

# ADVANCE WEIGHT SYSTEMS, INC.

## WEIGHING SYSTEM DESIGN CONSIDERATIONS: GROUNDING

### **Equipment Grounding**

#### **1. Purpose**

Grounding may be defined as low impedance metallic connection to a properly designed ground grid, which is located in the earth. Grounding of the Ground Buss on this machine is required for two reasons:

- a. *To prevent hazards to personnel in case of a breakdown between current carrying parts and exposed metal surfaces.*
- b. *To minimize the effects of electrical "noise" on the control system.*

Electrical noise from any source, whether it is the power line, an adjacent machine, or crosstalk inside the control, is transmitted by conduction, inductive or capacitive coupling, or radiation. It is very important to maintain the electrical enclosures and panels, conduits, wire shields, and machine numbers at zero potential and also provide a return path to earth ground for noise currents in order to effectively shield the sensitive logic circuits from electrical noise.

#### **2. Reason**

Although a utility ground such as a cold water pipe is generally an adequate ground for safety purposes, it is not adequate to minimize the effects of electrical noise. In many instances other electrical equipment is also connected to this same ground, and therefore carries the transient electrical noise currents associated with all of the attached equipment.

All this noise current causes a voltage change to be developed in the pipe because of its resistance and reactance. The voltage from the ground buss to the measuring tool is, therefore, a function of the noise current flowing at any moment.

Because of this ground-shift voltage, disturbances are produced which may be coupled into the computer and cause the control to malfunction.

#### **3. Requirement**

A separate "ground electrode" should always be used to ground an electronic measuring tool. It may consist of a drive rod (solid copper or copper clad, 1/2" or larger) or buried plate, and should be installed per the **National Electrical Code, section 250-83**, as near as possible to the ground buss. This type of ground will provide a low impedance, stable, and noise-free ground needed to minimize the effects of noise on the control, and also provide a safeguard for personnel.

*Advance Weight Systems, Inc. requires a separate "ground electrode" for grounding its measuring tools. Maximum permissible ground resistance is 5 ohms. Ground rod placement should be at a point as close to the machine as possible. The measuring tool should not be grounded through its own conduit.*

For distances of ten (10) feet or less, a Green THHN 8 gauge or larger wire should be used to connect the "ground electrode" to the machine ground buss. For distances of ten (10) feet or more, a Green THHN 6 gauge or larger wire should be used to connect the "ground electrode" to the machine ground buss. Improper grounding of the machine may affect the warranty.

### **Radio Frequency Radiation**

The Balance/Scale System will not function properly in the presence of strong radio frequency radiation (such as that from heavy-duty RF heaters that are not properly shielded). Radiation sources that are over fifty (50) feet away will have negligible effect if the radiated power is less than five (5) watts.