

Overview:

The Noise Eater Driver is designed to optically stabilize a laser through a combination of amplitude and phase modulation. The driver is intended to be used with the Harris H-401 AO modulator. Features of the driver include:

- Wide frequency range
- Amplitude and phase control
- USB and optional Ethernet control
- Alarm output

Connections and Indicators (shown with optional Ethernet)



Rear (left to right)

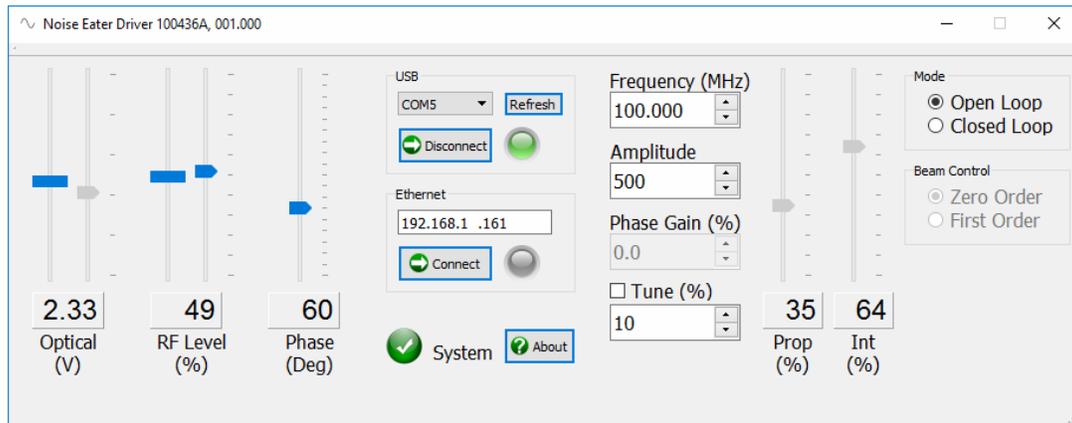
Connection	Description
Power switch / indicator	Main on/off switch and status indicator. Green indicates the optical power is within the allowable range. Red indicates that the optical power is out of regulation.
Power Input	5VDC input, 2A max, center +.
Ethernet (if supplied)	For control and status.
USB	For control and status.
Alarm out	3.3V logic level output, high indicates the optical power is out of regulation.

Front (left to right)

Connection	Description
HDMI RF output port	Connection to the AO modulator
Detector input	Analog optical power input signal from detector. 50Ω terminated, 5V max.

Software Controls

The following section describes the software controls.



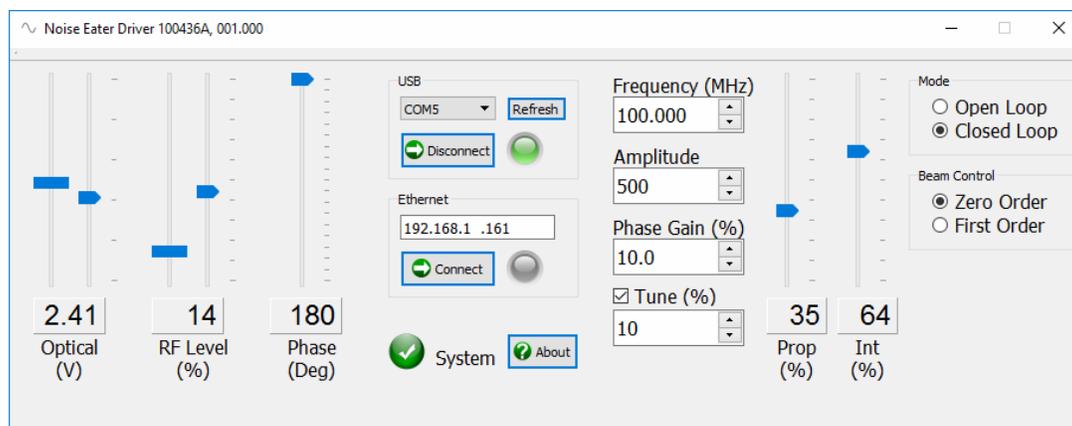
Control	Description
USB area	The refresh button searches for connected devices and refreshes the port list. Select the desired port and press connect to use USB. The LED indicates the connection.
Ethernet area	Enter the desired IP address and press connect to use the Ethernet connection. The LED indicates the connection. See the software programming guide for information on changing the IP address.
Optical	The left slider displays the optical power level from the receiver and the right slider sets the optical control point. This value is retained between power cycles. The control point slider has no effect in open loop mode.
RF Level	The left slider displays the RF drive level and the right slider sets the RF drive control point. This value is retained between power cycles.
Phase	Sets / displays the phase difference in degrees. Dragging the control will set the phase. When the phase gain is not zero and in closed loop mode, the digital controller automatically adjusts this level.
System Indicator	This indicator follows the front panel LED – green: normal operation, red: indicates that the loop is out of regulation.
Frequency	Allows the user to set the drive frequency. This value is retained between power cycles.
Amplitude	Sets the full scale drive amplitude. This value is retained between power cycles.
Phase Gain	Sets the gain of the digital loop (0.1% to 25%). On each 10mS cycle, the phase is changed by this amount multiplied by the RF power error signal. With an RF error of 50%, a 10% phase gain setting would change the phase by 5%, or 9°. This value is retained between power cycles. This control has no effect in open loop mode.
Tune check box, tune amplitude	Modulates the optical control point between the current setting and the current setting plus the tune value. This is useful when tuning the loop.

Control	Description
Proportional Gain	Sets the loop proportional gain (0 to 100%). This control has no effect in open loop mode.
Integral Gain	Sets the loop integral gain (0 to 100%). This control has no effect in open loop mode.
Mode Area	Sets the operating mode (open or closed loop)
Beam Control Area	Allows the user to choose which beam to monitor in closed loop mode. This control has no effect in open loop mode.

Operation

The Noise Eater Driver can be operated in either open loop mode for general use or closed loop mode for use in optical stabilization applications. Certain controls are used for closed loop applications only and are disabled in open loop mode. These controls include optical setpoint, phase gain, proportional gain, integral gain, and beam control. In open loop mode the RF level and phase are controlled directly from the application.

In closed loop mode a fast analog control loop adjusts the RF drive level to the AO modulator to compensate for fast changes in optical power and a slow digital control loop constantly adjusts the phase difference of the RF drive signals in order to stabilize the RF drive power to the AO modulator thus minimizing thermal effects. The optical slider sets the desired signal at the optical input port; the RF power is automatically adjusted to maintain this level. The proportional and integral gain settings should be adjusted for optimal loop performance while maintaining good stability. These settings will depend heavily on the beam position in the AO cell.



Revision and Compatibility Table

Date	Firmware	Software	Description
12/7/2017		1.1	Added code so that GUI remembers the last IP address and restores it upon startup.
7/7/2017	1.1		Increased DAC DDS current output from 1/4 th to full scale.
6/9/2017	1.0	1.0	Added support for hardware rev 1.x, digital pots and switches.
12/21/2016	0.0	0.0	Initial release