February 9, 2003

CLAMP-ON SINGLE POINT GROUND TESTERS

A very handy tool for performing grounding tests on a single point grounding system (such as a controller cabinet ground or a signal pole ground) is a clamp-on ground resistance tester. As shown in Figure 1, this device simple clamps around (not really "on") the ground wire to indicate the total resistance in ohms of the entire grounding system located below the clamp point. It has a number of **advantages** over a typical 3-point ground tester including:

1. **Ease of use** - simply "clamp on" and take a reading, no rods to drive or jumpers to connect.

2. **Ability to test an active system** - unlike a 3-point tester, a clamp-on tester can be used on an active grounding system. There is no need to disconnect the grounding system from the cabinet or the pole. This makes the clamp-on tester particularly useful for final inspection work or for maintenance and repair work.

3. **Complete system testing** - The clamp-on tester provides a reading for the entire grounding system, not just a single ground rod. Consequently, array grounding systems can be easily tested. In addition, the results of a clamp-on test includes the effect of the ground wire and connections on the overall ground resistance whereas a 3-point test deals only with the ground rod itself. A poor connection between the ground wire and the ground rod or a partially severed ground wire can be detected with a clamp-on test, but not with a 3-point test.

However, there are a couple of **disadvantages** with a clamp-on ground tester with respect to a 3-point ground tester:

1. **Can't test a partial systems** - with a 3-point system you can test the ground rods as you drive them into the ground in order to see the progress you are making towards achieving the desired level of resistance (usually 25 ohms or less). However, to use the clamp-on tester, you need a finished system so that a complete circuit is available. (The circuit being from the cabinet or pole through the ground wires to the ground rods and then via the earth back to the cabinet or pole.) So we see that both the 3-point test and the clamp-on test have their place.

2. **They're a little expensive** - expect to spend $2000 for a clamp-on tester whereas a 3-point tester is around $500.

There is one additional caution in the use of a clamp-on tester. If, when testing a grounding system with a clamp-on tester, you get an extremely low resistance reading of less than an ohm, it is almost certain that you are not testing the grounding system but rather some form of continuous loop of wire or metal. This can happen when the clamp-on tester is placed in the wrong location within the grounding system, when the ground wire is touching the cabinet during the test, or when a savvy (i.e. slimy) contractor simply loops the ground wire back to the source without installing ground rods at all (see Figures 2 and 3).

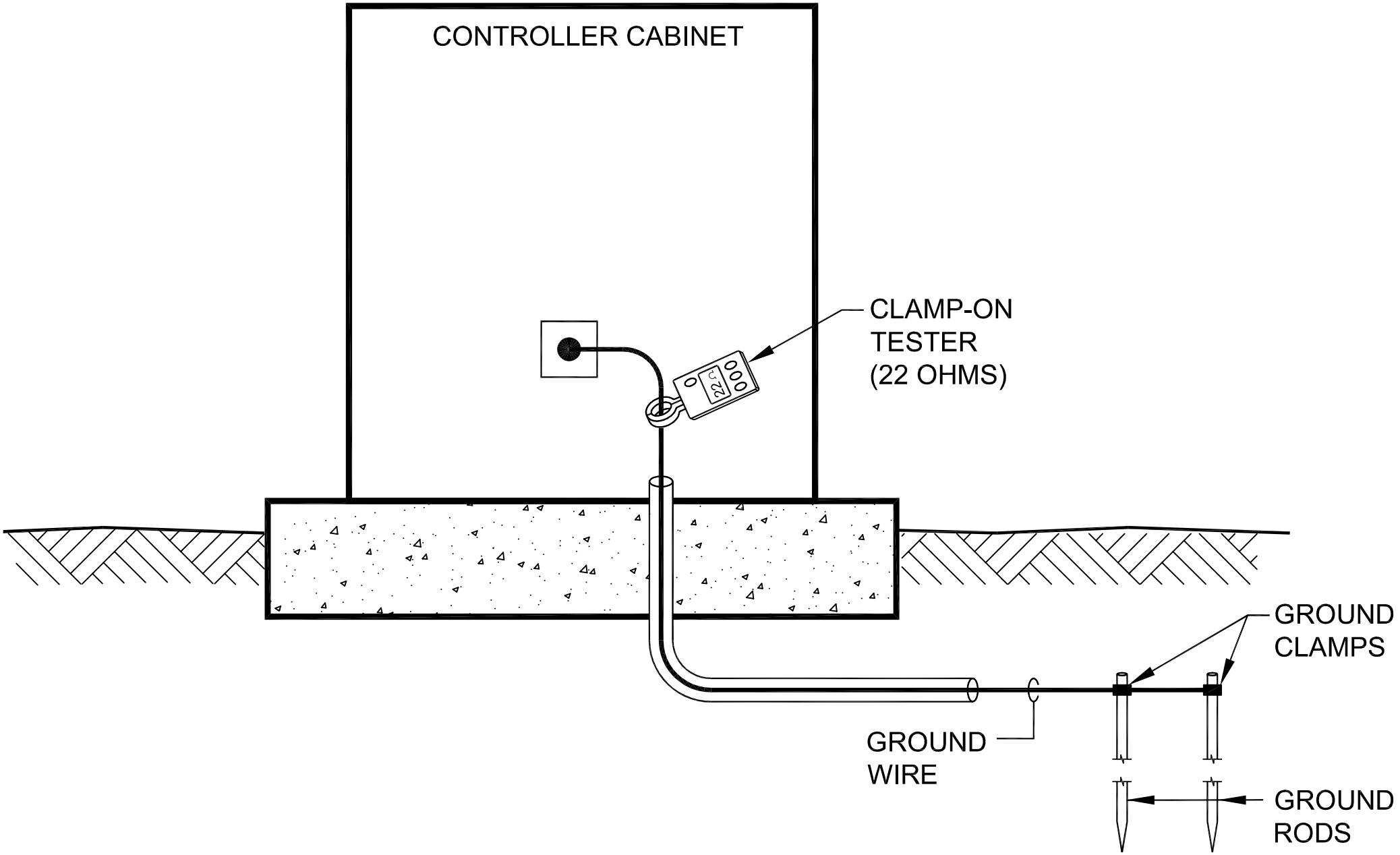
CONTROLLER CABINET
CLAMP-ON
TESTER
(22 OHMS)
GROUND
CLAMPS
GROUND
WIRE
GROUND
RODS

FIGURE 1

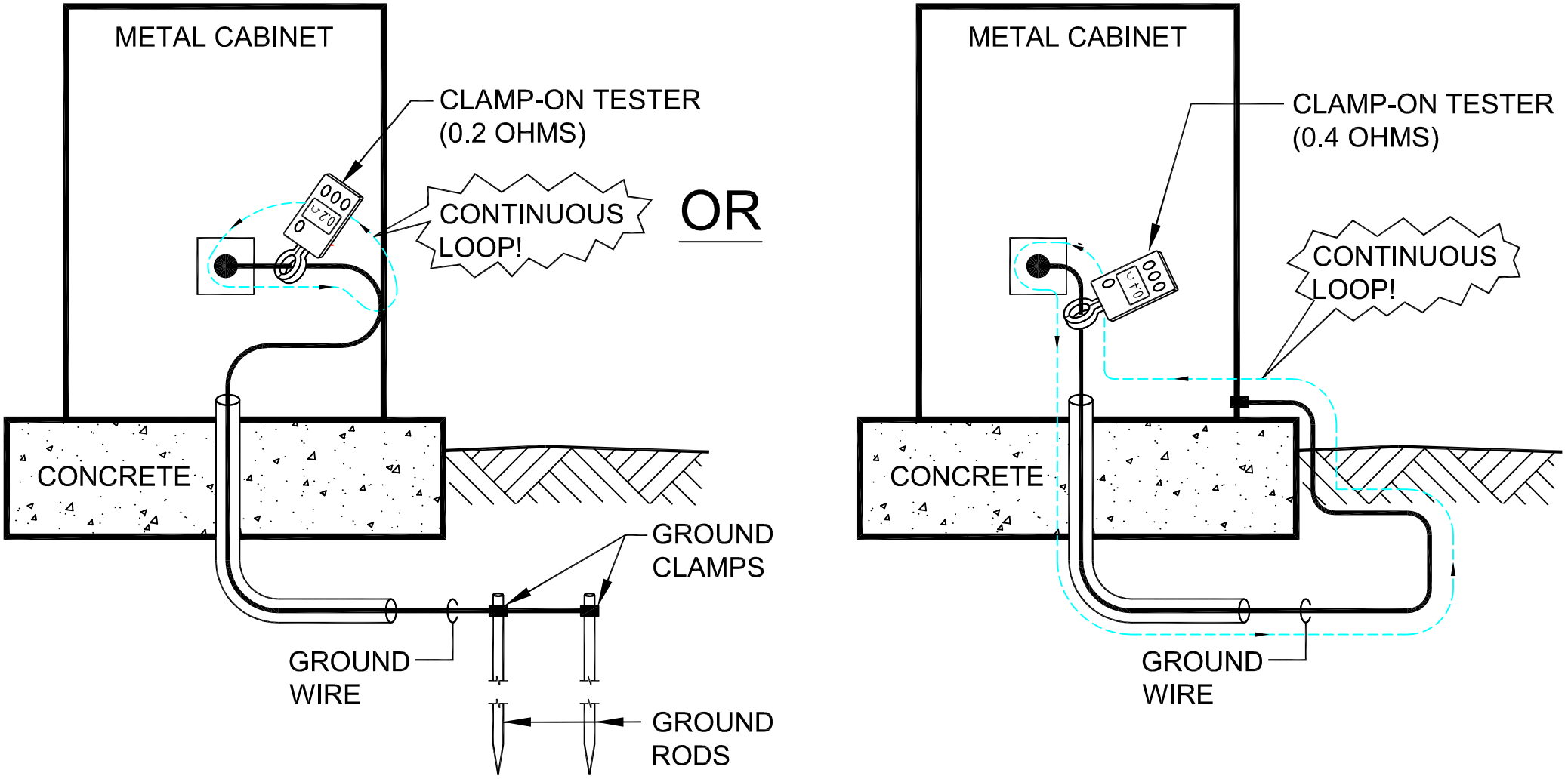
METAL CABINET
CLAMP-ON TESTER
(0.2 OHMS)
CONTINUOUS
LOOP!
OR
CONCRETE
GROUND
CLAMPS
GROUND
WIRE
GROUND
RODS
METAL CABINET
CLAMP-ON TESTER
(0.4 OHMS)
CONTINUOUS
LOOP!
CONCRETE
GROUND
WIRE

FIGURE 2

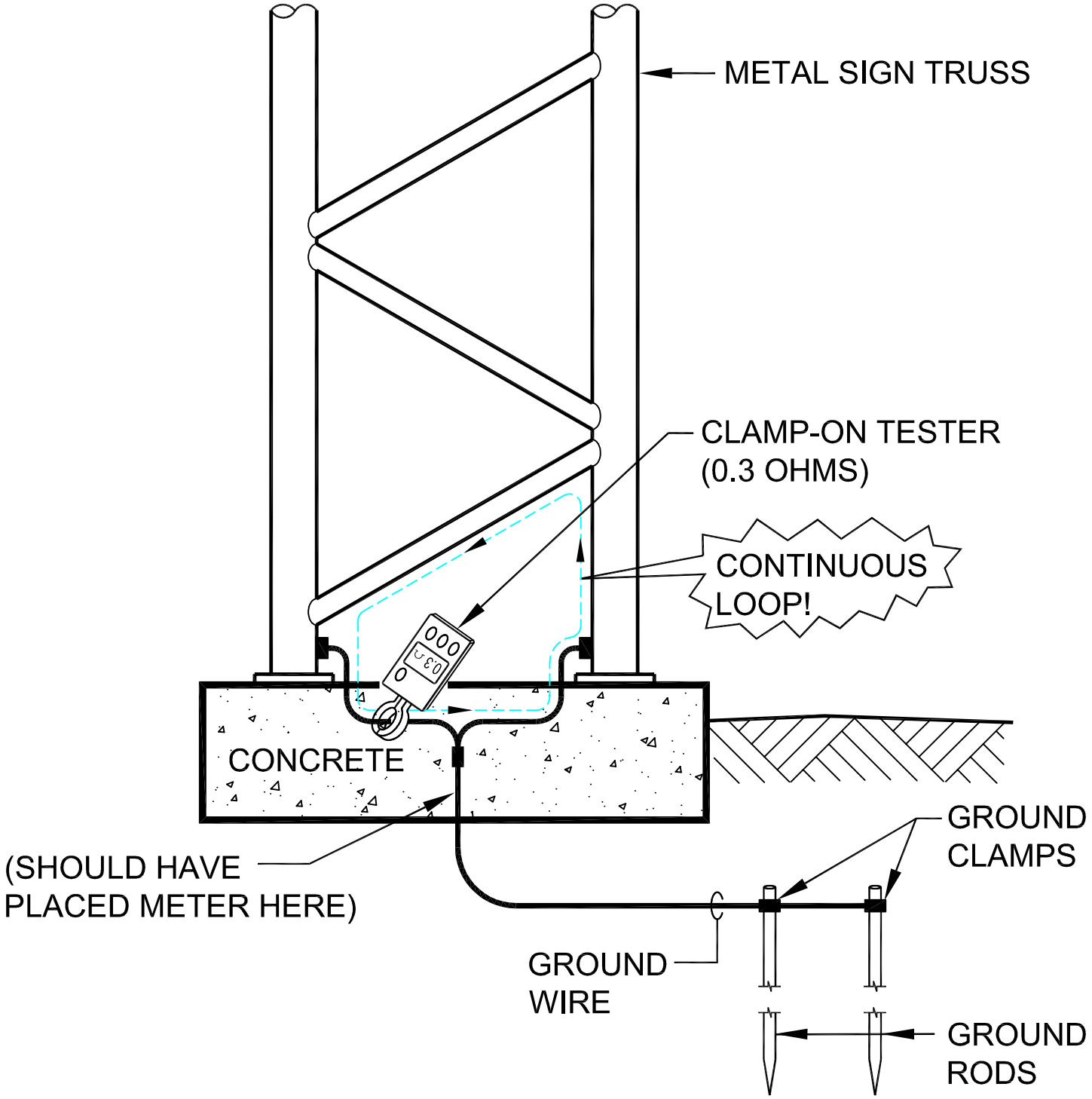
METAL SIGN TRUSS
CLAMP-ON TESTER
(0.3 OHMS)
CONTINUOUS
LOOP!
CONCRETE
(SHOULD HAVE
PLACED METER HERE)
GROUND
CLAMPS
GROUND
WIRE
GROUND
RODS

FIGURE 3