

## Instruction Sheet

# Aligning the PASCO Model OS-9171 Laser with the OS-9172 Alignment Bench

### The Helium Neon Laser

The helium neon laser is a 0.5 mW, TEM<sub>00</sub> mode laser, providing randomly polarized light at a wavelength of 632.8 nm. The built-in power supply is regulated so the output has minimum ripple and the intensity is stable to within  $\pm 2.5\%$ . A 15 minute warm up is required to reach full power, but the power on start-up is greater than 0.35 mW. If you'd like more technical specifications, and a detailed explanation of laser operation, see the instruction manual that's included with the laser.

**Caution:** This is a relatively safe, low power laser. Nevertheless, we strongly recommend the following precautions:

1. Never look into the laser beam, either directly, or as it is reflected from a mirror.
2. Set up experiments so the laser is either above or below eye level (for both sitting and standing people).

### To Set Up the Laser using the Laser Alignment Bench:

The laser is most conveniently aligned using the laser alignment bench, which can be joined to the optics bench using the bench couplers. The procedure is as follows:

1. Place the optics bench and the laser alignment bench end to end, as shown in Figure 1. Notice that only one end of the laser alignment bench has holes for two leveling screws. That is the end that joins to the optics bench.
2. Remove the four leveling screws on the adjoining ends of the two benches.
3. Use the 1/4-20, hex-head screws that are included with the bench couplers to attach the couplers to the legs of the benches, as shown. Do not yet tighten the screws.
4. Insert one of the leveling screws, rubber foot down, through the threaded hole in each coupler.

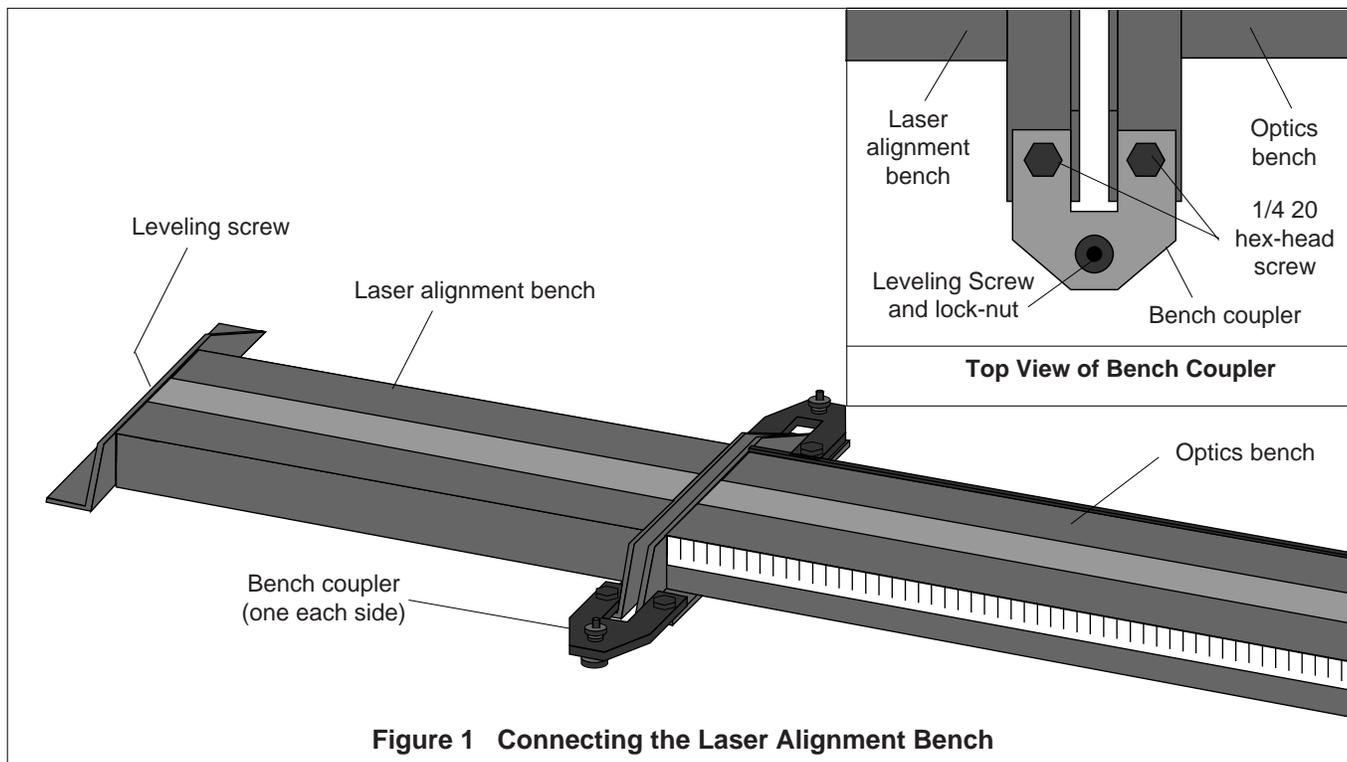
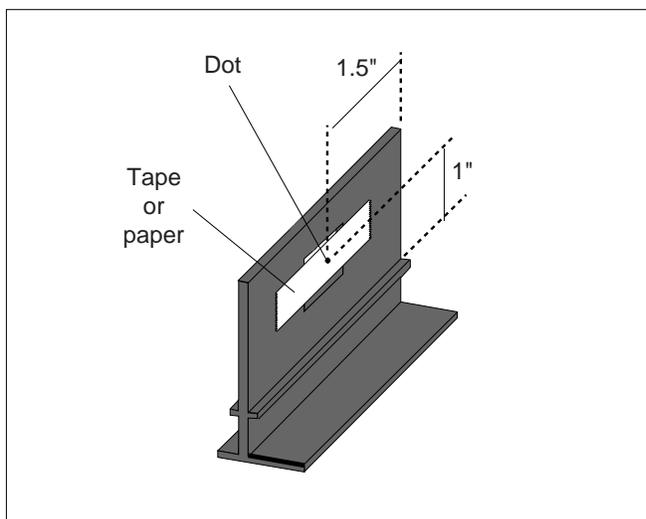


Figure 1 Connecting the Laser Alignment Bench

- By adjusting all five leveling screws (one on the laser alignment bench, two on the optics bench, and two on the bench couplers), align the two benches so they are in a straight line. Use a meter stick or a long straight edge on top of the benches to check vertical alignment, and on the side of the bench to check horizontal alignment.
- When the benches are aligned, tighten the lock-nuts on all the leveling screws, and also tighten the four hex-head screws. After tightening the screws, recheck the alignment.

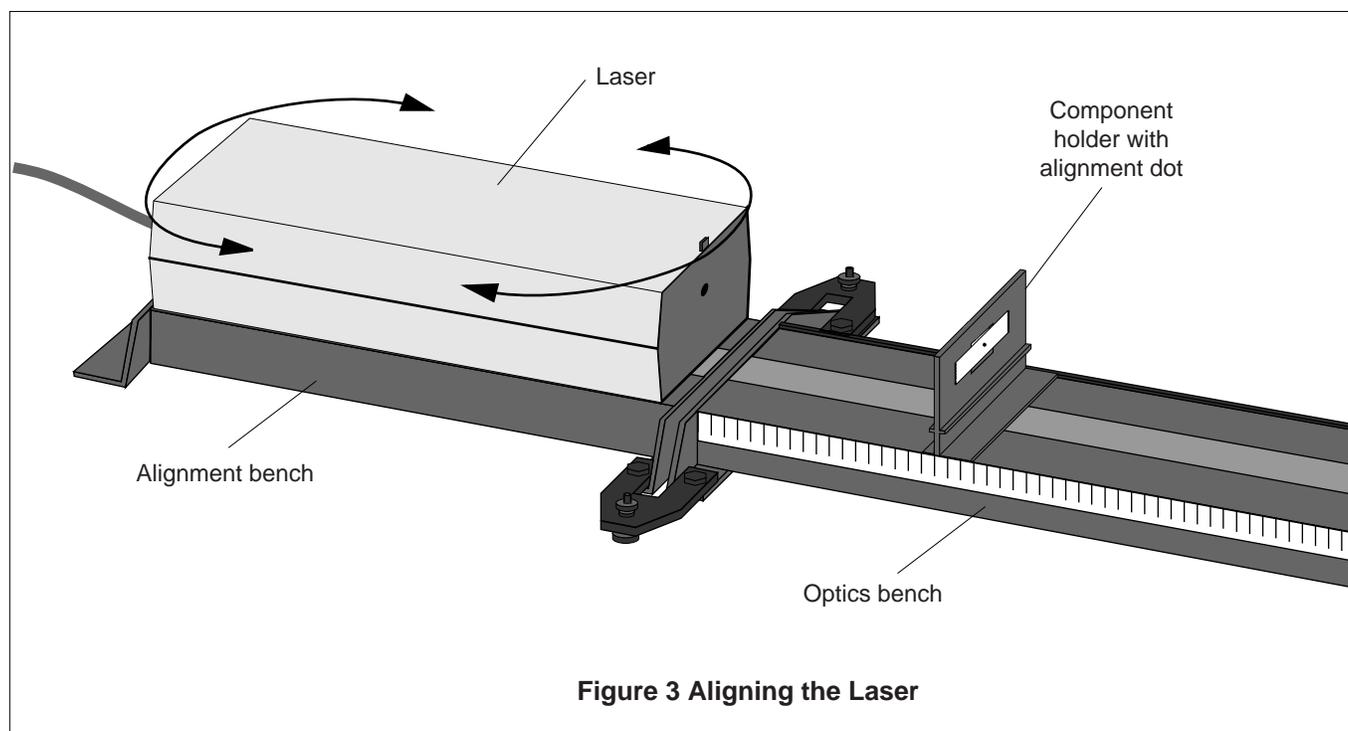
**To Align the Laser (so the laser beam is coincident with the optical axis of the bench):**

- Place a piece of masking tape or tape a piece of paper over the square hole on the front of a component holder, as in Figure 2. Make a small dot on the tape or paper, in the center of the square hole (1-inch from the top of the component shelf, and 1.5-inch from the edge of the component holder).
- Place the laser on the alignment bench, as in Figure 3. Center the laser on the bench, and make sure it is reasonably parallel with the bench.
- Place the component holder on the optics bench, about 10 cm from the laser aperture. Make sure that the component holder is flush against the alignment rail of the bench. The dot on the tape now marks the optical axis of the bench.
- Turn on the laser, and move the aperture end of the laser sideways, as needed, so that the laser beam falls on the dot.



**Figure 2 Locating the Optical Axis**

- Move the component holder about 90 cm away from the laser aperture. Again, be sure the edge of the component holder is flush against the alignment rail of the bench.
- Without moving the aperture end of the laser, move the rear end of the laser as needed to recenter the laser beam on the dot. (You may also need to adjust the leveling screws on the laser alignment bench in order to center the laser beam vertically on the dot.)
- Repeat steps 3 through 6 until the laser beam is aligned with the dot for both positions of the component holder.



**Figure 3 Aligning the Laser**