MS-4-360R
Scanning Stage System

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Care and Maintenance

Cleaning the painted or plastic surfaces

Avoid the use of any organic solvents such as thinner, alcohol, ether, etc. to clean the painted or plastic surfaces of the accessory. Instead, use a mild solution of soap and water or a neutral detergent.

Never attempt to dismantle

Never attempt to dismantle the instrument, thereby avoiding the possibility of impaired operational efficiency or accuracy. Contact ASI for service and repair.

When not is use

When not is use, turn off power to the accessory with the power switch on the Controller Module. When unit is not in use for an extended period unplug transformer from its 120VAC 60Hz outlet.

Handle with care

Handle all equipment with care. Install equipment in a environment with limited exposure to direct sunlight, dust, high temperatures, humidity and vibration. Avoid any mechanical or electrical shocks.

Introduction

The Motorized Stage 4360 is designed to allow the electronic control of the stage and a z-axis 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 25mm/sec

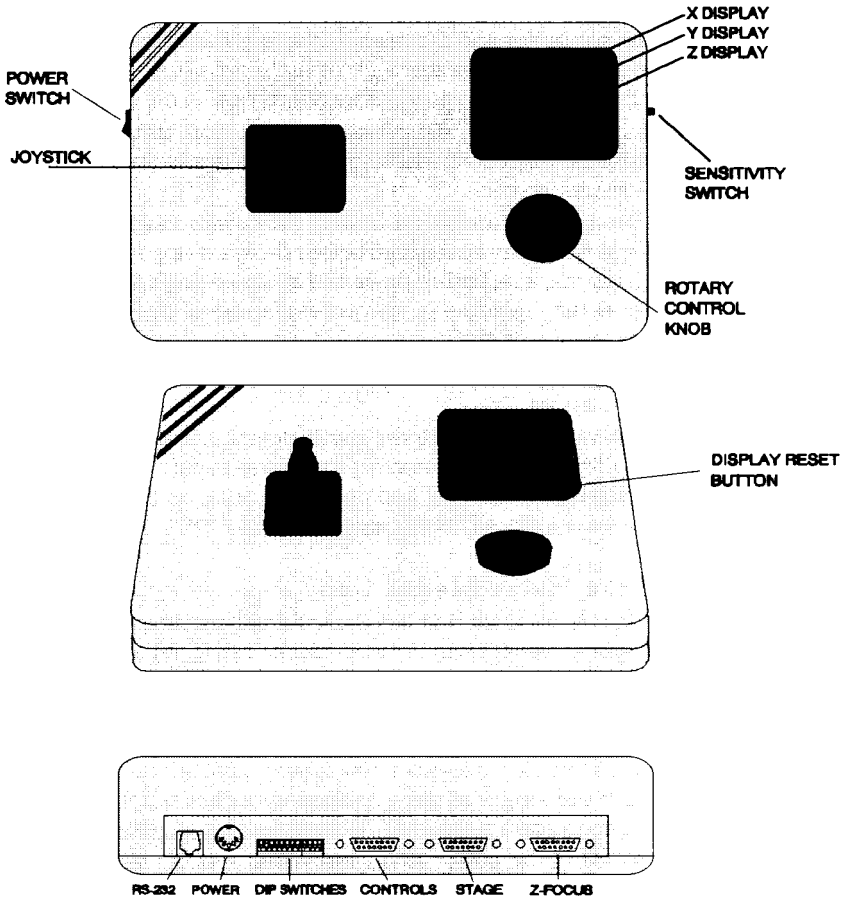
⇒ 3 Axis coordinated motion

⇒ 15 Micron accuracy with submicron resolution

⇒ Remote focus of the z-axis via rotary knob on controller

⇒ Adjustable limit stops

Control Unit



REAR VIEW OF CONTROLLER

Control Unit Diagram

Installation

Installation of Motorized Stage 4360

Install the stage onto your microscope stand. Hook up the stage cable by plugging it into the 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.

There are four adjustable limit sensors/stops on the stage. These sensors/stops are located near each end of both the x & y limit of travel. The two y-axis limits can be easily accessed from the top of the stage and are mounted in a rail on the right side of the bottom plate. The x-axis limit sensors are accessed from the bottom of the unit and are located in a rail on the front of the top plate. The right limit x-axis sensor is easily accessed. However, the left x-axis sensor is hidden by the middle plate. To access the set screw for the left x-axis sensor a hole has been drilled in the middle plate.

Check to see if the stage hits the neck of the stand when pushed to the extreme rear limit. If it hits, adjust the rear y-axis limit stop, use the 0.05” allen wrench to loosen the set screw on the stop. Slide the stop along the rail that it sits in to the desired position and retighten the set screw. The set screw should be securely tightened to prevent the sensor from moving out of alignment.

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 the limit stop is encountered.

Connect Power Cables

Plug power supply cable into the round power connector on the 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

Remove the fine focus knob that has the locking 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.

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.

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

Note: Some 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: During 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 an interface between a host computer and the controller. The communications is established through an RS232-C serial connection. A wiring diagram showing the wire communication link is given in Appendix 1. 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 allowable commands are listed below. After the command are the parameters. Some commands have no parameters. 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><lf>	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 controller's internal buffer must be emptied by sending as 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 ok)
command:	**W Z<cr>**	(where is z-axis)
response:	**:A 1001<cr><lf>**	(z-axis position is 1001)
command:	**AQRST<cr>**	(an illegal command)
response:	**:N -1<cr><lf>**	(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 than the hex code version. The ASCII version, like all other ASCII commands, is only interpreted after the previous command is completed. This makes the ACSII form of the command less useful than the hex code version. It still may be used.

Response (ASCII only):

A positive resonse 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 than 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 emptly 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.

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 x-axis, y-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).

Example:

HERE R=1000 T=1500<cr>

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

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 velocitiy. The slower velocitiy helps ensure the postion is as accurate as possible.

Response:

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

:A<CR>

Expample:

HOME<cr> the stage moves to the limit switches

Enable/Disable 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

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 rotary knob.

Response:

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

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

Set Min Speed

Format: **MINSPEED<cr>**

The command sets the start up speed for movement of the stage. The operator can choose a value form 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>

Move Absolute

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

This command will move the x-axis, y-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

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

Move Relative

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

This command will move the x-axis, y-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.

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 complete. The command responds prior to reset.

:A<CR>

Example:

RESET<cr>

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

Change Units

Format: **UNITS??<cr>**

This command will change the current units that are displayed on the controller. The units can be changed to millimeters, inches or steps.

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 setting determines the initial power up units but may be overridden by this command.

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>

Get Current Location

Format: **WHERE R T Z<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 R T Z<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 y-axis in number of units.

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:

:Stage 4360 Controller<cr>

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.

Dip Switches

The default setting for dip switches 1 through 12 are as follows:

Up	Up	Down	Down	Down	Down	Down	Down	Up	Up	Up
1	2	3	4	5	6	7	8	9	10	11

Dip Switch Definitions:

Switch 1 - RS232C 0
Switch 2 - RS232C 1
Switch 3 - N/A Leave Down
Switch 4 - Right/Left Hand Operations (z-knob orientation)
Switch 5 - Z Doubler (Up=Right Mount, Down=Left Mount)
Switch 6 - Z Orientation (Up=Right Mount, Down=Left Mount)
Switch 7 – Steps / Units
Switch 8 – Units Millimeter / Inch
Switch 9(1) - N/A Leave Up
Switch 10(2) - N/A Leave Up
Switch 11(3) - T-Axis Orientation
Switch 12(4) - R-Axis Orientation

Baud Rates: 300, 1200, 2400, 9600

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

Right/Left Handed Operation

This selects the direction of rotation of the motor with respect to operator motion of the Rotary Control Knob.

S3	**Orientation**
Down	Right
Up	Left

Note: Switches are only interrogated at power up, so before making adjustments turn the unit off.

WARRANTY

Applied Scientific Instrumentation, Inc., here after referred to as ASI, guarantees its equipment against all defects in materials and workmanship to the original purchaser for a period of one (1) year from the date of shipment. ASI's responsibility to this warranty shall not arise until the buyer returns the defective product, freight prepaid, to ASI's facility. After the product is returned, ASI at its option, will replace or repair free of charge any defective component or device that it has manufactured. The warranty set forth above does not extend to damaged equipment resulting from alteration, misuse, negligence, abuse or as outlined below:

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