

Field Tests

You have no doubt heard the line about the highly skilled farmer who was “out standing” in his field. Well, in our business, cable users are sometimes found “out standing” next to an installed cable while conducting *field tests*.

Field tests can be broadly grouped into three categories: *acceptance*, *maintenance* and *fault location* testing. An acceptance test is conducted on wire or cable *after* installation but *before* placing it into service. Acceptance tests are designed to detect installation or shipping damage that might affect cable performance. Maintenance tests are conducted *after* the cable has been placed in service and are intended to detect in-service deterioration. Fault location tests, on the other hand, are used to pinpoint the exact failure site in a cable that has actually failed. Knowing exactly where the cable has failed permits the cable to be repaired or replaced as necessary.

A few of the most common test methods are described below.

Megger Testing

Megger[®] testing is normally conducted on 600 volt power cable for either acceptance or maintenance purposes. This device applies a DC voltage (typically 600 to 2500 volts) for several minutes. While the voltage is applied, the device measures the current “leaking” through the insulation and displays the results in units of resistance (Megohms or millions of ohms). A low reading (less than about 100 Megohms) indicates possible cable problems. The word “Megger” is a registered trademark of AVO International (formerly the Biddle Co.), but the term is widely used for all similar tests regardless of manufacturer.

Hipot Testing

The hipot (high potential) test is also an acceptance or maintenance test, but is normally used on cables rated 5 through 35 kV and higher. Like the Megger test, this device applies DC voltage to a cable and measures current leakage through the insulation. Unlike the Megger test, however, the applied voltage is considerably higher (up to 65 kV for a 15 kV cable, for example) and the results are displayed in units of microamps (μA). With the



hipot test, a high reading (for example greater than 100 μA) indicates a possible problem. Because of the potentially lethal high voltages involved, this test must be performed only by qualified persons.

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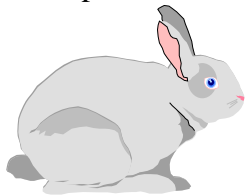
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Continuity Testing

The continuity test can be used on virtually every type of wire and cable except optical fiber. It is probably the easiest and least expensive field test available. It can be conducted with a handheld multimeter purchased from your local Radio Shack or other electronic supply store for about 50 dollars. Using the “resistance” setting of the multimeter, the wire or cable can be checked for “shorts” between conductors, that is, accidental contact between copper conductors due to damaged or defective insulation. A multimeter can also be used to check for “opens” in conductors, that is, copper conductors that have been broken somewhere along the cable’s length. The continuity test can be used for either acceptance, maintenance or fault location testing.

Thumper Testing

To all you animal rights activists, this is *not* a test where high voltage is applied to Thumper the rabbit! A thumper is a fault location device that applies a high voltage pulse to a *cable* to determine the exact location of a cable failure. It works by applying a very brief (millisecond) high energy pulse to the cable. At the point of cable failure, the injected energy is released with a loud bang similar to that of a firecracker. When the test is performed on cable buried several feet underground, a muffled “thump” is usually heard aboveground. The cable is usually “thumped” several times a minute until someone walking the length of the cable run can locate the point of failure.



Other Test Methods

Several additional field test methods are listed below in approximate decreasing order of usage:

- LAN Cable Testers (measure attenuation, crosstalk, and impedance)
- Time Domain Reflectometer (TDR)
- Optical Time Domain Reflectometer (OTDR)
- Resistance-Based Fault Location Equipment
- Capacitance-Based Fault Location Equipment
- Arc-Pulse Fault Location Equipment
- Very Low Frequency (VLF) AC Test Set
- Series Resonant AC Test Set

Additional information on field tests can be found on pages 126-133 of Anixter’s 1996 *Wire & Cable Technical Information Handbook* (Catalog # 104113).