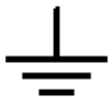
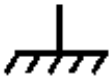

'Earth'


'Ground'


'Chassis'

APPLICATION NOTE

Ground

BEA Products to which this Application Note applies: MS21-H

CAUTION: Use extreme care when working with power wires

Introduction

Developed for use as a safeguard against failed wiring in both private and commercial environments, Earth ground, chassis ground, building ground, or simply "ground" is also used as a shield and/or a noise sink. This application note explains techniques for confirming a good ground connection.

Finding ground

A properly installed door operator/control within a metallic enclosure should be connected to Earth ground. All metal conduit and junction boxes should also be connected to Earth ground. Using an multi-meter is the most straightforward approach to confrim a ground connection. A few examples of real-world ground connections and wires are shown in Image 1 below.

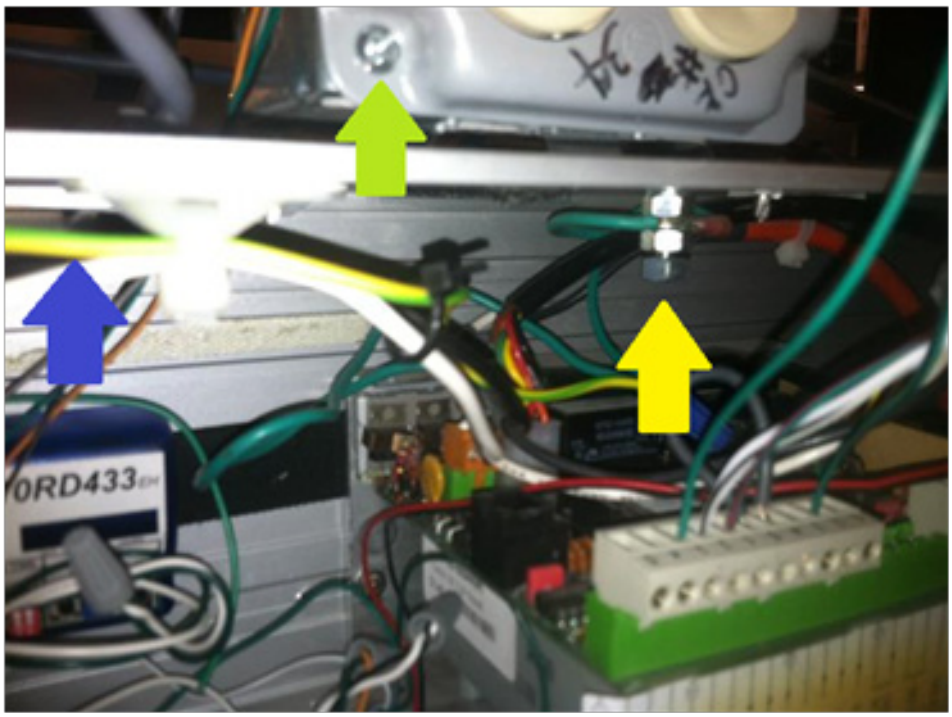


Image 1

In Image 1 above, the blue (left) arrow shows the ground (green/yellow) wire along with the "hot/live" (black) wire and the neutral (white) wire coming from the 110 VAC building wiring. The green (center) arrow shows a screw on a metallic junction box that should be connected to ground. The yellow (right) arrow shows a ground line bolted directly to the door header. All of these points should have continuity between them; they should be electrically connected. Image 2 below, illustrates a simple test with an multi-meter.

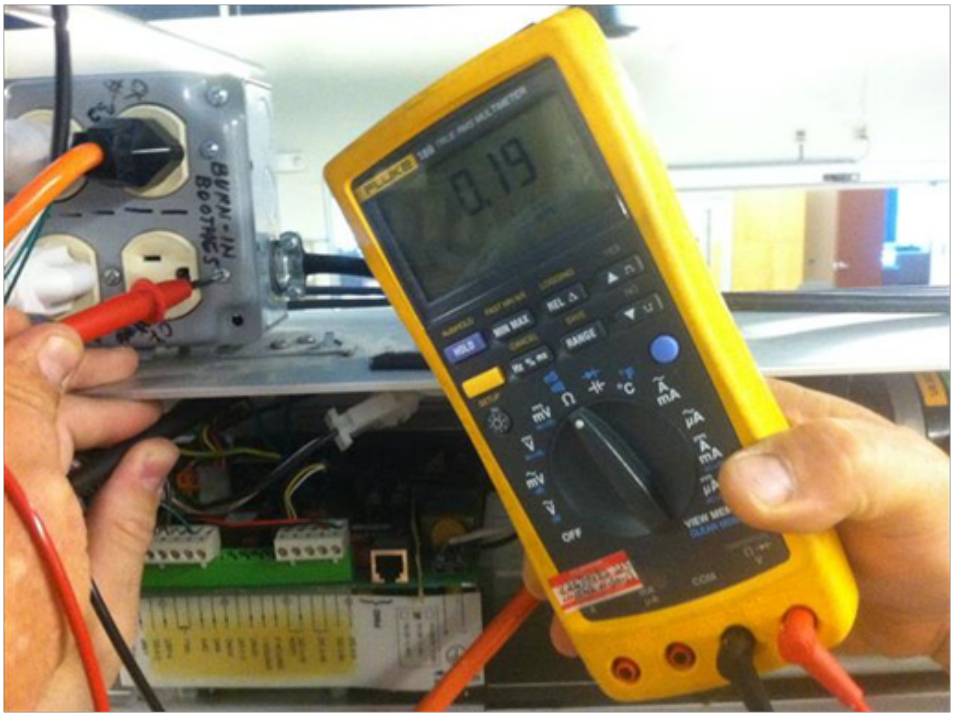


Image 2

Continuity - junction box and door header
In Image 2 above, a multi-meter is set to ohms, or resistance, and the continuity between the junction box and door header is measured. It is confirmed that there is continuity, and therefore properly grounded, because our reading is within ohms, or fractions of an ohm.

Ground and Neutral Wires
To determine if the neutral wire and the ground wire are different, and that the wiring has been installed correctly within the door header, measure either resistance or voltage between the neutral wire and the ground wire.

- If measuring resistance, the resistance value will be small but it must be grater than zero ohms if the two wires are installed correctly.
- If measuring voltage, the voltage value will be small but it must be grater than zero volts if the two wires are installed correctly.

Ground and Neutral Wires - reversed?
To determine if the neutral and the ground wires have not been reversed, use a multi-meter meter. First, make sure there is a load on the circuit. (CAUTION!) Measure the voltage between the hot wire and ground, and then measure the voltage between the hot wire and the neutral wire. The voltage reading of the hot wire to ground wire must be greater than the voltage reading of the hot wire to the neutral wire.

Sensor Grounding
When a sensor is wired, we can use a continuity test to confirm proper ground connection. Each sensor's installation environment will vary so ground should be confirmed each and every time. If the sensor is mounted in a metallic junction box and it is correctly grounded, it is preferred that the ground connection be made at both the sensor and door header.

Floating Grounds
Any unused cable conductors and cable shields should be tied together and grounded at both ends of the cable. Non-grounded conductors and shields will conduct "noise" into the cable's signal and power lines, and will interfere with normal sensor and/or door operation.