A covering group of the elementary abelian 2-group $Q$ of rank $n$ is a group $G$ for which $G/G' \cong Q$ and $G' = Z(G)$ is elementary abelian of order $2^{\binom{n}{2}}$. Designating a particular covering group amounts $G$ to writing the square of each of the $n$ elements of a minimal generating set for $G$ as a product of the $\binom{n}{2}$ simple commutators in the generators. One may investigate whether and when different such designations yield non-isomorphic covering groups. In this talk we discuss the question of how many characters of a covering group of $Q$ may be real-valued, and describe up to isomorphism those groups in which the maximum possible number of real-valued characters is attained.