CHAPTER-I

INTRODUCTION

The increasing demand for electrical energy creates the need for more transmission lines with higher system voltages. However, it may not be easy to find the "Right of way" (R.O.W) for new overhead lines, from economical, technical and political grounds due to the high density of population in the Urban areas, difficulties experienced in obtaining forest clearances and nature preservation philosophy.

This increasing demand for power can be met alternatively by "Uprating" or "Upgrading" the existing line with suitable modifications in the existing transmission lines. While the former calls for replacement of existing power conductors with higher capacity conductors, the latter requires increase in the transmission voltage levels. The efficient use of existing transmission 'right of way' necessitated development of various new compact designs of transmission lines with insulated cross arms and solid core post insulators. The project on upgrading of existing 132 KV line to 220 KV transmission line by use of Insulated cross arms was assigned to Research Directorate PSEB on RSOP basis by CBI&P, New Delhi.

The basic problems that need to be solved in the upgrading process are of electrical, mechanical and practical nature. Practically, it may not be possible to spare the line in question for upgradation which is already in use and part of existing transmission system. Further more, the size of conventional transmission line towers is governed primarily, by the live metal clearance required with respect to tower under various conditions of swing of the conductors. In case of horizontal formation, the spacing between two phase conductors is the sum total of the minimum live metal clearances required by the two conductors and the width of the steel structure. In case of the vertical formation, the distance between the two conductors is governed by the live metal clearances between the top conductor and the inclined member of the lower steel cross arms. In this report, an attempt has been made to analyse, whether the electrical parameters of transmission line towers can be changed by reducing live metal clearances and phase to phase separation between conductors. This is necessary as unless the standard
clearances are brought down without in any way affecting the performance of the transmission lines, the upgradation of transmission lines to higher voltage will not be feasible.

The overhead conductors are insulated from their supporting structures by strings of standard insulator units. The insulation between conductors and earthed metal work is basically by air insulation. The tower window design is governed by the insulation requirement, both air insulation and insulating materials. The weight of steel that goes into the manufacture of a tower has a bearing on its geometry and therefore, the tower cost is dependent upon the insulation requirement. As such with the development of these latest technologies there is scope to reduce the tower weight by compacting the tower by use of insulator cross arms. Insulator cross arms are basically designed to replace metal cross arms with insulators. They not only offer advantages in permitting compact tower design and narrow right of way, but have the additional feature of supporting higher mechanical loads, which are more fitting to EHV transmission lines. The principle, various types and the features of insulator cross arms have been discussed separately in the chapter to follow on “Use of insulator cross arms in upgradation of Transmission lines”.