERE T<cr>   The current location is sent
                               back from the controller.

Response:

          :A 4000<CR>   The current location of the
                               T-axis in number of units.

ASCII Commands

Get Current Accessory:

format: **WHO<cr>**

This command will query the controller for the current
accessory being used. In this case it will be the Stage 4360
system

Response:

A positive response is sent back immediately after the
command is received.
:A<CR>

Example:

WHO<cr>

Response:

:A Stage 4360P Controller<cr>

ASCII Commands

Set Zero Of Origin:

format: **ZERO <cr>**

This command will set the origin to the current location. This results in the current location being the new ZERO (origin).

Response:

A positive response is sent back immediately after the command is received.
:A<CR>

Example:

ZERO <cr>   The current location becomes the ZERO position.

S1	S2	Baud Rate
Up	Up	9600
Down	Up	2400
Up	Down	1200
Down	Down	300

S3	ORIENTATION
Down	Right
Up	Left

For warranty repair return the product to the warranty department of Conix Research Inc. at the following location:

Conix Research Inc.
857 28TH
Springfield, OR 97477
(541) 747-8512

You should provide a written description of the problem with the unit. Consumer must prepay all postage, shipping, insurance, and delivery costs associated with the return of the product.

For more information refer to the Conix Research Inc. Limited Warranty Card provided with this product.

CONIX RESEARCH Inc

857 28TH SPRINGFIELD, OR 97477
PHONE (541) 747-8512 FAX (541) 747-8528

VERSION J.2.8