



## LBO SHG REINSTALLATION

The following procedure is valid only for a laser system that has been in operation with no major adjustments made or optical components removed in the attempt to correct a malfunctioning system.

1. The laser head should have the Quantronix supplied I.R. 12% Transmission Mirror installed at the cavity end located by the LBO Cell Assembly.
2. The laser head at this time should be capable of meeting the performance specifications for this model system with the LBO Cell Assembly removed. Performance specifications specific to your system will be found on the original data sheet supplied with your system. Both CW and Q-switched modes of operation should be verified before reinstallation of LBO Cell Assembly.

**Note: The Q-switch requires water cooling when r.f. drive power is present.**

3. Reinstall the LBO Cell Assembly into the mount taking note that the black mark on the flange is placed in the uppermost position; for example 12:00 PM. Replace fastener hardware at flange to retain LBO Cell Assembly to the mount.
4. Cut to length the water-cooling tubing loop at the LBO Cell Assembly and place each end of the tubing on the LBO mount fittings. The length of tubing should not be too long causing lack of response to LBO cell tilt adjustments.
5. Reconnect the cooling water circuit for the LBO and Q-switch. Turn water pump on for coolant circulation and examine the fittings to make certain there are no water leaks. Place cover plate over rear of LBO Cell Assembly taking care not to pinch coolant tubing. Replace beam tubes to enclose resonator.
6. Verify coolant flow direction for maximum stability:  
At this time verify direction of flow is from the temperature regulated inlet water supply at laser head pump chamber to the LBO cell, then to the Q-switch and returning to the discharge manifold of the laser head pump chamber. The coolant path flow should conform to above for stability of the SHG output.

### **IR SAFETY GLASSES REQUIRED FOR THE FOLLOWING STEPS!**

7. Turn on the Krypton Arc Lamp and set current to approximately 10 amperes. Turn off the Q-switch R.F. (in q-switch menu) using the Model 224 Remote Control Unit. The laser is to be operated in the CW mode only. Open the inter-cavity shutter. Using an IR card placed at the transmission mirror end; slowly increase the lamp current until lasing is detected. With an IR power meter set the CW output to approximately one watt by slowly increasing the Krypton Arc Lamp current. Do not exceed one watt.

8. Centering of LBO Cell Assembly:

At each of the two LBO mount translation adjustment knobs place a piece of tape to "flag" its angular orientation. Rotate and count the number of turns until the LBO Cell Assembly aperture interacts with the resonator as evidenced by a sudden decrease in IR output from the original one watt level. Note the position of the "flag" and rotate the translation adjustment in the opposite direction while keeping track of the number of turns to interact with the resonator. Now translate the LBO Cell Assembly back to the center position by rotating the translation adjustment one half the number of turns.

9. Repeat above procedure for second axis.

10. Phase Match Angle:

**MAKE PHASE MATCH ANGLE ADJUSTMENTS DESCRIBED BELOW ONLY AT REDUCED OPERATING POWER. FAILURE TO OBSERVE THIS PRECAUTION MAY RESULT IN DAMAGE TO THE Nd:YLF CRYSTAL AND THE LBO CRYSTAL!**

With LBO Cell Assembly centered and one watt or less of CW IR turn on the Q-switch R.F. and set the PRF to 1.0 kHz. Place a white sheet of paper in front of the IR Power Meter and observe the green SHG pattern/intensity. Refer to Figure Y. Adjust tilt control 1 to over lap spots or maximize SHG intensity. Refer to Figure Z and adjust tilt control 2 to maximize SHG intensity. Verify that tilt control or LBO Cell Assembly theta is set to the maximum intensity peak as shown in Figure Z.

11. With tilt adjustments completed, compare CW performance to original data sheet at point LBO Cell Assembly was installed in cavity with 12% Transmission Mirror present.

**CAUTION - DO NOT MAKE ANY ADJUSTMENTS TO LBO CELL ASSEMBLY!**

If results compare favorably proceed to next step describing reinstallation of HR/HR Mirror.

**IR SAFETY GLASSES NOT REQUIRED FOR FOLLOWING STEPS:**

12. Reinstall HR/HR Mirror:

Decrease Krypton Arc Lamp current to approximately 10 amperes and close inter-cavity shutter. Replace 12% Transmission Mirror with HR/HR Mirror. Place metal safety cap removed earlier over this opening. Open inter-cavity shutter. SHG green light should be evidenced from turning mirror assembly with laser operating in either CW or Q-switched mode. Make small and slow tilt adjustments to HR/HR Mirror Mount to maximize SHG output while in Q-switched mode of operation.

13. Place a power meter at output of turning mirror assembly and Q-switch system at 1.0kHz. Slowly increase lamp current to obtain approximately 30% of maximum energy output. For example 4.5 watts/milli-joules for a Model 527DP-H laser head. Make a very small and slow adjustment to LBO Cell Assembly tilt control number 2 in Figure X to maximize SHG output. Limit small and slow tilt adjustment to region described in Figure Z. Do not make large tilt adjustment to LBO Cell Assembly as made during earlier operation with 12% Transmission Mirror. Make small and slow tilt adjustments to HR/HR Mirror Mount to maximize SHG energy output.

14. Compare present performance to an earlier data point from original test data sheet. This completes basic reinstallation of LBO Cell Assembly.

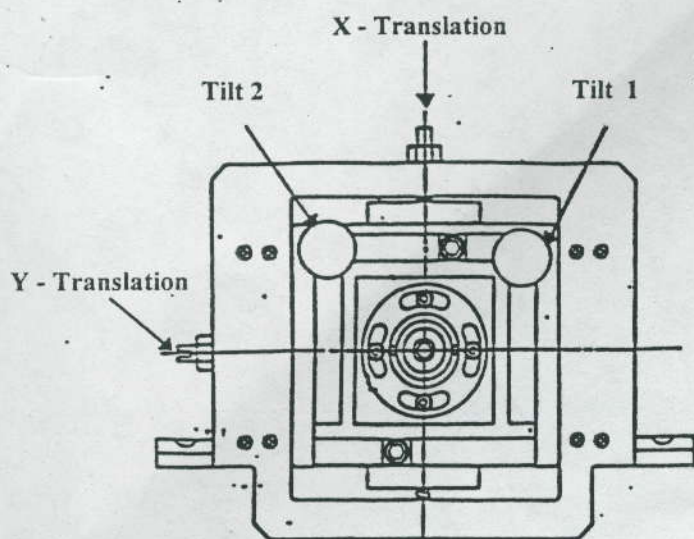


Figure X

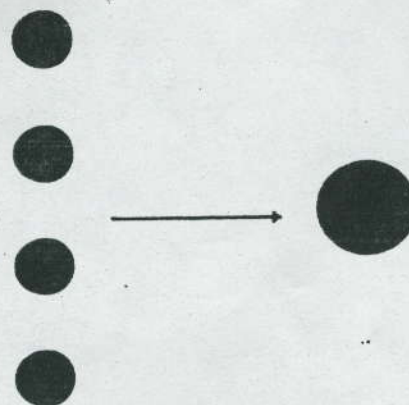


Figure Y

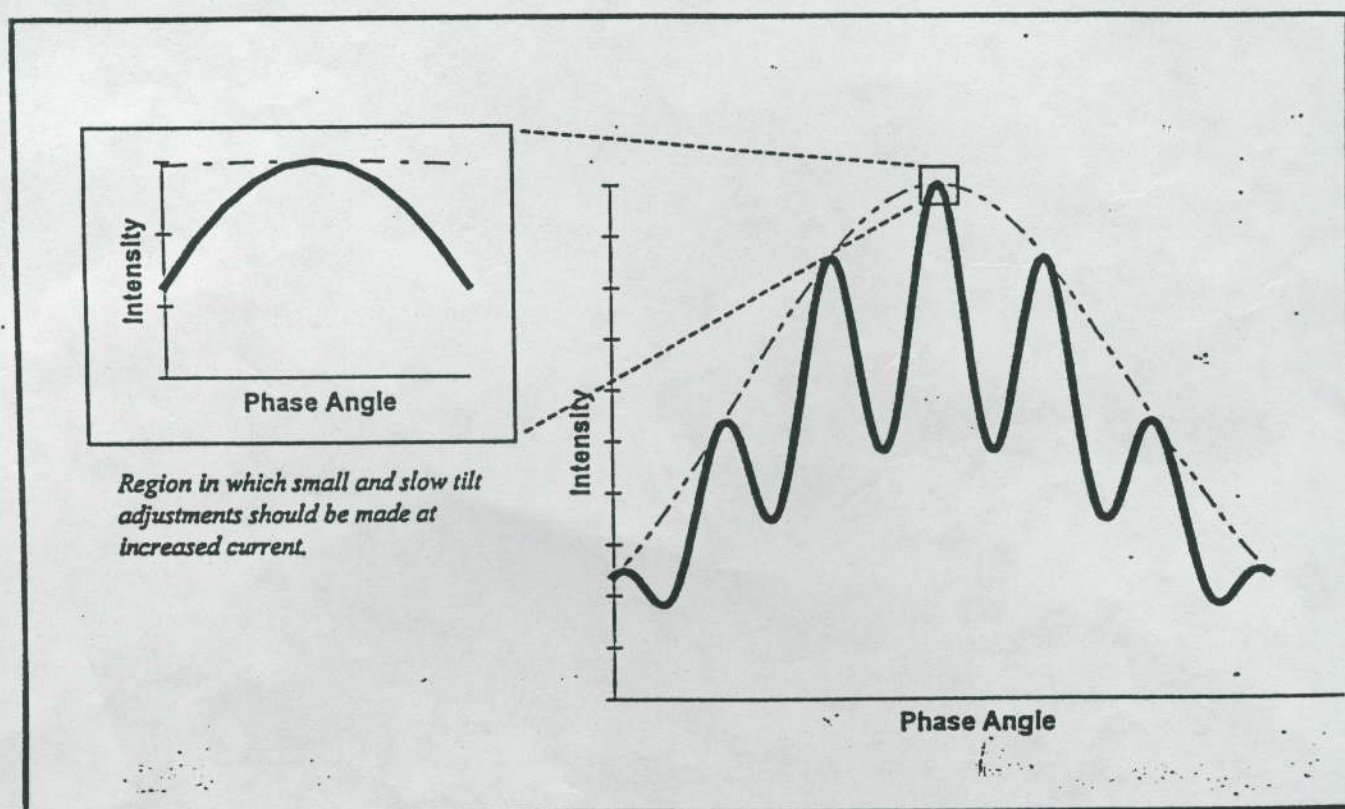


Figure Z