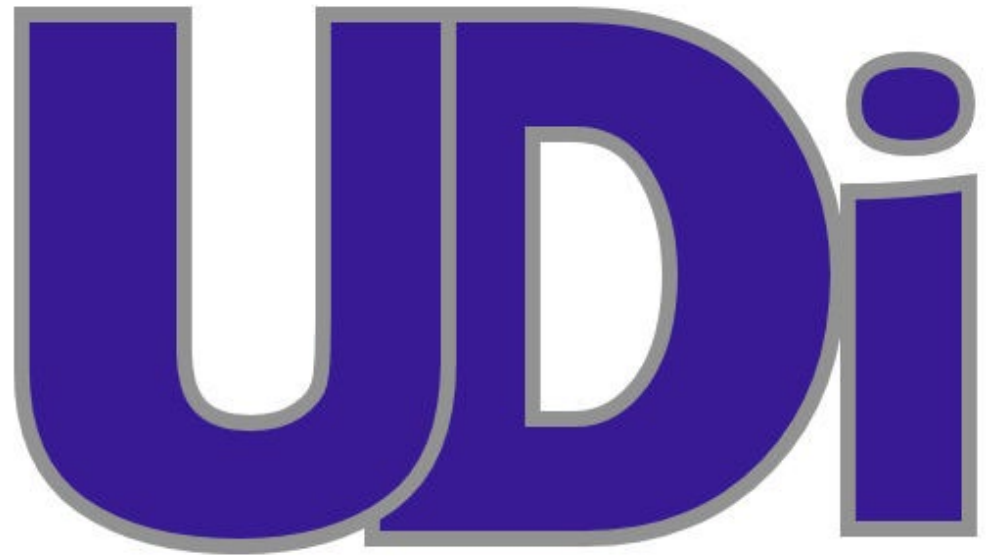


Presented By:

**Basic SUE
Designator
Training**

The logo for UDI (United Designers Institute) features the letters 'UDI' in a bold, blue, sans-serif font. The letters have a thick grey outline. The 'i' is a smaller, lowercase letter, also in blue with a grey outline, positioned to the right of the 'D'.

Basic SUE Designator Training

Utility Damage Investigations, LLC offers basic Subsurface Utility Engineering (SUE) training designed to enhance the skills and expertise of technicians in the field.

Our training programs are tailored to equip technicians with essential knowledge and practical skills needed to accurately identify, locate, and manage underground utilities.

By focusing on best practices and industry standards, we aim to empower technicians to improve their performance, reduce utility damage risks, and ensure safety and efficiency on every job site.

Whether you're new to the field or looking to refine your skills, our training provides the foundational understanding and hands-on experience necessary for success in SUE operations.



Basic SUE Designator Training

- Recognizing the need, we have endeavored to create a training course for SUE Technicians, and those who perform utility or pipeline locating services, to address knowledge gaps and improve skillsets. This slideshow is the first in a series that will address locating and SUE related skills, knowledge and terminology.
- This series is intended to assist SUE Technicians who are early in their SUE Career while also providing a level of review information for more seasoned SUE Technicians.
- This training series can be used in conjunction with other programs such as; Staking University, Utility Training Academy, and equipment manufacturer provided technical information to create a diverse program wherein technicians can develop and refine skills and continue to excel.
- This program is intended to be interactive.

Basic SUE Training

Module 1

- Basic EM Theory

Module 2

- EM Methods & Operation

Module 3

- Locating with detectable rods and sondes
- Useful Tips

Module 1

Basic EM Theory



Basic SUE Training

- **Module 1**
 - Tools of the Trade



Basic SUE Training

- **Module 1**
 - Basic EM Theory – Tools of the Trade
- All of the previously pictured devices perform essentially the same function; they all impress an electromagnetic signal on a targeted underground facility
- So, why so many different manufacturers and configurations?
 - Essentially, each of them believe they have invented a better mousetrap in terms of features, power, frequencies, frequency discrimination, antenna numbers and configuration, user interface and ergonomics
 - Some frequencies are unique to certain manufacturers, but in the digital age it is relatively easy to program transmitters and receivers to utilize virtually any frequency (within the range of capability of the unit)
 - Some systems are single frequency, many have two or three frequency options and a few, top of the line systems, have many frequencies and are programmable to virtually any frequency
 - The choice of which system to use has a number of variables; type of designating to be performed, composition of target facilities, expected depth of target facility and length of overall locate distance, and of course personal preference

Basic SUE Training

Module 1 - Basic EM Theory – Tools of the Trade, Single Frequency Systems



Metrotech 810 Classic



Subsite 830R/T



Sewerin UT 830 Digital



Metrotech 810DX Digital



RadioDetection RD5000



Vivax VM810 Digital

Basic SUE Training

Module 1 - Basic EM Theory – Tools of the Trade, Dual Frequency Systems



Leica DigiCat 550i



Metrotech 9860 / 9890



3M DynaTel 2250



Subsite Utiliguard

Basic SUE Training

Module 1 - Basic EM Theory – Tools of the Trade, Multi-Frequency Systems



Rigid SeekTech SR20



3M Dyna Tel 2220M



Vivax vLoc Pro3



Rycom Pathfinder PLS



Radio Detection RD8200

Basic SUE Training

Module 1

Basic EM Theory

The pipe and cable locator is a form of electromagnetic equipment that utilizes electromagnetic signals to designate buried pipes and cables. The equipment is composed of a transmitter, a receiver, and other components such as connecting cables, batteries, and speaker, among others. Both the transmitter and the receiver are very portable. The electromagnetic energy generates the magnetic fields around a buried electrically conductive material (pipe, cable, tracer wire) and the receiver captures the signal radiating from the magnetic field. The signal produces a visual or audible indication of the horizontal location of the utility. Most pipe/cable locators have the ability to “induce” a signal onto an object using the transmitter solely, without any physical connection to the target facility. The object must be conductive in order to carry the signal.

Basic SUE Training

Module 1

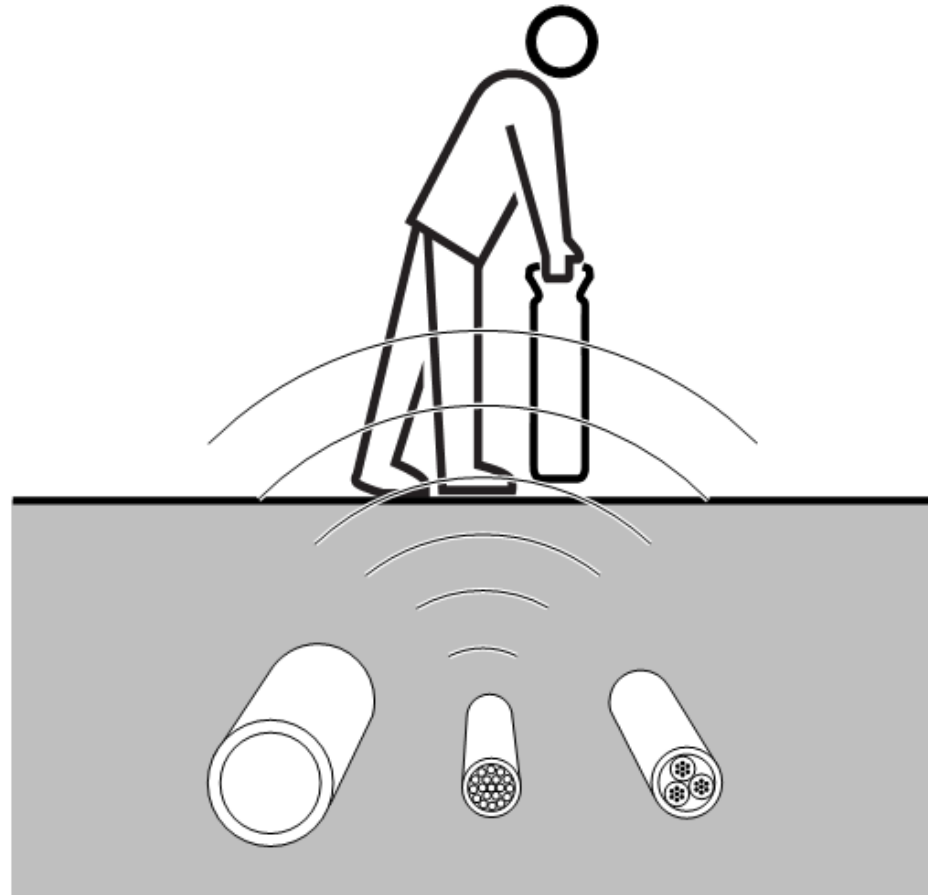
Basic EM Theory

Pipe/cable locators typically come with a receiver and a transmitter, depending on the model. Some models come with a portable, pocket-sized transmitter with limited features, and some are equipped with standard transmitters that are built into a hard case and offer more features for varied situations. The pipe and cable locator works well for metallic utilities, utilities that have tracing materials installed above the utility, and utilities that have spaces for a metallic conductor or transmitter inserted into the utility. The major shortcoming is that non-metallic utilities without the aforementioned condition cannot be detected with this method. A crew size of 1 or 2 people can locate underground utilities with the pipe and cable locator.

Basic SUE Training

Module 1

Basic EM Theory



Which Utility Is This Electromagnetic System Locating?

Basic SUE Training

- **Module 1**
 - Basic EM Theory

Most Important Principal to Remember;

Electromagnetic Locating Systems DO NOT LOCATE UTILITIES!

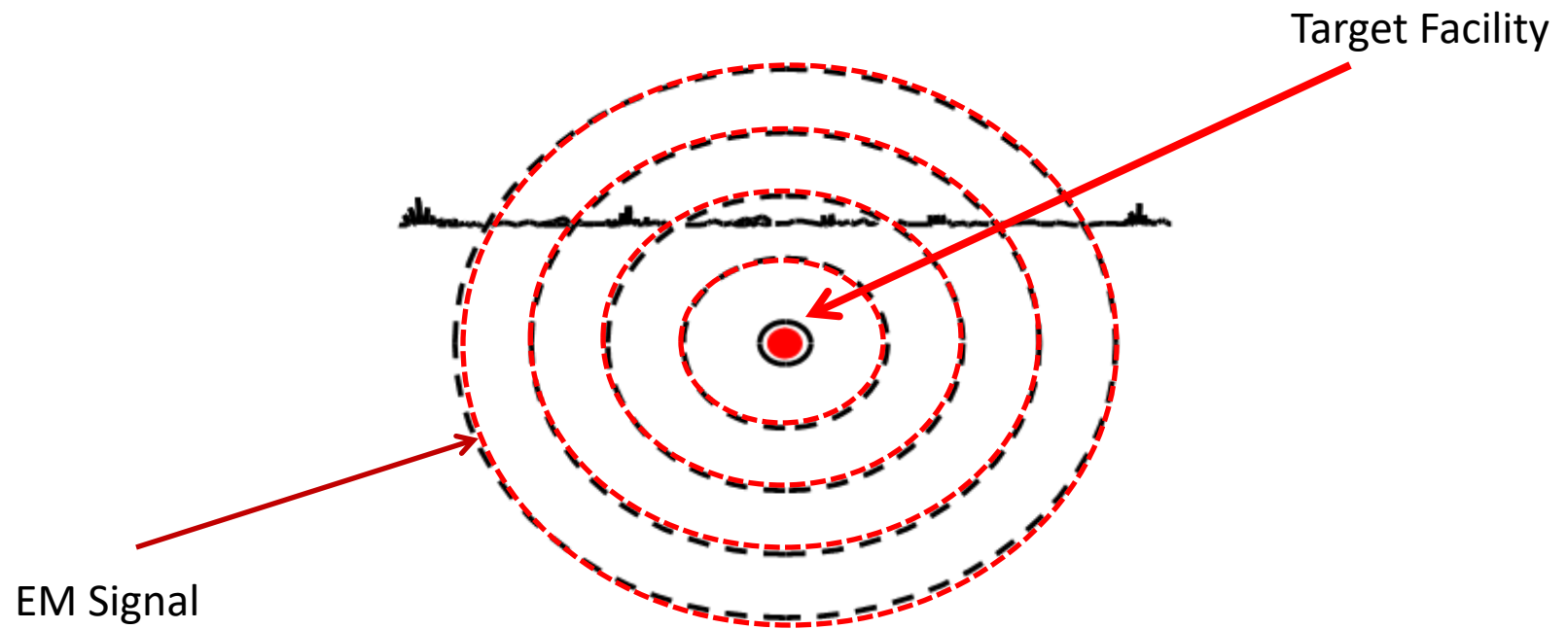
EM Locating Systems impress an alternating current (ac) across a conductive facility to produce an oscillating magnetic field. The EM Locator DESIGNATES the path of that field, it traces electromagnetic fields, not utilities.

The idea that this activity is called “Locating Utilities” is a huge misnomer, we “Designate” the path of utilities based on the position of electromagnetic signals. This is why we refer to this process as “Designating”.

In the SUE Practice, “Locating” a utility means that you have PHYSICALLY located it by exposing it and confirming its horizontal and vertical position.

Basic SUE Training

- **Module 1**
 - Basic EM Theory



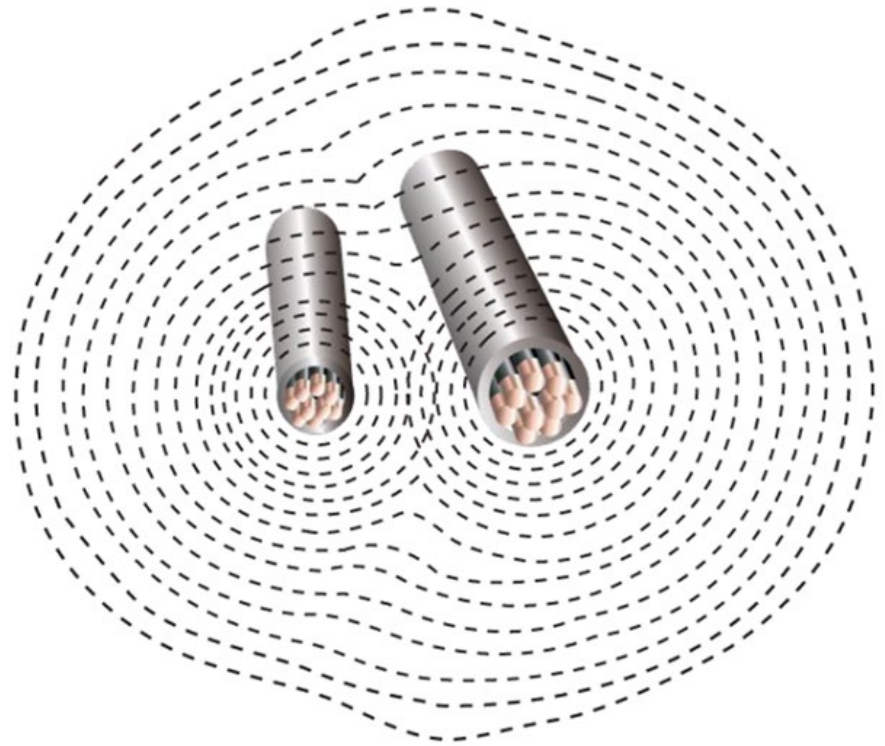
Electromagnetic Signal

Basic SUE Training

- **Module 1**
 - Basic EM Theory

The proximity of other buried facilities can affect or distort the EM signal.

The signal can be distorted by neighboring conductive or non-conductive facilities. It is important to understand how to utilize depth readings, current readings, and current direction indications to assist in diagnosing signal distortion.



Basic SUE Training

- **Module 1**
 - Basic EM Theory

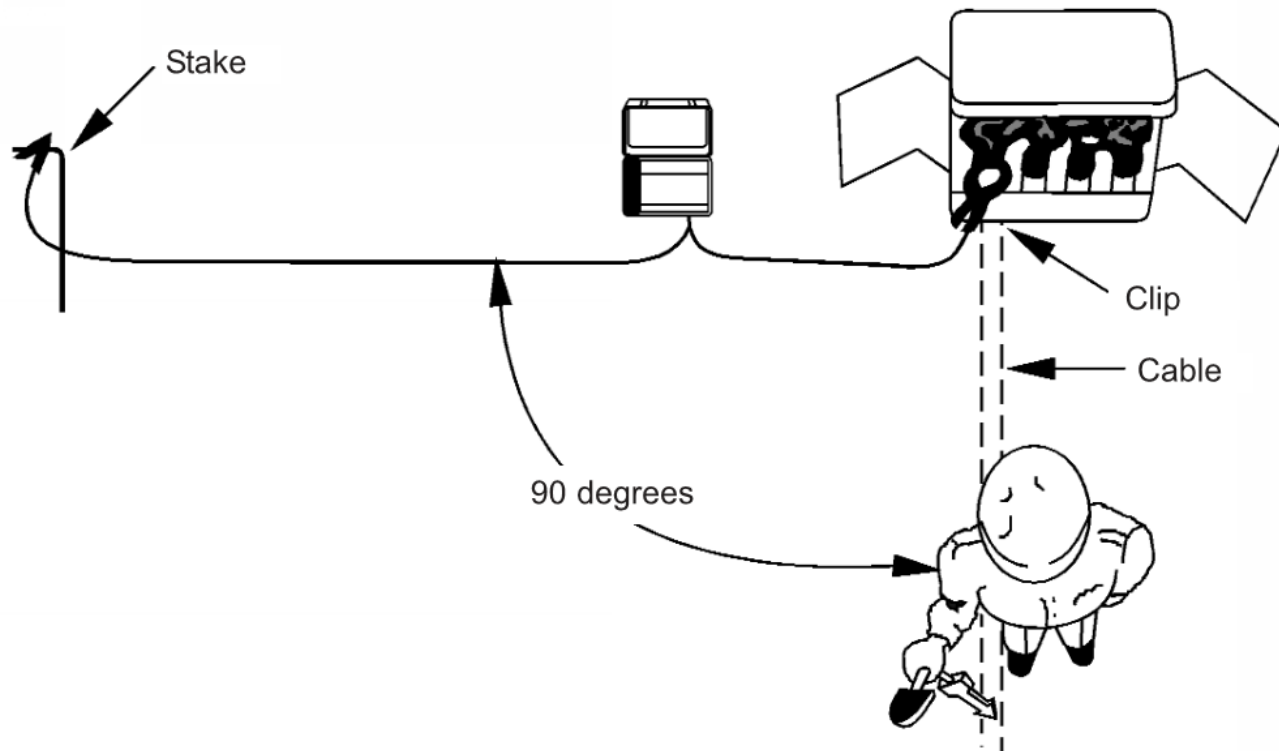
Technological Limitations

Every geophysical technique has its own limitations. Even now, there is no single geophysical technique that could be used for every type of utility, every soil type and every site. Many factors, including characteristics of expected underground utilities, geological conditions at the site, conductivity of the soil and other environmental factors should be considered as criteria for the appropriate selection of geophysical techniques. Information about the factors can be obtained from existing documents, as-built drawings, utility companies, site visits, and other sources.

Qualified SUE consultants that are familiar with all geophysical techniques are necessary for surveying underground utilities and interpreting the results of the surveys. Unqualified SUE consultants can result in the need for another survey and create serious problems for projects.

Basic SUE Training

- **Module 1**
 - Basic EM Theory, Methods of applying a signal

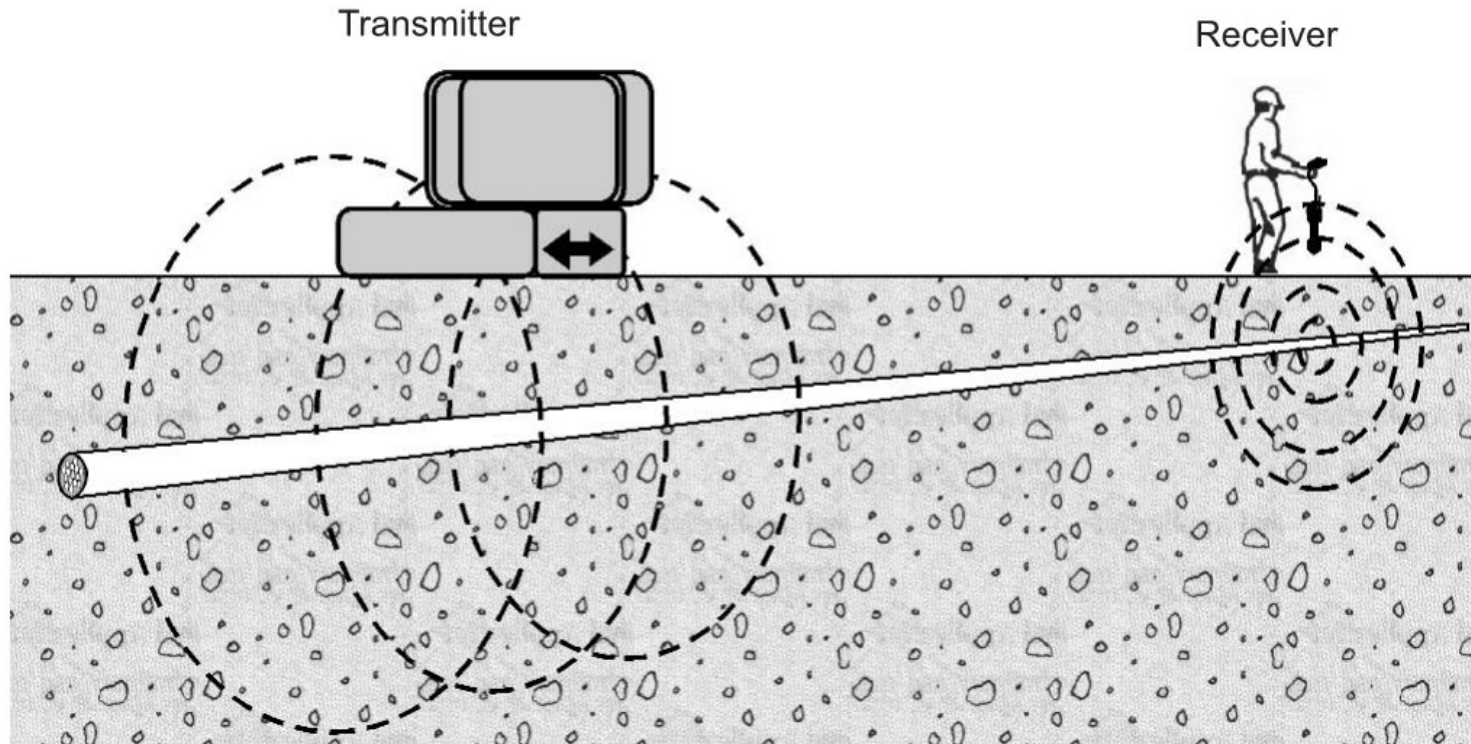


Conductive Method
Often Referred to as; Direct Connect

Basic SUE Training

Module 1

Basic EM Theory, Methods of applying a signal



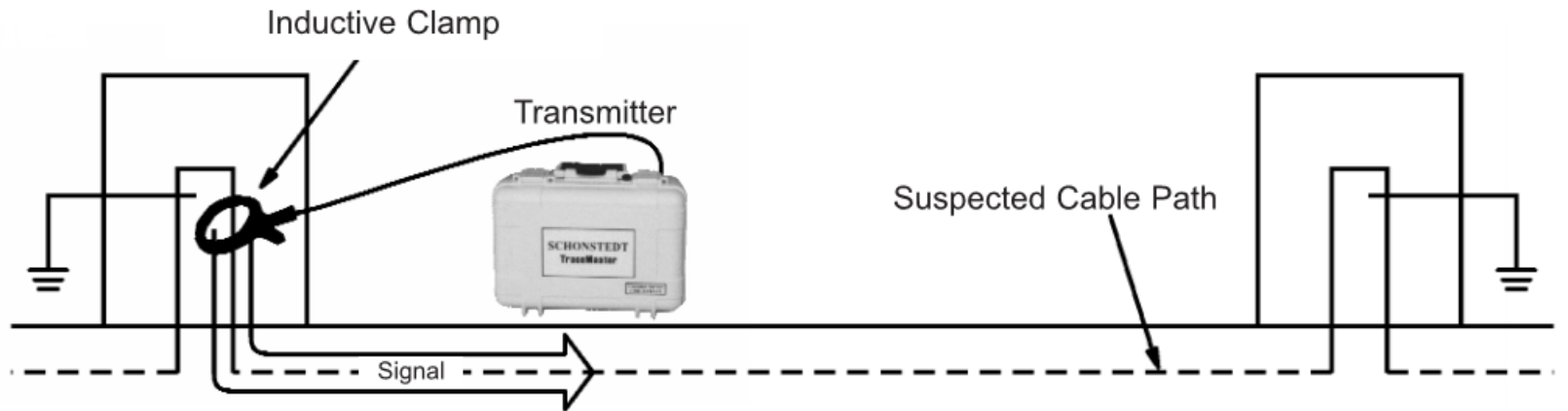
Inductive Method

Often Referred to as; "Dropping the Box"

Basic SUE Training

Module 1

Basic EM Theory, Methods of applying a signal



Inductive Clamp Method
Often Referred to as; “Clamping”

Basic SUE Training

- **Module 1**
 - Basic EM Theory
 - Signals

Of the three (3) methods we just reviewed, which method do you believe is the **most** reliable?

Direct Connection

Of the three (3) methods we just reviewed, which method do you believe is the **least** reliable?

Inductive – Dropping the Box

Of the three (3) methods we just reviewed, which method do you believe is the **most accurate**?

Trick Question – They All Are, IF done properly

Basic SUE Training

This is the end
of basic training
module 1

Additional
Questions?



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