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**VOLTAGE HAZARD ASSOCIATED WITH  
USE OF CIRCUIT BREAKERS HAVING  
GRADING CAPACITORS**

## **Voltage Hazard Associated With Use of Circuit Breakers Having Grading Capacitors**

It is possible to develop substantial sustained voltages on a bus which has connected potential transformers and is disconnected from the external system through an open air circuit breaker having grading capacitors. A sustained voltage of about one-half rated magnitude and one third normal frequency has been observed on a supposedly deenergized bus. We are not aware of any equipment failures that have resulted from this phenomenon, but safety is a concern due to the hot bus and shock hazard. This reemphasizes the necessity for strict adherence to approved grounding procedures in the Reclamation Operation and Maintenance Safety Standards when approaching and working

on circuits and Instrumentation. The voltages observed in this phenomenon were caused by a ferro-resonant circuit consisting of the grading capacitors in the air circuit breaker and the magnetizing impedance of the potential transformers. The resonance can be suppressed through application of resistors or through use of capacitor potential devices instead of potential transformers. Where observed voltages are found to be objectionable, recommendations for corrective action should be obtained from the Program Services Division, Project Operation Services Staff, Code D-5140, Denver Office.