Abstract. Let $G$ be a countable Abelian group with $\mathbb{Z}^d$ as a subgroup so that $G/\mathbb{Z}^d$ is a locally finite group. (An Abelian group is locally finite if every element has finite order.) We can construct a rank one action of $G$ so that the $\mathbb{Z}$-subaction is 2-simple, 2-mixing and only commutes with the other transformations in the action of $G$.

Applications of this construction include a transformation with square roots of all orders but no infinite square root chain, a transformation with countably many nonisomorphic square roots, a new proof of an old theorem of Baxter and Akcoglu on roots of transformations, and a simple map with no prime factors. The last example, originally constructed by del Junco, was the inspiration for this work.