Two-dimensional torsion-inversion surfaces for methylamine, protonated methanol and ethyl radical were calculated and fit to a function containing a polynomial in the inversion angle (\( \tau \)) and trigonometric functions of the torsional angle (\( \alpha \)). Calculations were done at the B3LYP, MP2, and CCSD(T) levels with the 6-311++G(d,p) and 6-311++G(3df, 2p) basis sets and partial optimization. \( \text{CH}_3\text{NH}_2, \text{CH}_3\text{OH}^+ \) and \( \text{CH}_3\text{CH}_2^- \) have \( G_{12} \) symmetry with 6-equivalent minima which are located by the various calculations at inversion angles 6.5 to 11; 42 to 45.5 and 52.5 to 55 degrees respectively on either side of planar. The three molecules have very different barriers to inversion ranging from no barrier for \( \text{CH}_3\text{CH}_2^- \) to 838 cm\(^{-1} \) for \( \text{CH}_3\text{OH}^+ \) to 1837 cm\(^{-1} \) for \( \text{CH}_3\text{NH}_2 \). The dominant torsion-inversion coupling term in all cases has the form \( \tau \cos 3\alpha \).