

## Diode Pointer Installation Instructions



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# Diode Pointer

## Introduction

The Diode Pointer consists of a housing containing a ZnSe beam combiner and diode laser. The angle of the splitter is adjustable for establishing far field coincidence between the CO<sub>2</sub> laser and diode beams and can also be translated for near field coincidence between the beams. The pointer is shipped with both near and far field adjustments set approximately to their nominal positions. If your SYNRAD laser is shipped with a Diode Pointer installed, it is pre-aligned and ready for operation.

## Required Tools

Assemble the following tools and hardware to install the Diode Pointer:

- One 1/4" open end ignition wrench
- Two 1/8" Allen hex wrenches (included)
- Four 8-32 x 1/4" hex head screws (included)
- Thermal image cards
- Fire brick or similar stable beam stop

Hex Head  
Cap Screws 



Ignition  
Wrench



Allen Hex  
Wrench



Thermal Image Cards



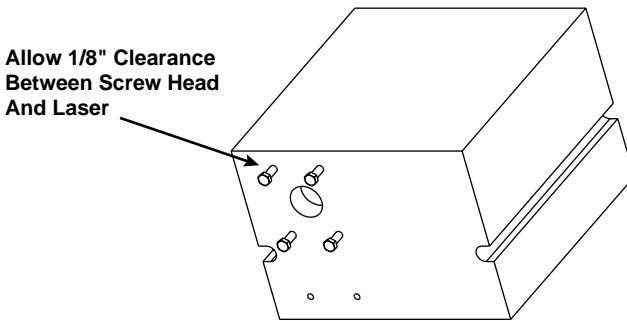
Fire Brick

### Required Tools

## Installation

### *Step One*

Insert the four 8-32 x 1/4" hex head screws into the front of the laser a few turns so that the threads are engaged. Allow at least 1/8" clearance between the screw head and the laser's front plate (see Figure 1).

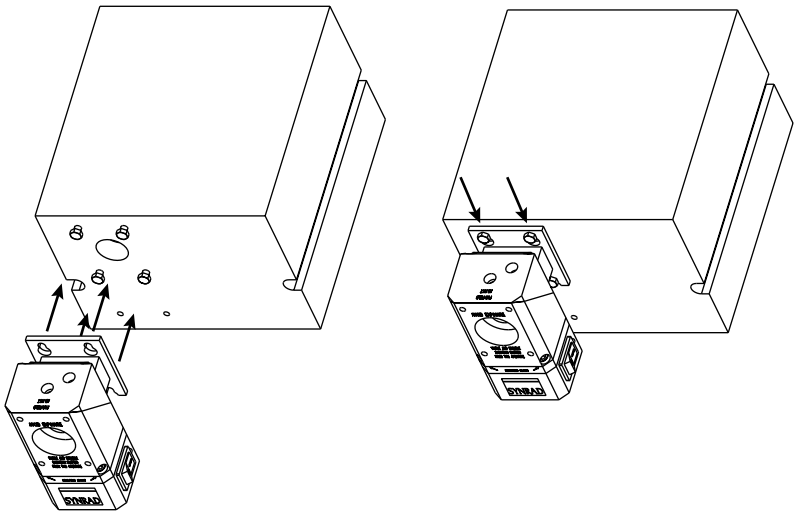


*Figure 1*

### *Step Two*

Remove the black plastic cover from the rear mounting plate of the Diode Pointer. Place the pointer mounting plate over the heads of the screws and slide it so that the screw heads cover the slots (see Figure 2). A good nominal position is all the way to the end of the slots. Tighten the four screws with the 1/4" ignition wrench.

*Note: Physical orientation of the Diode Pointer is not important, however you should install it so that you have access to the near and far field adjuster screws with the hex Allen wrench, and can reach the On/Off switch.*



*Figure 2*

### ***Step Three***

To power the Diode Pointer, connect the supplied power cable between the 5 VDC jack on the side of the pointer and the laser's diode pointer power connector. If your laser does not provide a power connection for the Diode Pointer, then connect the plug from the supplied wall-plug transformer into the 5 VDC jack on the side of the pointer.

*Note: SYNRAD Series 48 lasers manufactured after August 1998 and all Evolution lasers provide a Diode Pointer power connector on the front faceplate. Series 48 lasers built prior to August 1998 and all Series 57 and 60 lasers will require the use of a wall-plug transformer power supply.*

**Warning:** Do not stare directly into the red laser light emitted from the Diode Pointer. The light is intense enough to injure the eye with prolonged exposure.

### ***Step Four***

Remove the cover from the front of the Diode Pointer. Turn on the Diode Pointer by pressing the On/Off switch. The red LED below the switch illuminates to indicate the pointer is on and laser diode emission should be visible.

## **Adjustment**

The next steps involve firing the CO<sub>2</sub> laser across a clear distance of 3 to 10 meters. Take adequate safety precautions to restrict access to the area where the CO<sub>2</sub> beam will be projected through the room. Ideally, the minimum clear distance required is twice the longest distance anticipated to the process-focusing lens. If this clear distance is not available, select a point equaling the maximum position of travel the beam is likely to achieve. Ensure that all necessary laser safety precautions are taken to avoid injuries to persons and ignition of combustible items by the invisible CO<sub>2</sub> beam.

## Diode Pointer

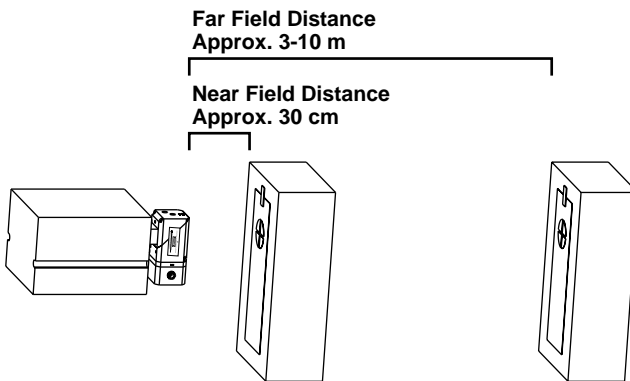
The adjustment process consists of two procedures: (1) adjusting the near field diode position coincident with near field CO<sub>2</sub> beam and (2) adjusting the far field diode position coincident with the far field CO<sub>2</sub> beam.

This is an iterative process requiring each step to be rechecked, and possibly readjusted, at least once.

**Warning:** The CO<sub>2</sub> laser emits invisible laser radiation. Since direct or diffuse laser radiation can inflict severe corneal injuries, always wear eye protection when in the same area as an exposed laser beam. Remain clear of the beam while performing adjustments; direct or diffuse laser radiation can seriously burn human tissue. Follow safety precautions in the laser's Operator's Manual.

### *Step One*

Remove the cover from the front of the Diode Pointer prior to firing the laser. Tape a thermal card to the firebrick and place it about 30 cm in front of the pointer (see Figure 3). Fire the CO<sub>2</sub> laser at low power (approximately 10-20 watts) for a long enough time to get a good burn image on the thermal card.

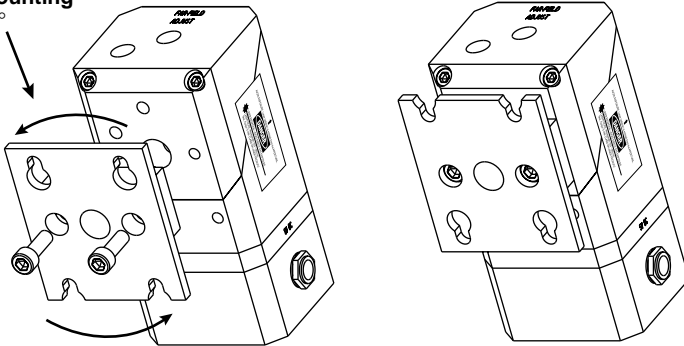


*Figure 3*

***Step Two***

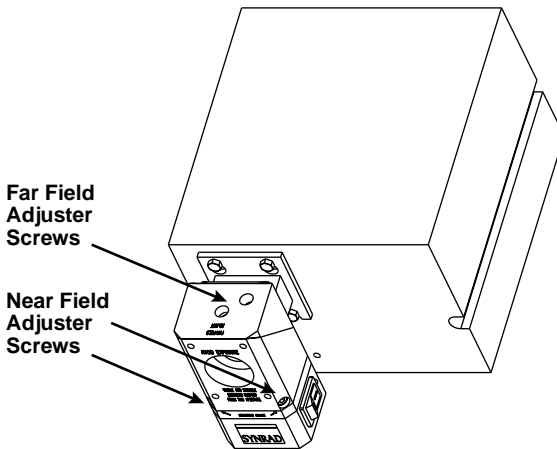
If the red diode beam is centered on the burn within 0.1 mm proceed to Step Three. If not, make coarse adjustments to the beam position by loosening the four hex head screws holding the pointer to the laser and moving the pointer in the direction necessary to center the beam in the CO<sub>2</sub> burn. If the pointer is all the way to its limit in the slots, it may be necessary to rotate the mounting plate in relation to the pointer housing. To do this, remove the pointer from the laser and remove the two socket head cap screws holding the mounting plate to the pointer body. Rotate the mounting plate 180 degrees then reinstall and tighten the two screws (see Figure 4). Reinstall the pointer to the front of the laser and repeat the process until the pointer is secured in a position where the red diode beam is roughly centered on the CO<sub>2</sub> burn image.

**Rotate Mounting  
Plate 180°**



**Figure 4**

Make fine adjustments to the diode beam position by adjusting both near field adjuster screws (see Figure 5) with the 1/8" Allen hex wrenches until the red diode beam is centered in the middle of the CO<sub>2</sub> burn. Since the diode spot is not perfectly round, visually average the shape to the center of the CO<sub>2</sub> burn image (see Figure 6).



*Figure 5*

### *Step Three*

Reposition the thermal card to a new location on the brick, then move the brick to the far field (see Figure 3). Fire the CO<sub>2</sub> laser again at low power (approximately 10-20 watts) until you get a good burn image on the thermal card. Adjust both far field screws (see Figure 5) on the Diode Pointer so that the red diode beam is centered on the CO<sub>2</sub> burn image as accurately as possible (see Figure 6). Average out any asymmetries of the diode beam.

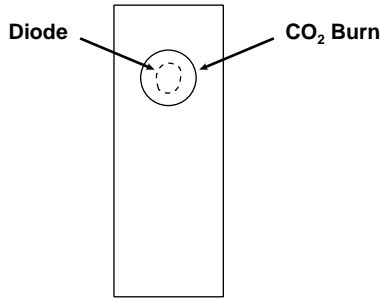


Figure 6

#### *Step Four*

Move the brick back to the near-field position and repeat the near field procedure in Step Two.

**Note:** Since adjusting the beam affects both near and far fields in the same direction, you may need to overcompensate towards the opposite side of center in one field and then bring both back to center in the other.

#### *Step Five*

Repeat the far field procedure in Step Three once more. The goal of the adjustment procedure is to get the CO<sub>2</sub> beam and the Diode Pointer coincident within 100 microradians, which is equivalent to 1 mm in 10 meters of misalignment. The eventual use of the pointer determines the accuracy required. Most articulated arm applications require 100 microradians, while a simple lens system requires only 1 milliradian. The worst misalignment acceptable is 1 milliradian, or 1 mm in 1 meter.

### **Congratulations**

The Diode Pointer is now correctly installed and the rest of the beam delivery system can now be installed.



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## Diode Pointer

### Beam Delivery Setup

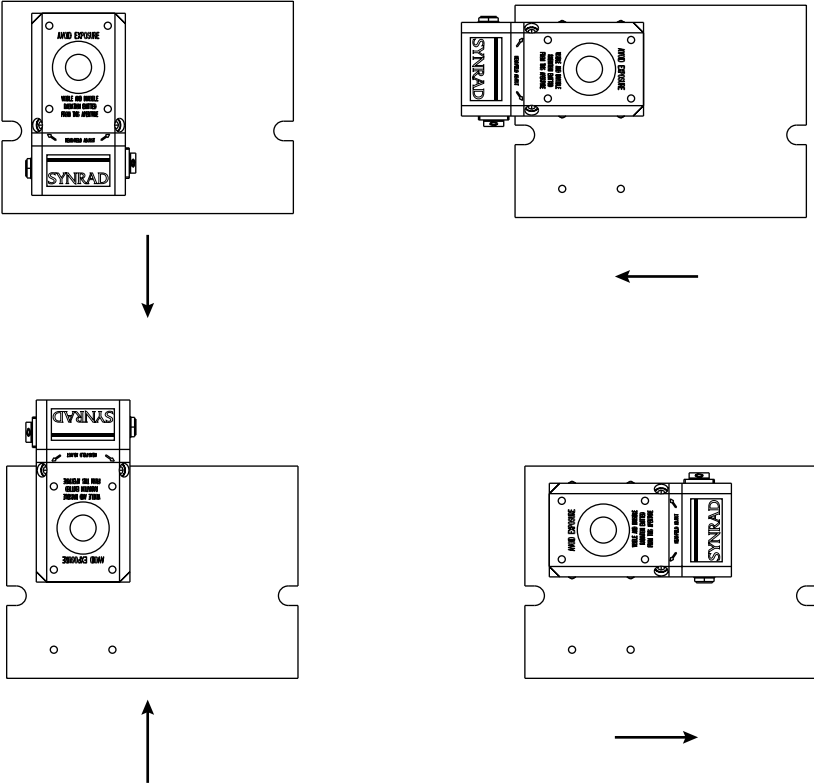
The Diode Pointer, when properly mounted to the laser, produces a beam centerline shift of 1 mm from its original exiting point on the laser. The direction of this offset is dependent upon the orientation of the Diode Pointer to the laser (see Figure 7). The CO<sub>2</sub> beam leaving the Diode Pointer is centered to the exiting bore of the pointer, however the beam centerline itself has shifted in relation to any beam delivery components not directly mounted on the pointer. Make necessary adjustments to your beam delivery setup in order to compensate for this 1 mm offset. When mounting components directly to the Diode Pointer, the CO<sub>2</sub> beam is centered and no additional adjustments are required.

### Specifications

Operational Voltage	3 to 5 VDC
Operational Current	<50 mA
Optical Power Output	<5 mW
Laser Diode Output (Power, max.)	5 mW
Wavelength	650 nm ±10 nm
Beam Diameter	3 mm
Divergence	<2 mrad
Optics	Aspheric plastic lens
Ellipticity	1.2:1

- Notes:**
1. Copper case not grounded
  2. Reverse polarity protected

## Diode Pointer



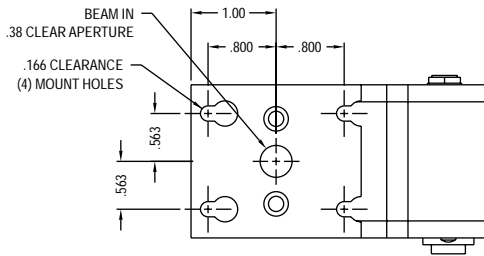
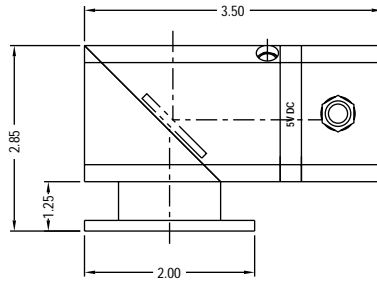
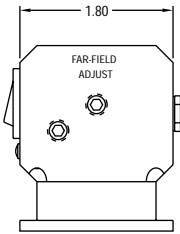
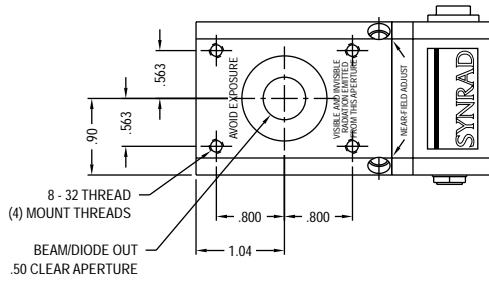
**Direction Of Beam Centerline Shift For Diode Pointer Orientations**

*Figure 7*

# Diode Pointer



## Dimensions



### Safety Labels

