Thus we always have an equivariant n-connective covering for connected G if X is a compact CW complex and $\chi(X)$ is relatively prime to the torsion of $\pi_n(X)$, since by [3, theorem 1.1] we have $\chi(X)\omega^* = 0$.

Now we consider the lifting up to homotopy problem for fibrations with fibre $K(\pi,1)$. For connected G we can convert all the information concerning i^* to information concerning the action $\hat{\omega}$. Recall that $\hat{\omega}^*(k)$ has the form $(1 \times k) + \omega_1 + (\omega^*(k) \times 1)$ where $k \in H^2(X;\pi)$.

Lemma 14: <u>Suppose</u> G <u>is connected</u>. <u>Then</u> $\hat{\omega}^*(k) = 1 \times k$ <u>if and only if</u> k <u>is in the image of</u> $i^*: H^2(X_G;\pi) \to H^2(X;\pi)$ <u>for arbitrary coefficients</u> π.

Proof: Consider the commutative diagram

$$\begin{array}{ccc} G \times X & \xrightarrow{\hat{\omega}} & X \\ \downarrow{\scriptstyle i \times 1} & & \downarrow{\scriptstyle i} \\ E_G \times X & \xrightarrow{\phi} & X_G \\ \downarrow & & \downarrow \\ B_G & \xrightarrow{1} & B_G \end{array}$$

Since E_G is contractible, it follows that if k is in the image of i^* then $\hat{\omega}^*(k) = 1 \times k$.