We say that a group G has a finite covering if G is a set theoretical union of finitely many proper subgroups. According to B. Neumann this is true iff the group has a finite non-cyclic homomorphic image. Thus, it suffices to restrict our attention to finite groups. The minimal number of subgroups needed for such a covering is called the covering number of G denoted by $\sigma(G)$.

Let S_n be the symmetric group on n letters. For odd n Maroti determined $\sigma(S_n)= 2^{n-1}$ except for $n = 9$ and gave estimates for n even showing that $\sigma(S_n) \leq 2^{n-2}$. Using *GAP* calculations, as well as incidence matrices and linear programming, we show that $\sigma(S_8) = 64$, $\sigma(S_{10}) = 221$, $\sigma(S_{12}) = 761$. We also show that Maroti 's result for odd n holds without exception proving that $\sigma(S_9) =256$

We establish in addition that the *Mathieu* group m_{12} has covering number 208, and improve the estimate for the *Janko* group J_1 given by P.E. Holmes. (L-C K., D.N., E.S.)

We also determine $\sigma(A9) =157$, $\sigma(A11)=2751$ (S.M., D.N., M.E.)