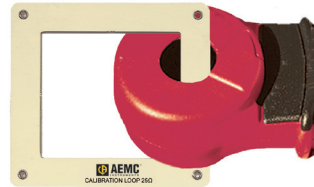


# Clamp-On Ground Resistance Tester Model 6416 Step-by-Step Usage Guide

1. Turn instrument on by rotating the selector knob to the “ $\Omega$ +A” position.
2. Allow instrument to boot up and begin beeping with 0R $\Omega$  displayed on screen.
3. Check calibration — locate the 5 $\Omega$  calibration gauge supplied with the tester and clamp the meter around any leg of the gauge.
4. Observe instrument reading – the reading should be within 0.2 $\Omega$  of gauge specification (5 $\Omega$ ). If reading is correct proceed to step 5. If not, clean instrument and repeat steps 3 and 4. **If you are not able to get the instrument to read within 0.2 $\Omega$  after cleaning instrument, do not proceed.** Have the instrument repaired.
5. Remove instrument from gauge. Observe instrument reading with nothing in the clamps. The reading should be 0R $\Omega$

If this condition is observed, continue to step 6. If not, clean instrument (see instructions below) and repeat steps 3 through 5. If, after cleaning instrument, you are still unable to get the instrument to perform as described in steps 4 and 5, open the jaws approximately 1/2 inch and let them snap shut. Make sure that the jaws close properly. **If the unit still does not perform properly, do not proceed.** Have the instrument repaired.

6. Switch instrument to Current Mode. (Rotate selector switch to the “A” position for Amps)
7. Clamp instrument around the ground wire or rod.
8. Observe reading – if less than 1.0A, proceed to step 9. If between 1.0 and 5.0A, make note of reading and continue to step 9. If greater than 5A, terminate test and remove instrument from the ground wire or rod and correct the problem before re-testing.
9. Switch instrument to Resistance ( $\Omega$ +A) mode. (Rotate selector switch to the “ $\Omega$ +A” position)
10. Wait for reading to stabilize and record reading. Lock reading on the display by pressing “HOLD”.
11. Remove instrument from ground wire or rod and re-clamp to gauge.
12. Observe reading – the reading should be within 0.2 $\Omega$  of gauge value. If reading is OK – measurement is valid. If reading is wrong, clean instrument (see instructions below) and repeat from step 4.



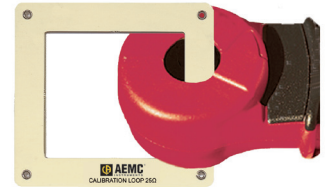
Step 3

# Clamp-On Ground Resistance Tester Model 6416 Step-by-Step Usage Guide

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Step 3

## Cleaning the Heads

To ensure optimum performance, it is important to keep the probe jaw mating surfaces clean at all times. Failure to do so may result in erroneous readings. To clean the probe jaws, use a lint free cloth or, if the jaws are pitted, use a very fine sandpaper (600 grit) to avoid scratching the surface, then gently clean with a soft cloth. Make sure that the instrument is oriented such that no debris or filings will fall into the unit while cleaning. Check with your finger afterwards to be sure that no foreign material remains on the jaw surfaces (both top and bottom).

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# Clamp-On Ground Resistance Testing

The clamp-on ground resistance testing technique offers the ability to measure the resistance without disconnecting the ground. This type of measurement also offers the advantage of including the bonding to ground and the overall grounding connection resistances.

## Principles of Operation

Usually, a common distribution line grounded system can be simulated as a simple basic circuit as shown in Figure A or an equivalent circuit, shown in Figure B. If voltage  $E$  is applied to any measured grounding system.  $R_x$  through a special transformer, current  $I$  flows through the circuit.

Therefore,  $E/I = R_x$  is established. If it is detected with  $E$  kept constant, measured grounding resistance can be obtained. Refer again to Figures A and B. Current is fed to a special transformer via a power amplifier from a 2083 Hz constant voltage oscillator. This current is detected by a detection CT. Only the 2083 Hz signal frequency is amplified by a filter amplifier. This occurs before the A/D conversion and after synchronous rectification. It is then displayed on the screen of the Model 6416 meter.

The filter amplifier is used to cut off both earth current at commercial frequency and high-frequency noise. Voltage is detected by coils wound around the injection CT, which is then amplified, rectified, and compared by a level comparator. If the clamp is not closed properly, an "open jaw" annunciator appears on the display.

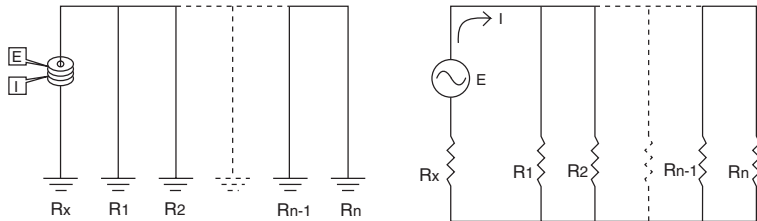


FIGURE A

FIGURE B

The important points to consider for proper use of the clamp-on ground tester are:

1. There is a series-parallel resistance path down stream from the measurement point that is lower in resistance than the point being measured.
2. That the earth is the return path to the point where the clamp-on meter is connected and not wire or other metal structures (see Figure C).
3. If the measurement point is not connected to a series-parallel low resistance network (such as the case with a single rod), a temporary path may be created by connecting a jumper cable from the measurement point to a low resistance like a pole ground (see Figure D).

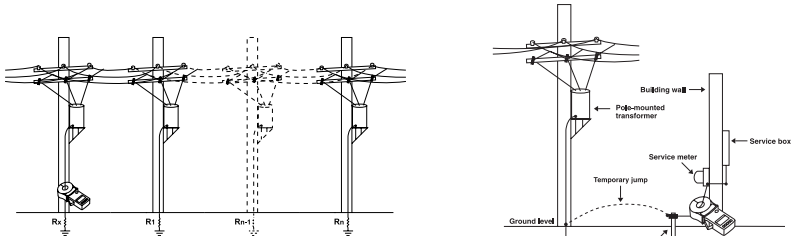


FIGURE C

FIGURE D

### Interpretation of Readings:

0.00 - 0.10	Local "Ground Loop" most likely present. Also indicates the conductor is bonded to other electric paths. This reading cannot be used to judge the quality of the path to earth.
0.10 - 5.0	Most likely a Local Ground Loop but also could indicate a VERY good ground path to earth.
5.0 - 25	Ground Resistance Value of a single local rod. Higher reading might indicate a poor BOND is also present.
25 - OL	Readings in this range are an indication of a POOR path to earth AND/OR a VERY POOR bond. OL indicates the lack of any bond to earth.

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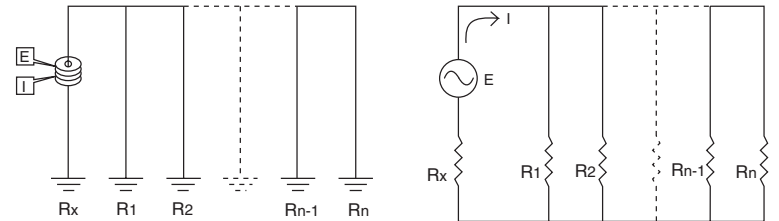


FIGURE A

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The important points to consider for proper use of the clamp-on ground tester are:

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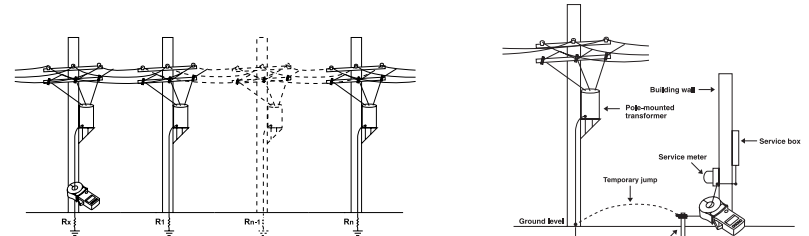


FIGURE C

FIGURE D

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