

### **Calculation of the Current Distribution of Return Circuit at the Station**

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The appropriate layout of the return circuit at the station, which consist of rails, cross bonds, jumper wires, etc. are very important for preventing the false dropping down of track circuits caused by the magnetic saturation of impedance bonds, and the damages to insulations . However, the layouts have been designed based on experiences. In order to enable more appropriate design, we propose to calculate the current distribution of the return circuit at the station based on nodal analysis. We have studied the application of nodal analysis to the current distribution calculation, and we confirmed the validity of the analysis by comparing the computed distribution with the actual distribution.