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Step Potential Modification by the Lightning Electromagnetic EnvironmentAuthors: [John M. Tobias](#); [ARMY COMMUNICATIONS-ELECTRONICS COMMAND FORT MONMOUTH NJ](#)

Abstract: The purpose of this report is to introduce a modified theory of propagation for lightning currents in earth. Recent experimental evidence has pointed to modified current flow distributions near earth grounding systems subjected to natural electric fields in excess of the fine weather electric field. Current distributions in earth due to lightning discharges are of interest to safety professionals due to the development of the step potential. This step potential examination considers the space charge region developed in the earth as a consequence of the charge present in a thunderstorm **cloud**. It is theorized that, under certain conditions, the step potential may be significantly higher than previous theoretical estimates, or empirical results obtained under fine weather electric field conditions. The objective of this report is to present the theory of the influence of the **cloud** charge on current distribution and, hence, step potential by citing recent qualitative observations of rocket-triggered lightning studies. Behavioral description of the step potential will be developed from electromagnetic theory. Impact of the modified step potential on personnel electrical hazards will be discussed. The presentation concludes with suggestions for further research in this area.

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