excessive amount of time to CCD readout). Note that for previous photographic monitoring it was important to approximately match the comparison star and QSO magnitudes due to nonlinearity of the detector. With CCDs we can do accurate relative photometry with stars which are an order of magnitude brighter than the QSO.

The field size for the detector used at the Lick 1 meter (TI 500x500 CCD, 0.58 arcseconds per pixel) was roughly 4.7 arcminutes on a side. For high galactic latitudes this yields on average 3-6 stars with magnitudes between 15th and 17th. Unfortunately, for some fields and some of the brighter QSOs we are forced to rely on comparison stars fainter than the QSO to establish the relative flux light curve. We also wish to have as many comparison stars as possible for consistency checks since some stars will be affected, on occasion, by cosmic rays, hot pixels, or CCD defects or may be intrinsically variable (see chapter 7). For this reason, we often include comparison stars fainter than the QSO.

Maps of the QSO field were made with the comparison stars marked. These maps are used on future observing runs so that the telescope can be pointed to maximize the number of comparison stars falling in the CCD field of view. This often means placing the QSO away from the center of the CCD. It is important to use a similar orientation on different observing runs so that the same group of comparison stars are observed each time.

5.4 : Multiple Exposures

Since the peak electron counts in the brighter comparison stars in a given field will generally reach the non-linear range of the CCD response in an exposure time shorter than that required to attain a signal-to-noise of $\sim$100 for the QSO, multiple exposures are required. Multiple exposures also allow for the detection of sporadic noise events such as cosmic rays. Since there are systematic differences between areas on the CCD due to defects, hot pixels, and uneven response (even after flat-field correction, see chapter 6), we have attempted to adjust the pointing of the telescope between exposures to average out these systematic differences. An even more aggressive strategy (more exposures, more