

Autofocus Basics

There are 5 main components.

- 1) Laser Head
- 2) Gray Pendant (servo driver)
- 3) Microscope focus drive
- 4) Tan Pendant
- 5) Autofocus controller (stepping motor driver)

The basics of all these components and how they relate together are as follows:

The Laser Head:

This is the main component. Its main job is to provide a laser line projected through the objectives of the microscope. If the microscope is not in focus, this projected line increases in thickness. The Laser Head will output information to the gray pendant to drive the servomotor driving the friction wheel attached to the Microscope focus knob. As with all servos, the greater the error, the more voltage that is applied to correct the condition. As the laser head gets closer to focus, the voltage driving the servo motor decreases, until focus is achieved, and 0 volts drives the motor (no movement). It also has a component attached to it called the "Trim Motor". Its basic function is to provide focus "offset" from that of a perfectly flat plane. As you focus, there is always topology, and requiring different focusing from a "default reference plane".

Gray Pendant:

This is the servo driver to the motor driving the friction wheel. It's basically a DC motor, and can be driven in either direction depending on the polarity of a voltage applied to it. It requires input from the laser head to determine the direction to drive the motor and from the Microscope focus drive to provide positional feedback. It is also used to set limits of travel, and home positions.

Microscope Focus Drive:

This is basically the DC motor assembly with positional feedback for driving the focus knob of the microscope. The whole assembly is a glorified motor with an encoder. The encoder tracks its position by using "Hall Effect Sensors" instead of the traditional optical means.

Tan Pendant:

This is the user controlling pendant. It allows adjusting of the "Trim Motor" attached to the Laser Head. It has an optical encoder with a knob attached to it to adjust the trim motor. This is basically called "gear following" and is a basic

function of most stepping motor drives, where as when you adjust the encoder, another motor follows its direction and stepped output. There are also three buttons, on the side is "Home" and on top is "Up" & "Down". The main purpose of this pendant is to control the "Trim Motor" on the Laser Head.

Autofocus controller:

This is basically a stepping motor indexer and driver. It requires input from the Tan Pendant. Its output is to the "Trim Motor" on the Laser Head. It provides programmed algorithms to drive the trim motor. Based on "setup parameters" and user input to the gray pendant.