complex line bundles over X which are G-line bundles correspond to the image of i^* in $H^2(X,Z)$, which is isomorphic to the group of complex line bundles over X.

§4. The Lifting Problem and the Orbit Map.

In this section we shall read out specific lifting theorems from the general results of the previous sections. We shall note how the orbit map $\omega: G \to X$ plays a decisive role in lifting problems. For the case of covering spaces, it can provide the only obstruction to lifting, for torus bundles it is one of two obstructions. Finally we study oriented fibrations with fibres $K(\pi,n)$. This will give geometric significance to the cohomology homomorphisms i^* and $\hat{\omega}^*$ and ω^*.

Let us consider the case of a covering $\tilde{X} \to X$ with G acting on X. Now theorem 5 gives the complete solution to this problem. How does this agree with what was previously known? In Chapter I, section 9 of G. Bredon's book [4], there is a selection of lifting theorems and an excellant lift of references for this problem.

We want to convert the statement $\tilde{X} \to X$ is a pullback by i of a bundle over X_G to a group theoretic one. First note, since $\tilde{X}$ is connected, the bundle over X_G must have a connected total space, hence if a pullback exists the bundle over X_G is some covering $\tilde{X}_G \to X_G$.