Tempest 300 (6mm YAG Rod) HeNe Laser Head Alignment

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Rev. 02

NEW WAVE RESEARCH

Manufacturing Engineering Department

Tempest LASER

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Safety Notes

Safety Notes I

Use this layout to highlight notations requiring special Before firing the laser:

- Wear safety goggles
- Remind others around you to wear safety goggles

Whenever the optics is re-arranged, ensure the:

- Beam is enclosed
- Optics mounts are secured to the table
- Hazardous reflections are properly blocked.

!! WARNING !!

Turn off and disable power supply when making any connections between the:

- Attenuator
- Selector
- Motorized wave plate
- Shutter

TEMPEST 300 (6MM YAG ROD)

HeNe Laser Head Alignment Procedure

Use the following procedural instructions for aligning the Tempest 300 (6mm YAG Rod) HeNe Laser.

Install the Resonator

To install the Tempest Resonator(0002-6720-3) with umbilical (0002-6738-4), place it onto the line-up table, then:

- **Tighten** the clamps to the resonator.
- **Check** all the screws on the resonator assembly are tight.
- **Place** four (4) stainless steel balls (2500-0021) into the pump cavity base plate.
- **See** Figure 1.

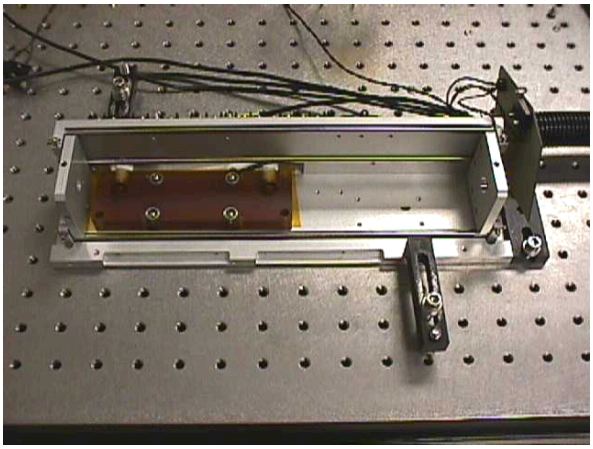

FIGURE 1

Check Base Plate Screws

- **Ensure** the four (4) pump cavity base plate screws are tight.
- **See** Figure 1.

Install the Pump Cavity

Perform the following steps to install the pump cavity (0020-0057) onto the baseplate:

- **Ensure** the red lamp lead is facing toward the front of the resonator, and the black lamp lead is facing toward the back of the resonator.
- **Tighten** the four (4) #4-40 x 1 7/8 SHD (2825-4503) screws, four (4) #4 split lock washers (2825-8155), and four (4) #4 small OD flat washers (2825-8151).
- **See** Figure 2.

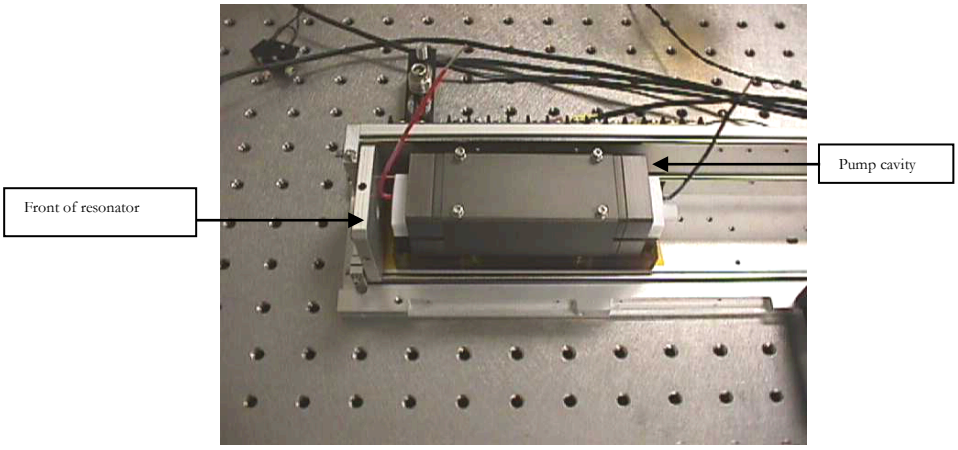

FIGURE 2

Flash lamp wiring configuration

To install the Flash lamp wiring configuration:

- **Secure** Flash Lamp (Red) to the 4th terminal from right end of terminal strip.
- **Secure** Flash Lamp (Black) to the 11th terminal from right end of terminal strip.
- **See** Figure 3.

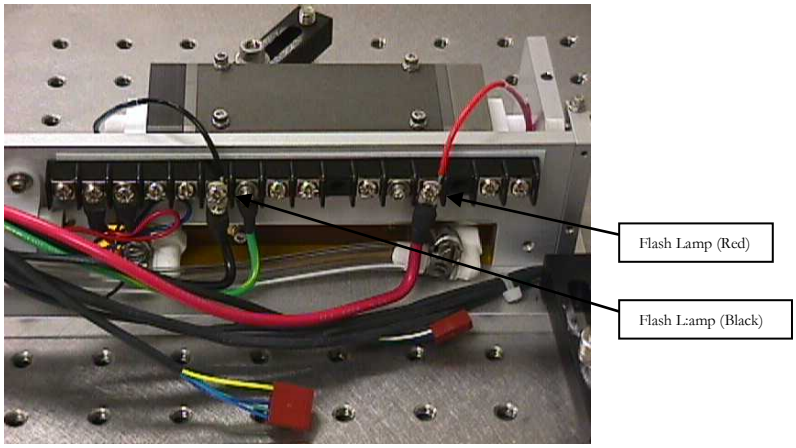

FIGURE 3

Attach Dot Output Coupler (O.C.) Assembly

To attach the dot output coupler assembly (O.C.) (0002-6783) onto the front of the resonator:

- **Ensure** that the O.C. (0002-6754-6) coating surface is facing down on the holder (0002-0727-1).
- **Determine** the position of the wedge on the O.C.
  - **Rotate** the O.C. so the wedge is in the 3 o'clock position.
  - **Attach** the O.C. to the front of the resonator so the wedge is facing on the right side of the front resonator.
  - **Affix** with four (4) #2-56 x 3/8 SHD (2825-6685) screws, four (4) #2 split lock washers (2825-8055), and four (4) #2 big OD flat washers (2825-8052).
- **See** Figure 4.

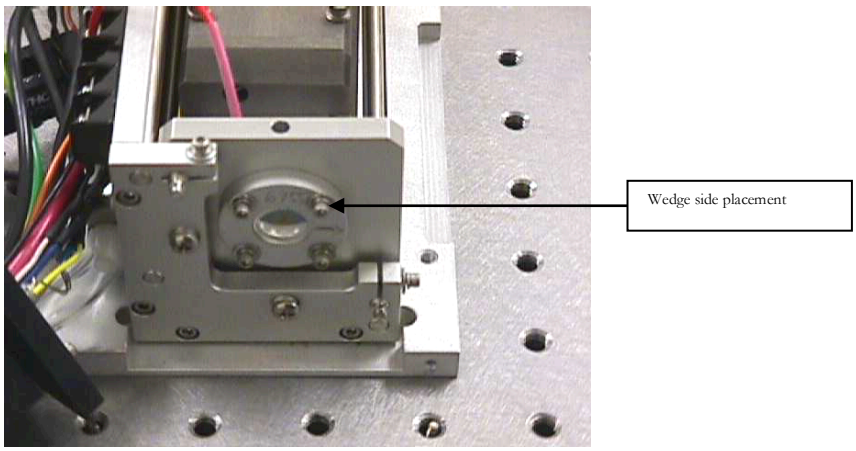

FIGURE 4

Center the O.C.

To center the Output Coupler (O.C.) via the back of the resonator and pump cavity:

- **Place** a business card in front of the resonator.
- **Remove** the dust tube on the black lead side of the flash lamp.
- **Tighten** the O.C. holder once the O.C. dot is centered on the front of the pump cavity YAG rod.
- **Loosen** the baseplate's 4 screws and rotate clockwise, or counter-clockwise until the YAG rod is centered with the O.C. dot if the O.C. is not centered.
- **Tighten** the baseplate screws when done.
- **See** Figure 5.

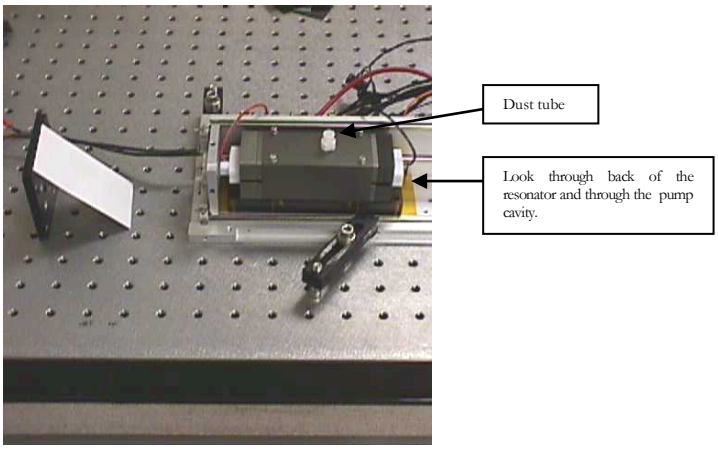

FIGURE 5

NEAR Alignment Setup and Tuning

To setup and tune the NEAR alignment, perform the following steps:

- **Turn on** the HeNe laser.
- **Place** a lens tissue in front of the O.C.
- **Place** a card inside the resonator between the pump cavity and the front O.C. plate.
- **See** Figures 6 and 7.

CAUTION: DO NOT REMOVE THE CARD!

- **Adjust** the 1st HeNe mirror.
- **Look** through the back of the resonator through the pump cavity and center the HeNe beam onto the front surface of the YAG rod.
- **See** Figures 6 and 7.

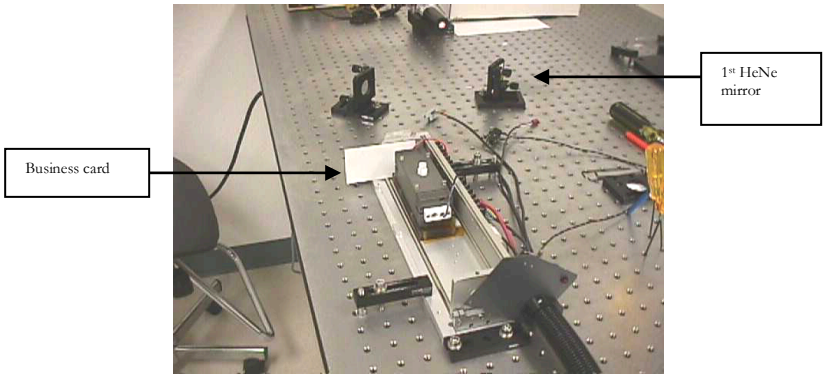

FIGURE 6

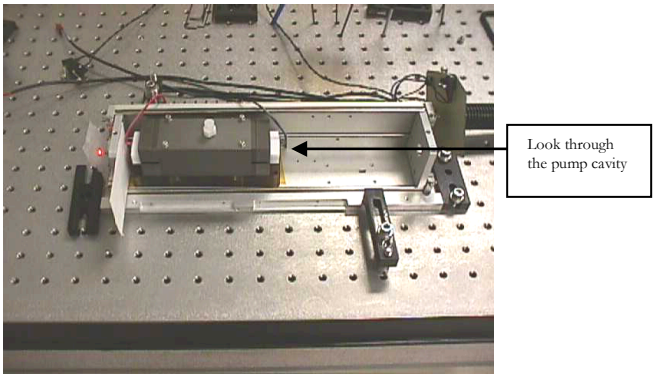

FIGURE 7

FAR Alignment Setup and Tuning

To setup and tune the FAR alignment, perform the following steps:

- **Remove** the card and place it against the rear plate inside the resonator.
- **See** Figures 8 and 9.

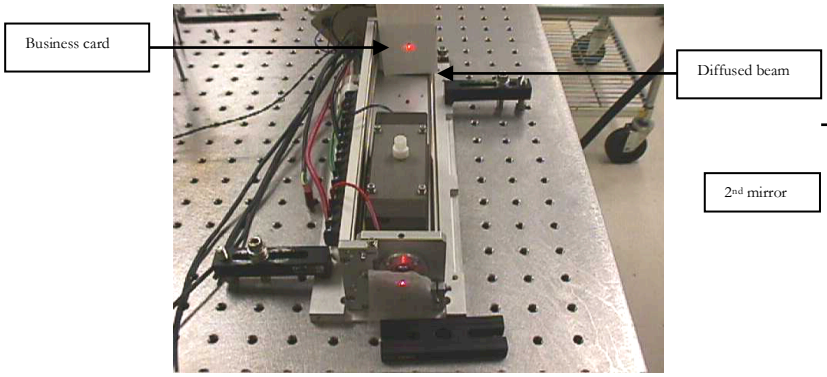

FIGURE 8

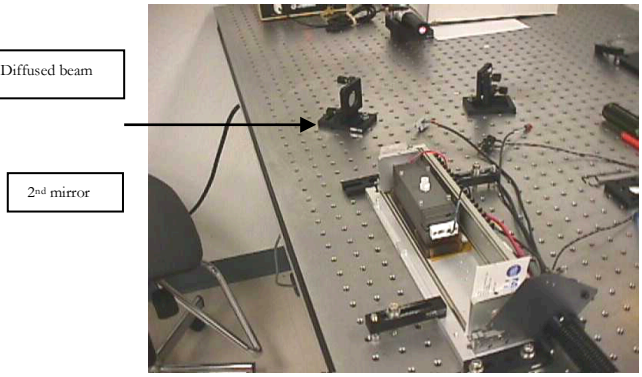

FIGURE 9

Tune the HeNe Mirror

To adjust the 2nd HeNe mirror, perform the following steps:

- **Center** the HeNe beam until it is centered on the diffused beam on the card.
- **See** Figures 8 and 9.

Center the Laser

To center the laser, perform the following steps:

- **Repeat** STEPS 7-10 until the HeNe beam is centered on the front surface of the YAG rod and centered on the diffused beam on the card.
- **Adjust** the precision screws on the O.C. so that the reflection goes back into the HeNe.
- **Use** the middle beam, since there are 3 reflections from the O.C.
- **Do not tighten** the precision screws.
- **See** Figure 10.

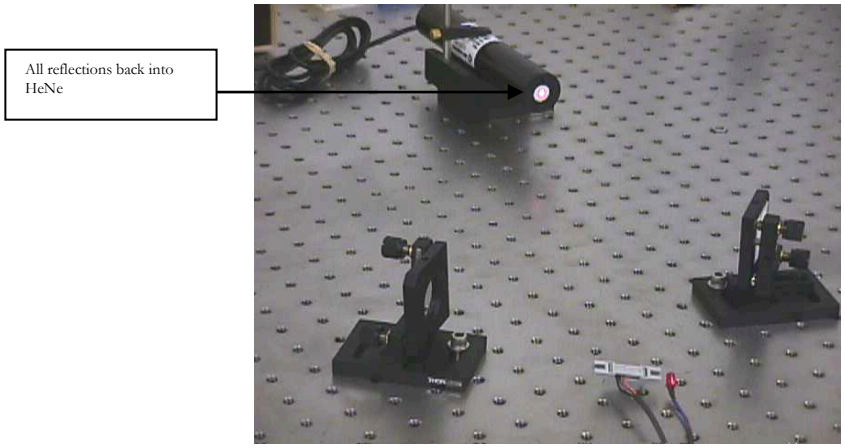

FIGURE 10

Install Polarizer Assembly

Perform the following steps to install the Polarizer assembly attachment:

- **Remove** the business card.
- **Attach** the polarizer assembly (0002-6728) to the resonator.
- **Center** the polarizer assembly with the HeNe laser beam using a lens tissue.
- **Adjust** the two (2) #4-40 x ½ SHD (2825-6736) screws, two (2) #4 split lock washers (2825-8155), and two (2) #4 big OD flat washers (2825-8152).
- **See** Figures 11 and 12

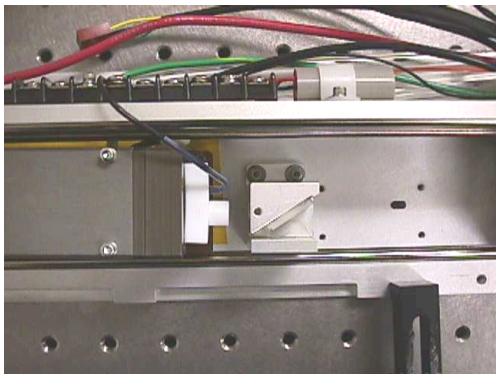

FIGURE 11

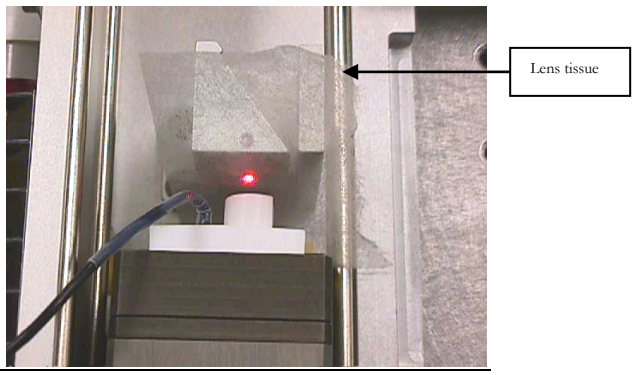

FIGURE 12

Q-switch Assembly

To install the Q-switch assembly attachment, perform the following steps:

- **Center** the q-switch assembly with the HeNe laser beam using a lens tissue.
- **Adjust** the one (1) #4-40 x ½ SHD screw, one (1) #4-40 x ½ PPH, one (1) #4 split lock washer, and two (2) #4 big OD flat washers.
- **See** Figures 13 and 14.

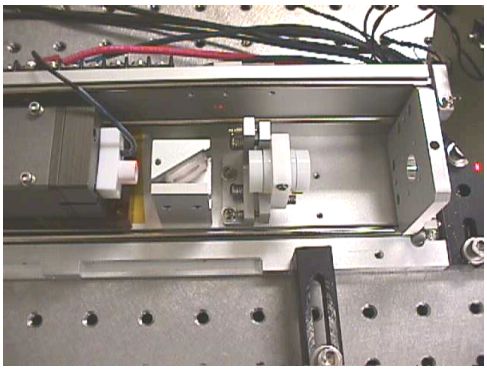

FIGURE 13

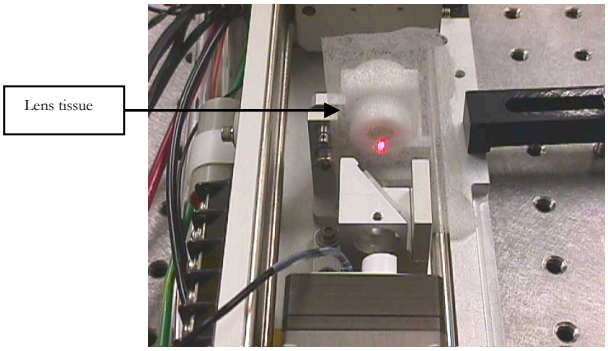

FIGURE 14

¼ Wave Plate

To install the ¼ wave plate attachment, perform the following steps:

- The wave plate holder assembly (0002-0402) is threaded through the center of the resonator end plate.
- **Screw** one (1) #4-40 x 5/32 nylon tip setscrew (2825-4557) to lock wave plate assembly in place.
- **See** Figure 15.

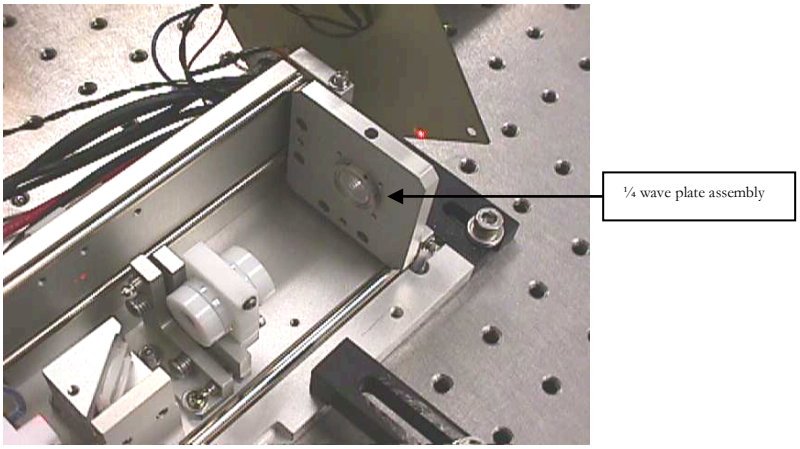

FIGURE 15

Adjust Polarizer plates

Place polarizer plates in front of the O.C. and against the back of the resonator, by performing the following:

- **Place** a box behind the resonator.
- **Place** a lens tissue in between the pump cavity and the polarizer assembly.
- **Ensure** the polarizer plates are depolarized.
- **See** Figures 16 and 17.

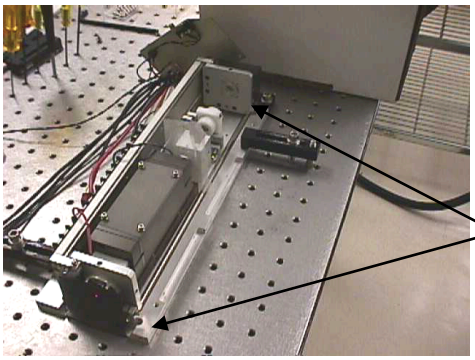

FIGURE 16

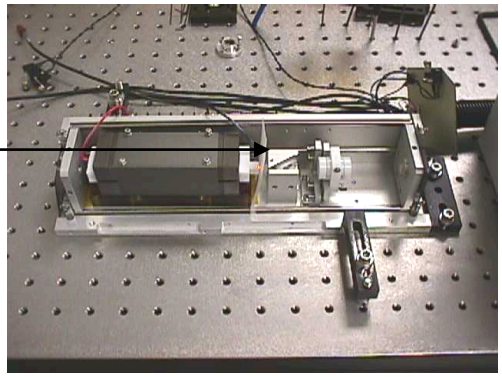

FIGURE 17

Wave Plate Adjustment.

To adjust the wave plate, perform the following steps:

- **Adjust** the ¼ wave plate, so a cross appears onto the box.
- **Adjust** the precision screws on the q-switch assembly, so the center of the cross is on the HeNe beam.
- **See** Figures 18 and 19.

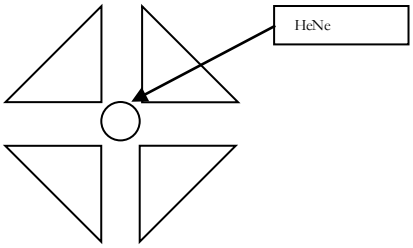

FIGURE 18

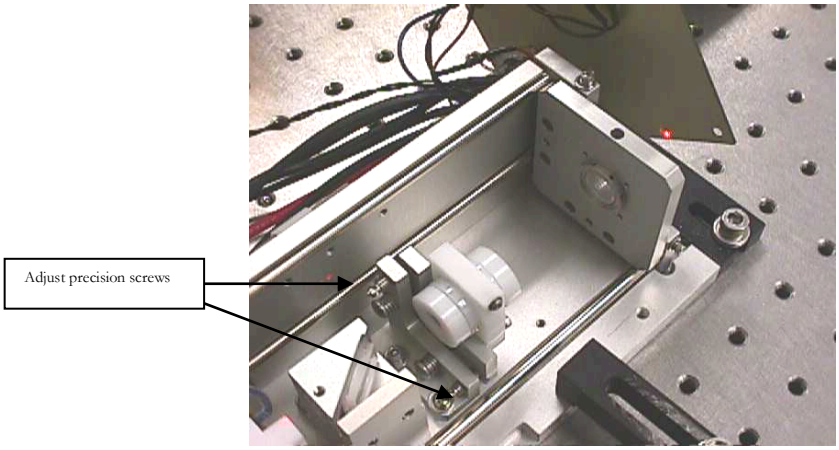

FIGURE 19

- **Remove** the polarizer plates, lens tissue, and card.
- **Use** the correct high reflector (H.R.) for the Tempest 300 laser system.
- **Position** H.R.: (0002-0681-1) (-3m).

H.R. Installation

To install the H.R. onto the rear plate of the resonator:

- **Center** as best as possible the H.R. with the HeNe laser beam and tighten the screws.
- **Write** the H.R. description onto the H.R. bracket.
- **Tighten** the four (4) #2-56 x 3/8 SHD (2825-6685) screws, four (4) #2 split lock washers (2825-8055), and four(4) #2 big OD flat washers (2825-8052).
- **See** Figures 20 and 21.

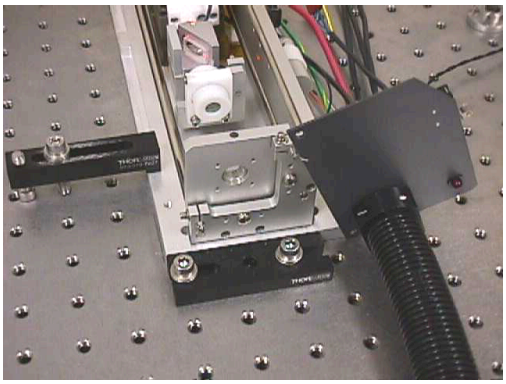

FIGURE 20

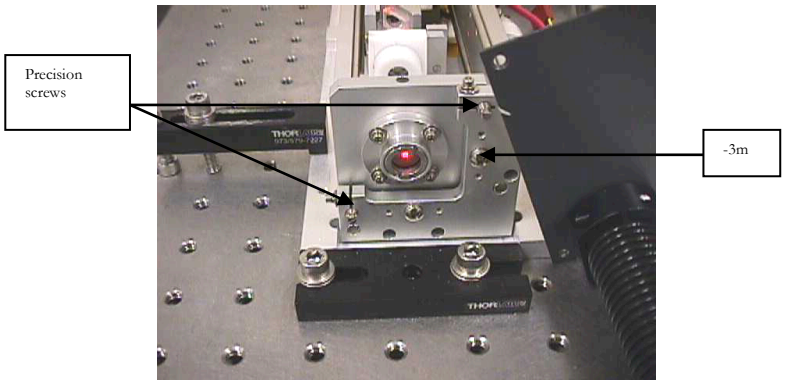

FIGURE 21

- **Adjust** the precision screws on the H.R. to get a beam reflected back and centered onto the output of the HeNe laser.
- **Use** the brightest beam (the reflection off the first surface of the H.R. optic), if there is one beam.
- **DO NOT tighten** the precision screws.

This completes HeNe laser alignment procedure.