Theorem 16: <u>There exists a principal T-bundle lifting of the action</u> $\hat{\omega}$ <u>if and only if</u> $\hat{\omega}^*(k) = 1 \times k \in H^2(G \times X; Z^n)$

Now $\omega^*(k)$ always has the form

$$\omega^*(k) = (1 \times k) + \omega_1 + (\omega^*(k) \times 1)$$

where $\omega_1 \in H^1(G; H^1(X;Z^n))$. Thus the theorem shows that there are exactly two obstructions to the lifting; ω_1 and $\omega^*(k) \in H^2(G;Z^n)$. Now $\omega_1 = 0$ whenever either $H_1(G)$ or $H_1(X)$ is torsion. The other obstruction $\omega^*(k)$ is frequently zero. It is zero when the action has a fixed point, when $H_1(X)$ is torsion and $H_1(G)$ is torsion free. It satisfies the equation $\chi(X)\ \omega^*(k) = 0$ where $\chi(X)$ is the Euler Poincare number of X. These remarks allow us to recover the lifting results of T. E. Stewart [17] and J. C. Su [18] on the torus bundle lifting problem immediately. Also noteworthy, the theorem gives us a transformation group interpretation of the algebraic homomorphism ω^*. It is the author's conviction that the induced homomorphism of the action on cohomology should play a much more important role in transformation group theory than it has up to now.

I would like to acknowledge several conversations that I had in connection with this work. Most important was that with Glen Bredon which resulted in the counterexample