A laser pump-dispersed fluorescence probe approach has been used to monitor state-to-state inelastic scattering in $S_1 (^3A_u)$ trans-glyoxal (CHO-CHO) by a variety of collision partners. These experiments have been benchmarks for the fully quantal three-dimensional theoretical calculations of Clary, Kroes and coworkers. Their azimuthal and vibrationally close-coupled, infinite-order-sudden (AVCC-IOS) calculations predict that excitation of the low frequency torsional mode must also involve a change in angular momentum. This selection rule is derived directly from symmetry arguments in the close-coupled matrix elements. Experiments were designed to investigate these predictions further, and involve glyoxal $^3P^0K^n + H_2$ or He where $n = 0, 2$ and $3$. The results show that quantum symmetry effects are present but not to the extent of the theoretical predictions.