Monitor multiple samples using a multiplexer

Figure 1 Displays a schematic and picture of the multiplexing system developed at our facility. This system allows up to 18 individual channels to be monitored with a single PI-200 Raman system. The excitation and collection fiber-optic patch cables are located on a spindle that is controlled by a servo motor inside the instrument. The sample probes and patch cables are connected to the top of the instrument in one of the 18 different channels displayed in the above picture.

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System Stability, 4 Weeks, 7500 Spectra

50/50 Toluene / Acetonitrile Solution and a Diamond Reference Standard

**Figure 2** The observed 7500 Raman spectra obtained using a single probe during the four week stability study. Each of these spectra was collected over a 1½ minute integration time period.

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Figure 3  The Gaussian/Lorentzian fitted frequency shift mean for toluene’s two strongest Raman bands at 786 and 1003.5 cm\(^{-1}\).
**Figure 4** A histogram of the fitted frequency shift means for the 1003.5 cm^{-1} Raman band, and one can observe that the histogram falls off to zero at ~ 1003.41 and 1003.48 cm^{-1}. These values correspond to 3 times the SDV indicating that the mean values are located within an expected Gaussian distribution.
Figure 5 During this study Raman probes were located at positions nos. 1, 9, and 18. The Mux would measure at 1, 9, 18, and go back to position 9 and 1. The system would repeat this cycle 10 times, and then go to a home position to double check the mux position and make any corrections if necessary. The Red dots in the intensity plots, are when the multiplex went to its home position. Again, no abrupt change after going to a home position. The plots above illustrate the intensity of the 1004 wave number peak of toluene as measured at the three different mux positions. Note that there is a ~ 2% change in intensity over the 28 day test. This intensity change is well within the intensity noise on our laser source. Thus, the multiplex is not adding any additional noise intensity to our measurements.