Experimental System to Study the $\alpha$ Decay of $^{178}$Hf$^{m2}$ K.A. NETHERTON, Drexel University, J.J. CARROLL, M.S. LITZ, US Army Research Laboratory, S.A. KARAMIAN, Joint Institute for Nuclear Research — The nuclide $^{178}$Hf possesses a second isomer that is notable in its spin ($I^r = 16^+$), lifetime ($T_{1/2} = 31$ years) and excitation energy ($E_m = 2.446$ MeV). It is this high excitation energy that permits $\alpha$ decay of the nucleus from the isomeric state, although the $^{178}$Hf nuclide is stable in its ground state. The $\alpha$ decay was detected (PRC 75, 057301, 2007) through the use of a track detector and the associated half-life was deduced to be $(2.5 \pm 0.5) \times 10^{10}$ years, compared with the previously-known half-life for IT decay of 31 years. The most probable decay sequence was predicted to be $\alpha$ decay with $E_\alpha = 3.91$ MeV to the $I^r = 6^+$ member of the $^{174}$Yb ground-state band. However, so far no spectroscopic study of this rare decay has been performed. An experimental system to accomplish this has been constructed using a silicon surface barrier (SSB) charged-particle detector and a high purity Germanium (HPGe) $\gamma$ detector, with the aim of recording both $\alpha$ decays and $\alpha - \gamma$ coincidences. The experimental design, instrumentation and preliminary testing will be discussed.