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## COMPACT MOTORIZED ZOOM BEAM EXPANDER

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### GENERAL

The motorized zoom beam expander is a computer controlled variable expansion beam expander. The useable expansion range is fixed in the software during manufacture. This is based on mechanical limitations and the wavelength of use. The standard zoom beam expander range is 2X to 8X in the visible to near IR range. The whole number expansion ratios within the useable range are available on a convenient slide bar selector.

Provided with the controlling software module is a data file of expansion ratios for the primary wavelength. The focus may be adjusted for optimization with the customer's laser and saved as a custom data file. Default.bin is the file that is prompted by the program on initial startup. After the customer has optimized the settings they may choose to overwrite the default.bin or name a new \*.bin file in which the data is stored. There is a customer specific read-only file that is also provided which is a duplicate of the original default.bin. This file is used for recovery purposes only and should not be selected for use in setting the beam expander.

There are two sets of lenses that move to give the proper expansion and focus. The beam expander always approaches the final positions from the same side (the high side). When changing expansions or optimizing focus there will be may be from 2 to 4 position changes depending on whether backlash is being taken out for one or the other lens movement.

### CONTENTS

1 EACH OF THE FOLLOWING:

- OPTICAL HEAD
- CONTROLLER
- DC POWER SUPPLY
- OPTICAL HEAD TO CONTROLLER CABLE
- COMPUTER TO CONTROLLER CABLE
- SOFTWARE CD

SPECIAL OPTICS, INC. • 315 Richard Mine Road • Wharton • NJ • 07885  
Phone: 973-366-7289 • Fax: 973-366-7407 • e-mail: [techsupport@specialoptics.com](mailto:techsupport@specialoptics.com)

## **CONNECTIONS**

All connections should be made before starting the program. The computer and power connections are on the back of the controller. The computer Com1 port is connected to the controller RS 232 input via a standard 9 pin Com cable. (The RS 485 port on the controller is not used). Plug the power cord of the DC supply into 110V 60Hz power outlet and the output end into the DC IN jack on the controller.

The optical head is connected to the front of the controller. Plug the 20 pin dual row connector of the ribbon cable into the mating connector on the optical head. Plug the 25 pin D-sub connector into the mating connector on the controller box.

Power the motor controller before launching the compact zoom program. All of the LEDs on the controller will light indicating power but not initialized.

## **STARTING THE PROGRAM**

Open the executable file called Compact Zoom. The program asks you if the com port settings and baud rate are acceptable. **DO NOT CHANGE** these numbers without contacting Special Optics. (There may be an occasion that an experienced user may need different settings).

Select Open when the program suggests the default.bin file. User defined files may be selected if previously stored. The program will now move the lenses to the home position. This will accurately set the starting position of the compact zoom on start up. When the home position has been determined by the programming, the motors will automatically move the maximum magnification value. This is for safety that the starting position is the largest beam diameter and an actual magnification setting.

## **USER CONTROLS**

### **MAGNIFICATION FACTOR**

Whole number magnifications are shown on the slide bar. Any of these magnifications can be selected by either dragging the arrow to the desired magnification, or by clicking on the slide beside the desired magnification. When the magnification is selected using the slide bar, the arrow turns blue to show the current selection.

### **SELECT CUSTOM MAGNIFICATION**

Select this button when the magnification desired is between the whole number magnifications displayed on the slide bar. The program will use the positions for that magnification from the data file, or if the custom magnification is between two data points, it will extrapolate the motor positions. A custom magnification can be optimized by jogging the motors and the new positions stored in the data file for future use.

## JOG SPEED

The JOG SPEED control allows the customer to optimize the beam expander for the divergence of the actual input beam. One of three speeds are selected for "jogging" the lenses toward or away from the output collimating lenses. To select a different speed, hold the left mouse button down while sweeping the blue line to the speed desired. Selecting the right arrow will change the button to "on" and jog the input lenses **away** from the output collimating lenses. Selecting the left arrow will jog the input lenses **towards** the output collimating lenses. The motors will continue to jog until the arrow is again selected the button returns to the arrow symbol. The motors will finish their jog cycle before stopping. Remember that backlash is taken out when the motors are jogged to the right and that they will move past the desired position and come back to it before the cycle is finished.

## STORE JOGGED POSITION

This button allows you to store the new jogged position in the expansion file of your choice for future use. If you optimize the lenses for a magnification and do not store them before moving on to a new magnification, the program will use the original positions the next time you return to that magnification. When you select the Store Jogged Position a window will display the currently used table of settings, and display the current position of the motors with the magnification you were at before starting to jog. If you would like to store these positions for this magnification you must select done. You then have the opportunity to save the settings under a new file name. If you select a new file name, then after you save you will be given the option of continuing to use the original file, or start using the new file.

## LOAD NEW POSITION SET

When new position files have been created, you have the opportunity to select which data file is to be used for positioning the lenses. For example, there are 2 lasers with different collimation settings, or different wavelengths (within the useable range of the beam expander). These settings have been stored in their own data files. Select Load New Position Set, you may then select the data file that contains the positions to be used.

## START HOMING SEARCH

This button may be used to start the motors into the homing routine to reset the motor positions. When the motors finish homing, they will again move to the maximum magnification position for safety. This can be used in lieu of quitting the program and restarting it to verify motor position.

## EMERGENCY STOP

Selecting the emergency stop button will stop the motors from moving immediately. The program will still remember the current positions, and a new magnification factor may be selected.

## QUIT PROGRAM

Select this button when you want to exit the compact zoom controller program.

## ACCESS HOLES

If the beam expander is stopped when the lower limit switches are lit, then the beam expander must be manually backed off past the home switch triggers. Turn off power to the motor controller units. Remove the 2 set screws (1/4 – 28) on the beam input side of the beam expander. You will need a slot head screwdriver to access the slot in the end of the lead screw. Engage the screwdriver in the slot on the end of one of the lead screws. Turn the screwdriver clockwise for 1 turn. If the lead screw turns freely, then continue for 2 or 3 more rotations, otherwise move to the other lead screw and turn the screwdriver clockwise for 3 to 4 rotations. You should hear both the limit switch and home switches release. Do the same for the other access, but turn 1/2 a turn less than with the first access. Again, you should hear both the limit and home switches release. Turn the power on to the controller units, and start the home routine again. The beam expander should now be within the working range of travel.