1 INTRODUCTION

Personnel safety and many aspects of an electrical installation's stable operation are directly related to the adequacy and continued performance of the electrical facility's ground mat. Therefore, AMP was using the fall-of-potential method to determine the adequacy and continued performance of the ground mats that are connected to its electrical facilities.

This document provides the necessary information and criteria needed to establish if a safe and effective grounding is in place. The purpose of this document is twofold: to provide a current overview of the existing earthing and a guideline for future earthing tests.

2 GENERAL PHILOSOPHY

The principal factor in determining the adequacy of a ground mat is its impedance to earth. Designing and achieving a low impedance ground still includes a good deal of both art and science. Impedance is certainly a major consideration in the design of all electrical facilities. However, there are no legislated standards for acceptable ground mat impedance levels at large electrical installations. Instead, the general philosophy is, the lower the better, with some consideration of economics.

AMP considers acceptable impedance levels as less than 3 ohm for large electrical facilities. Although there can certainly be exceptions in a specific case, it is generally true that a ground mat impedance of 3 ohm will be adequate to:

- Protect personnel and property from injury or damage by high voltage surges resulting from lightning, switching, or other causes.
- Handle discharge currents from lightning arrestors, overvoltage gaps, and so on.
- Provide a ground return path for grounded wye generators and transformers.
- Provide stable ground conditions for protective relays.
- Improve the reliability of electric process controls, computers, and communication circuits by providing low-resistance ground connections.

3 TEST OBJECTIVES

From the discussion in section 2, we understand that ground mats are engineered to achieve impedance levels that provide adequate protection and stability for a facility, and once installed they remain physically and electrically stable. "So why test an existing ground system?" The following are valid reasons for considering such tests:

- To obtain realistic earthing resistance values.
- For determining the step and touch potentials which may occur within a station during fault or surge conditions.
- To help to resolve the instability of equipment relays or communications, which might be caused by inadequate grounding.
- To determine the continued adequacy of the ground mat wherever system changes are implemented which increase the available fault current at the station.

- To determine the effect on the integrity and performance of the ground mat caused by known physical changes (planned or unplanned) in the grounding system.

To establish on going documentation of the stability and continued performance of the grounding system by periodic, scheduled measurement of the ground mat resistance, or, conversely, to detect any unsuspected and undesirable changes.