Dispersed fluorescence spectra of the acetylene $\tilde{A} \rightarrow \tilde{X}$ system have been recorded, and observed transitions in these spectra have been assigned which terminate on eigenstates with greater than 15,000 cm$^{-1}$ of internal energy. Results for both $^{13}$C$_2$H$_2$ and $^{12}$C$_2$H$_2$ will be discussed, as well as implications for acetylene-vinylidene isomerization, which is expected to become feasible at 15,200 cm$^{-1}$.