Utility Locator Training

BY

Radiodetection

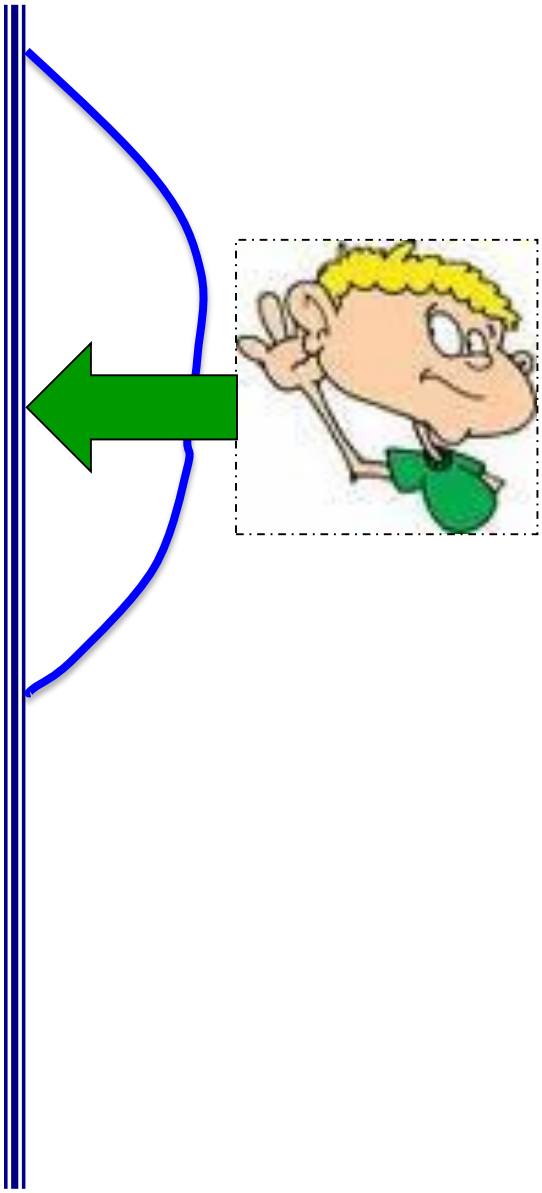
Brian Moss

RJM

Radiodetection

RJM

Single Sound Source



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Two Sound Sources

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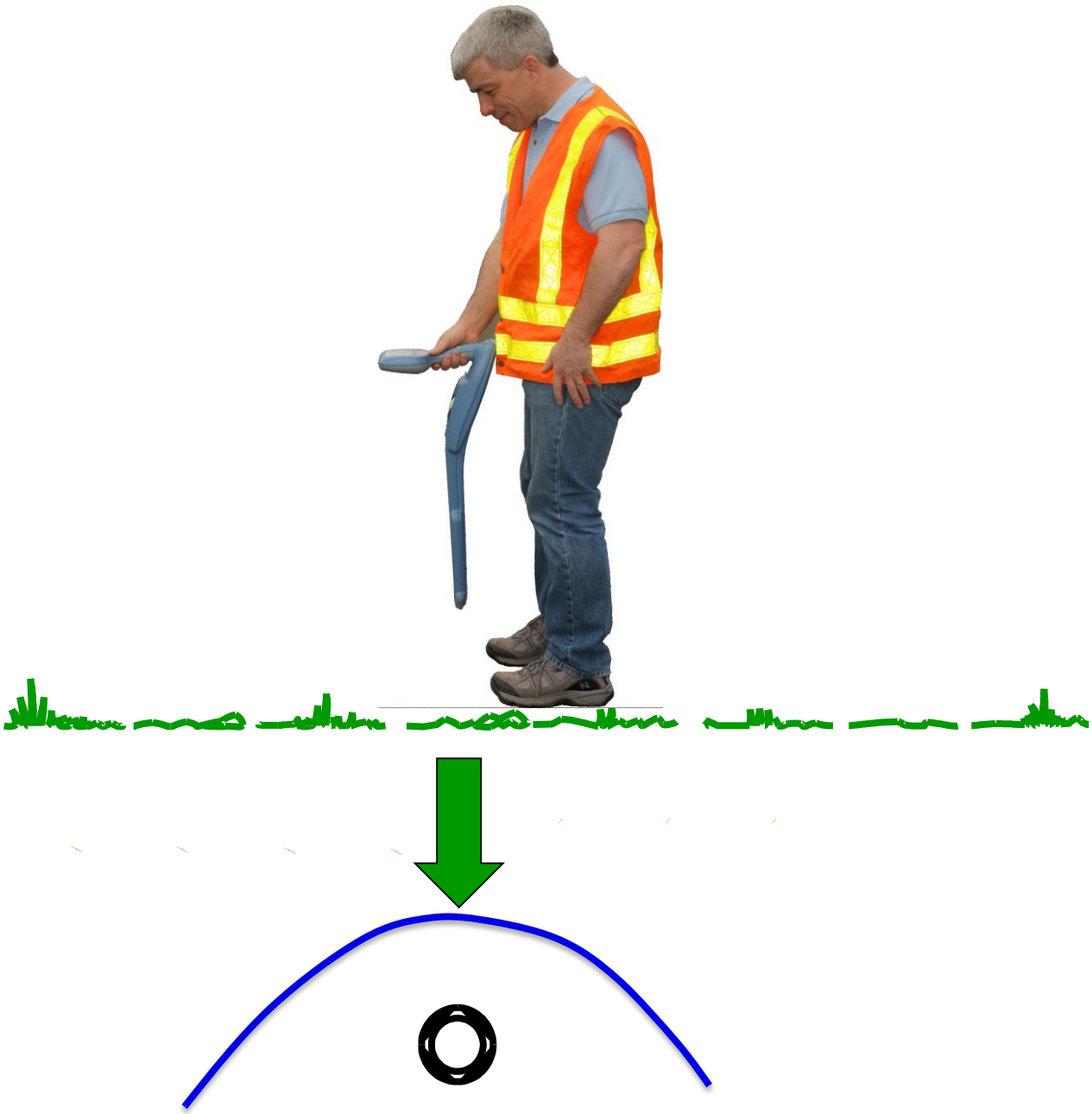
One Signal



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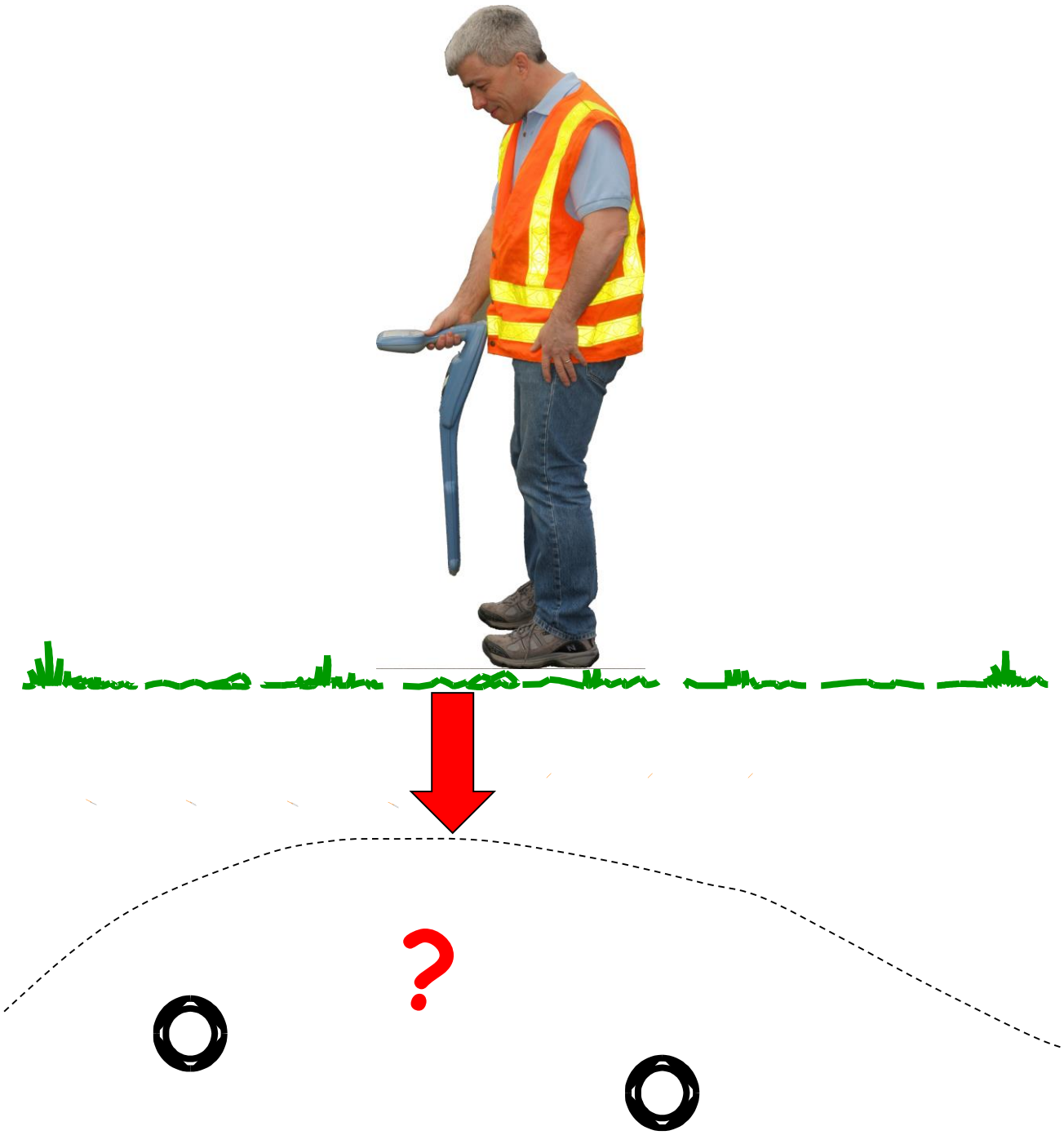
Two Signal Sources



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Locator Signal Travel

Radiodetection

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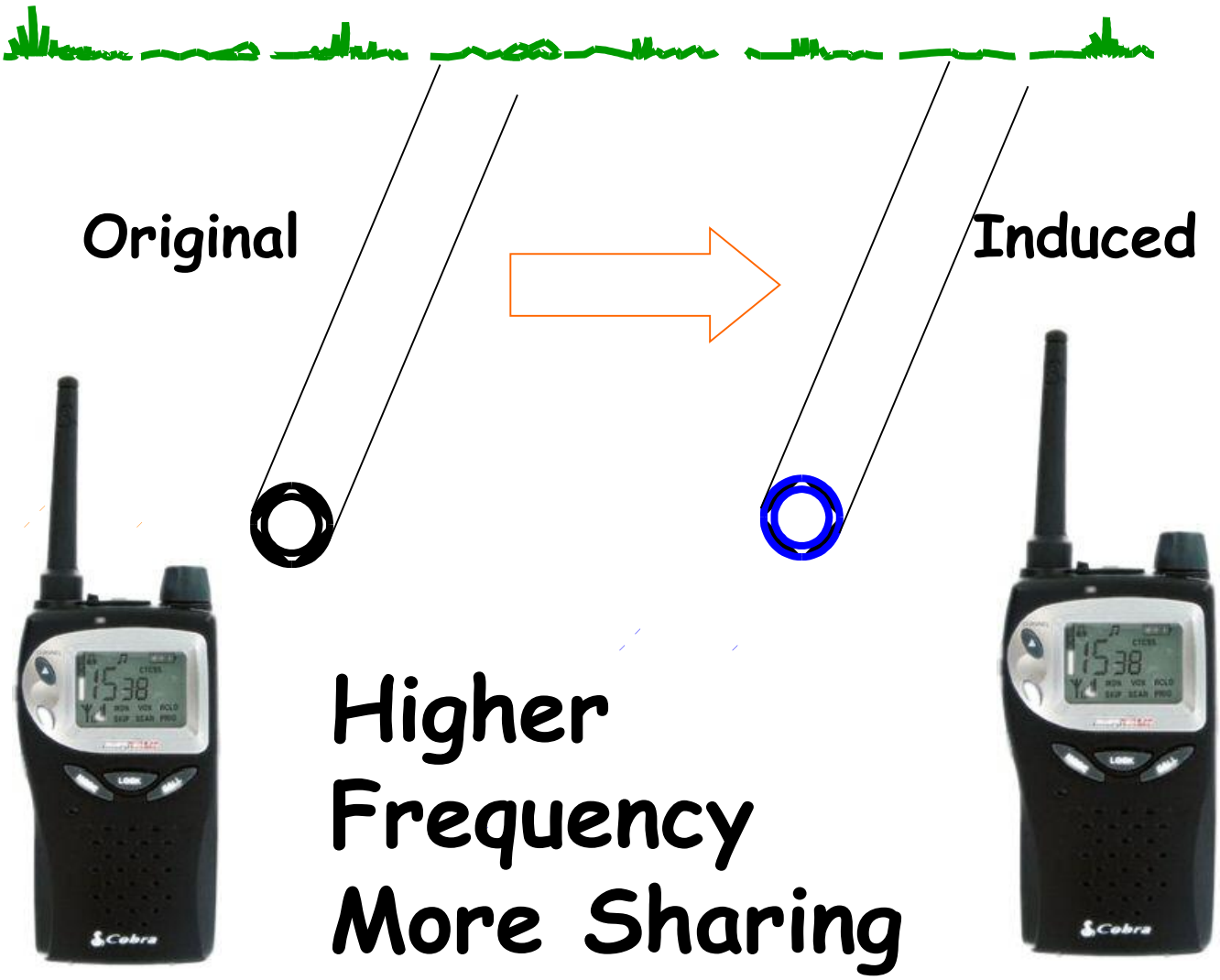
Locator Signal Travel

Inductance Signal Transfer



Higher Frequency More Sharing

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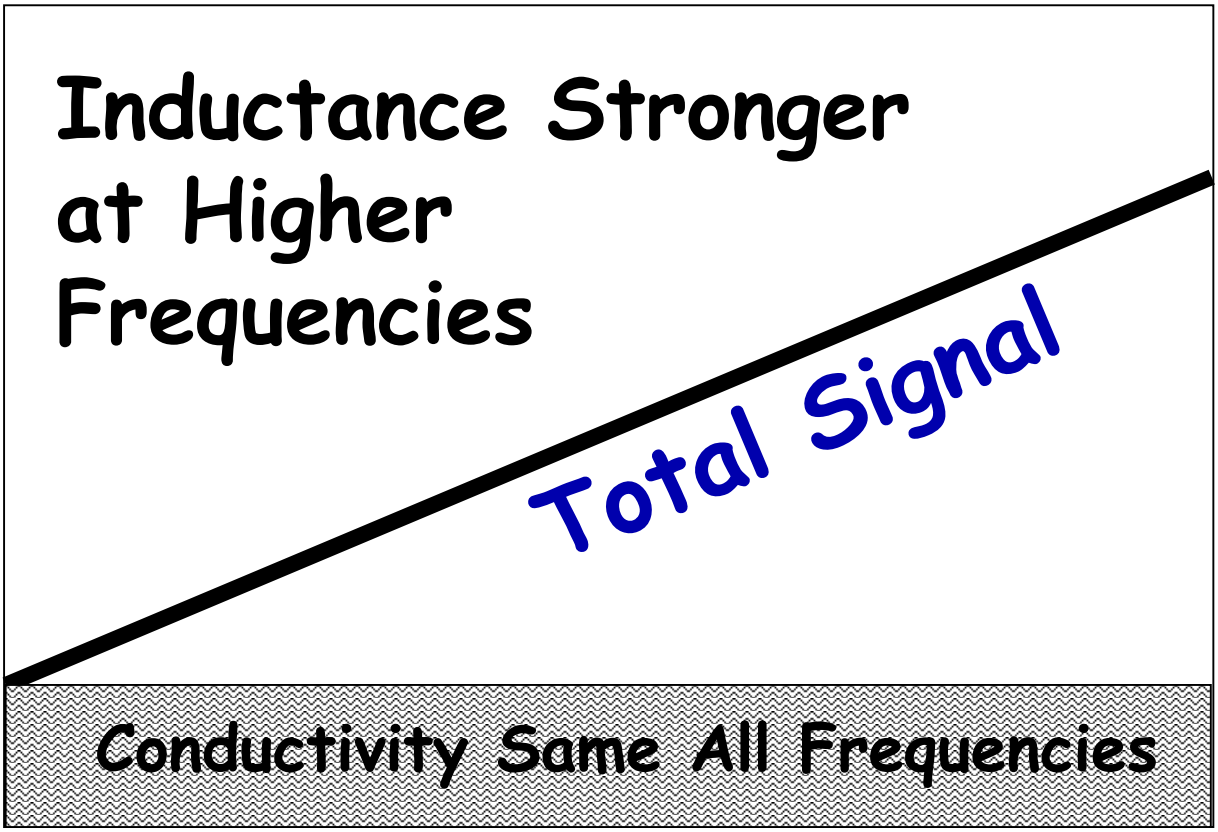
Signal Transfer Types



Low → High Frequency

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Simple Frequency Selection Guide

- Use the lowest frequency that is strong enough

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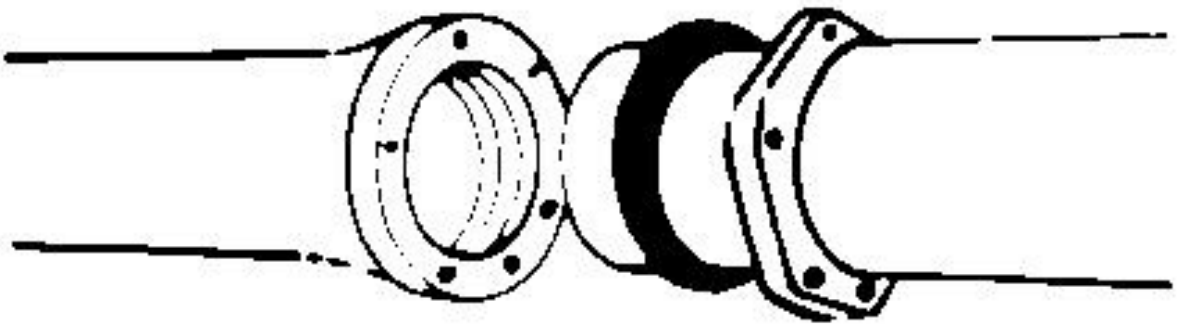
Simple Frequency Selection Guide



- Pipe with gaskest: CIP or DIP >33Kz

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What Frequency?

Copper or galvanized pipe:

Recommended Frequency:

512 hz

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What Frequency?

Tracer wire:

If grounded at far end:

512 hz

If not grounded: **> 8 Khz**

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Need More Signal?

Increase signal output

Still not enough?

Increase output and frenquency

Then lower the signal output and increase frencquency.

Still need more?

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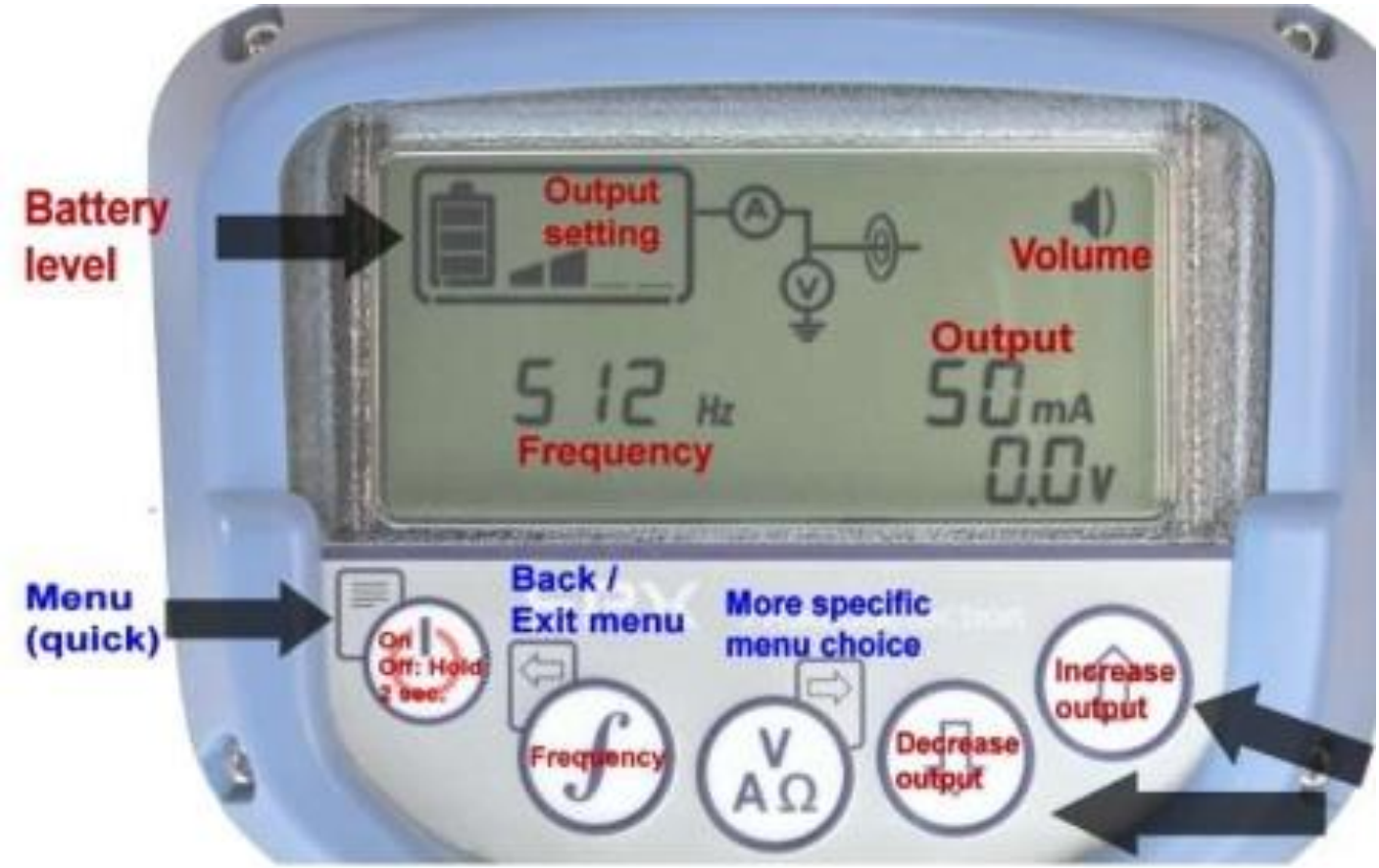
Need More Signal?



Higher voltage works like higher water pressure to increase flow

Low to High

30 volts to 90 volts

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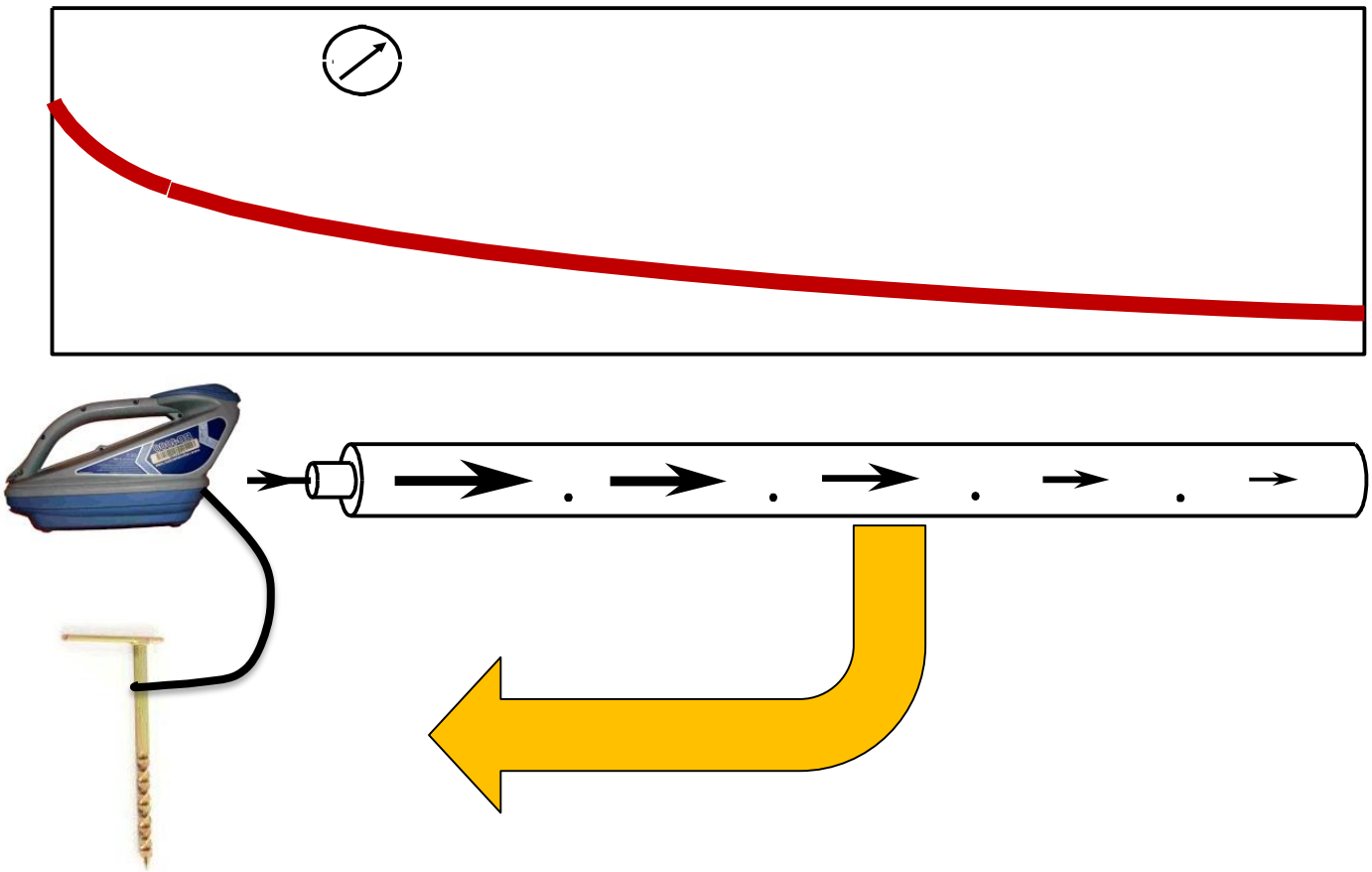
Higher Frequency Distance



Signal starts stronger, but fades faster

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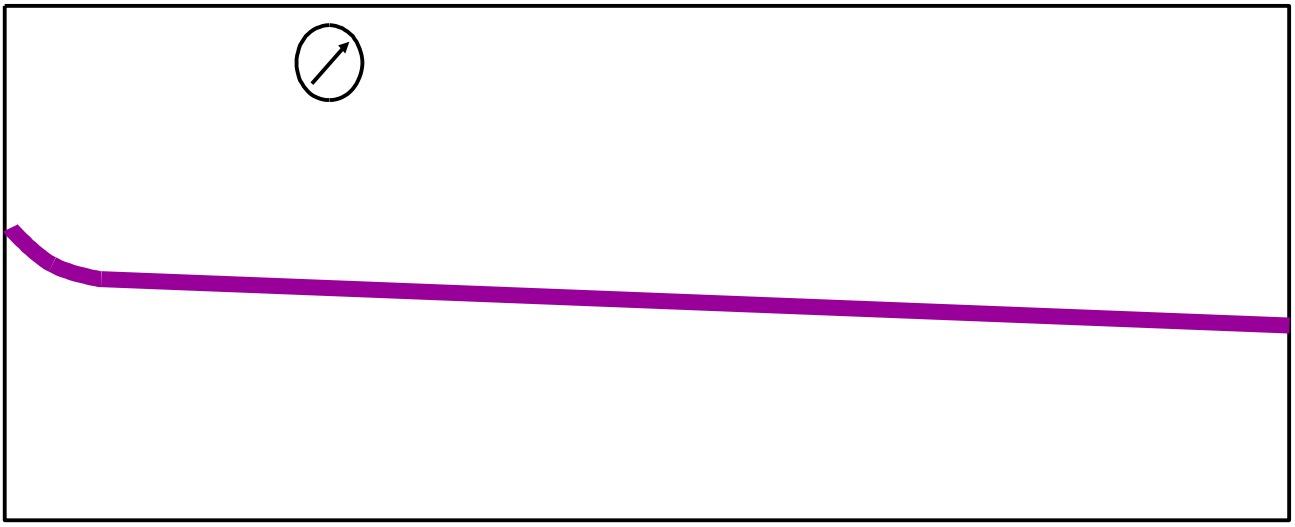
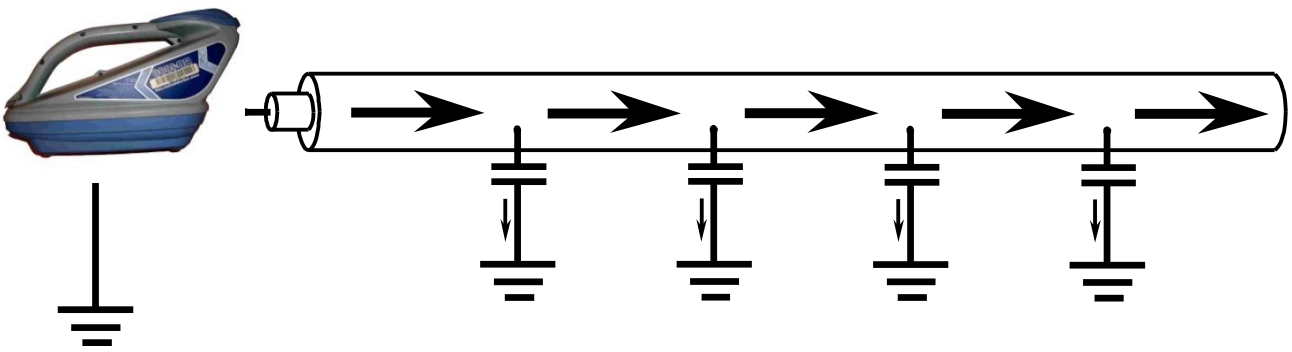
Low Frequency Distance





Starts weaker, but drops slower

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Locating In Passive Mode

- Radio (Includes traffic loop noise)
- Power
  - 60, 180, 300 …
- CPS: Cathodic Protection Systems
- Passive Avoidance

  (Power and radio simultaneously)

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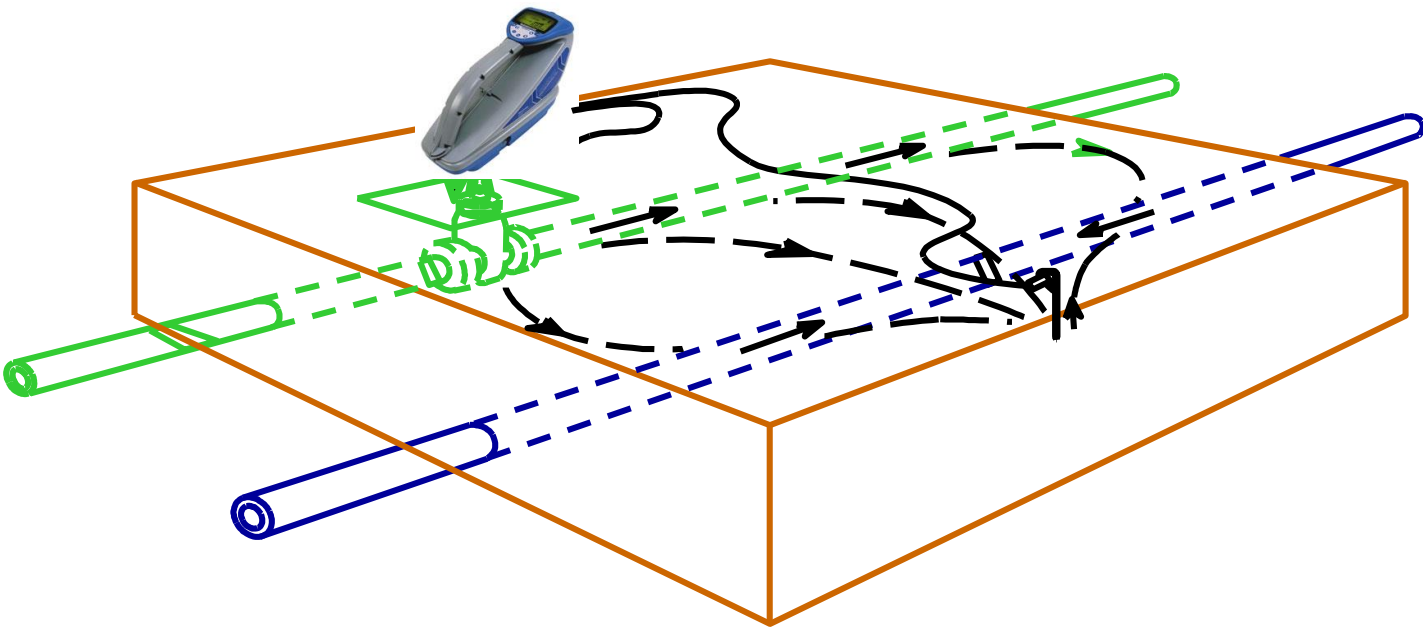
Ground Rod Location



Place ground rod away from other utilities.

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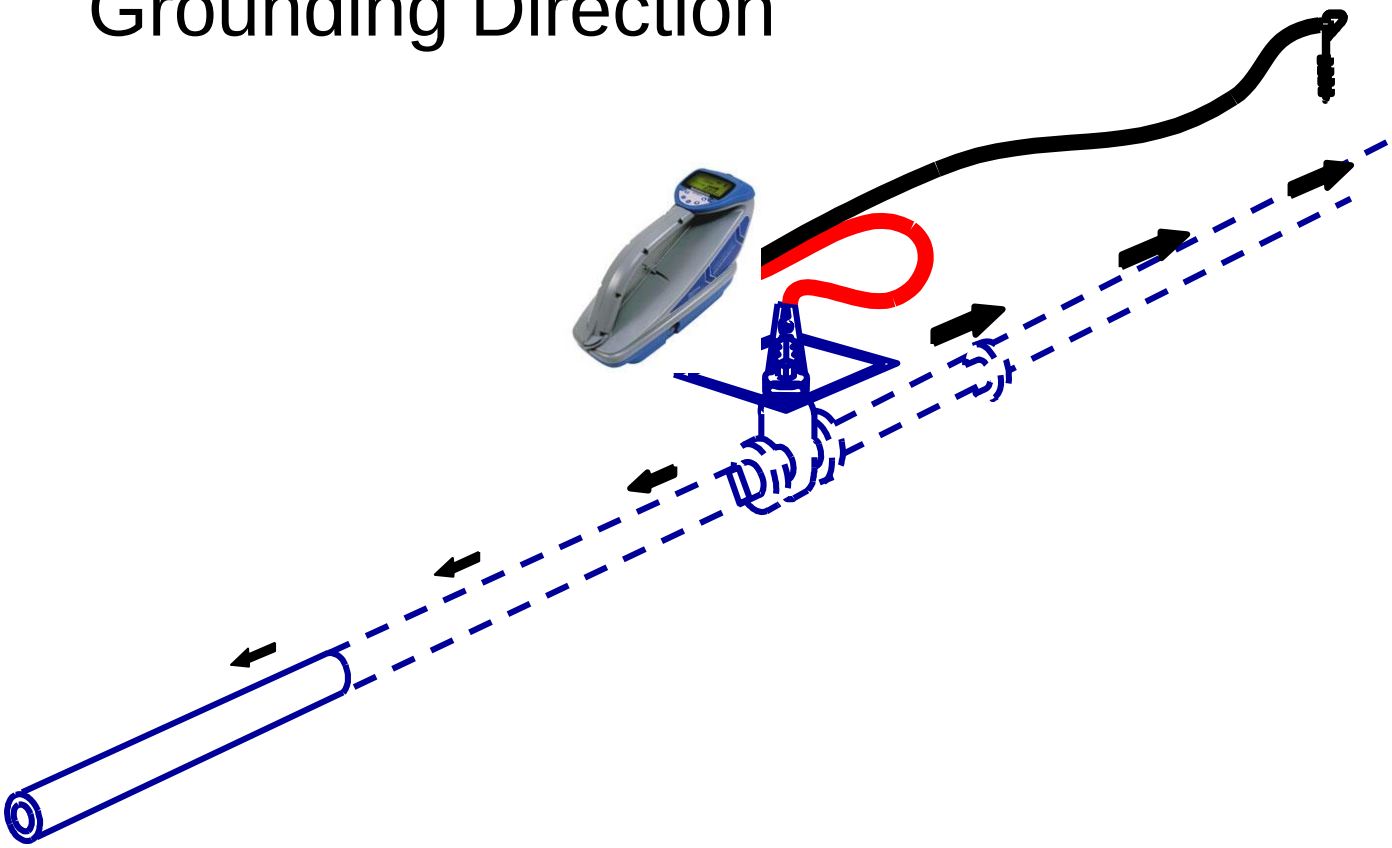
Grounding Direction



The signal will go towards the ground rod

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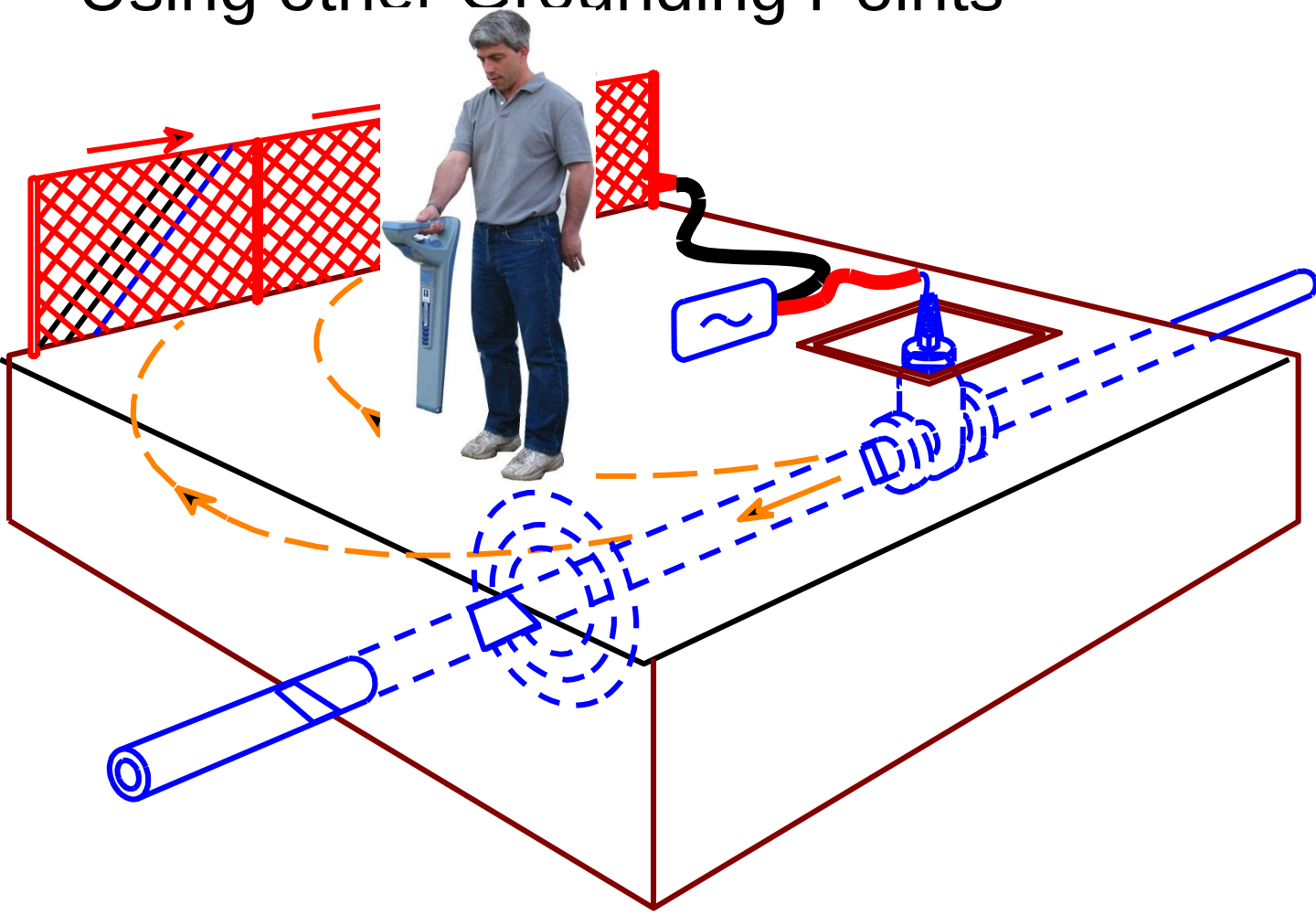
Using other Grounding Points



- Always use an small independent ground.
- Fences produce interfering signals.

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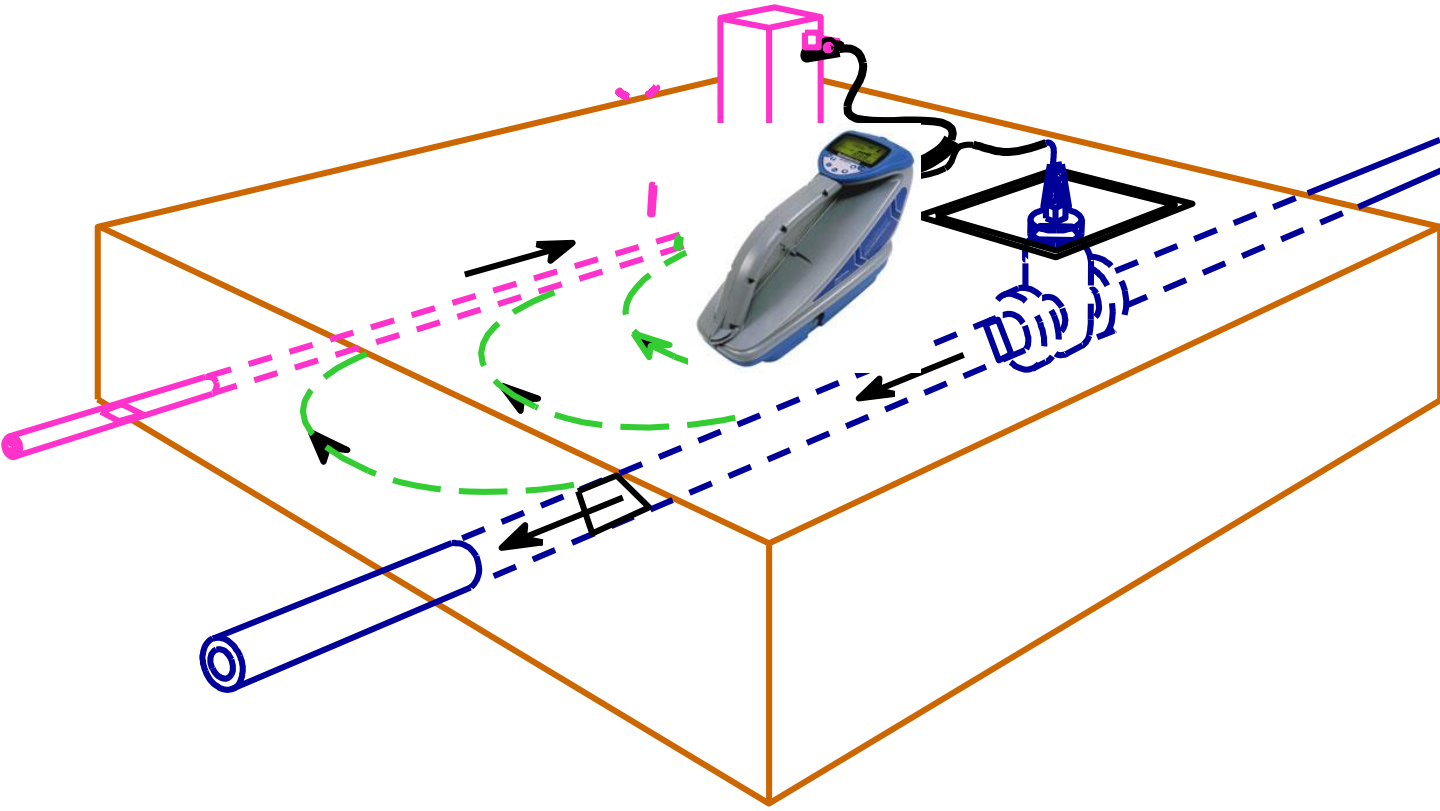
Connection



Grounding to other structures

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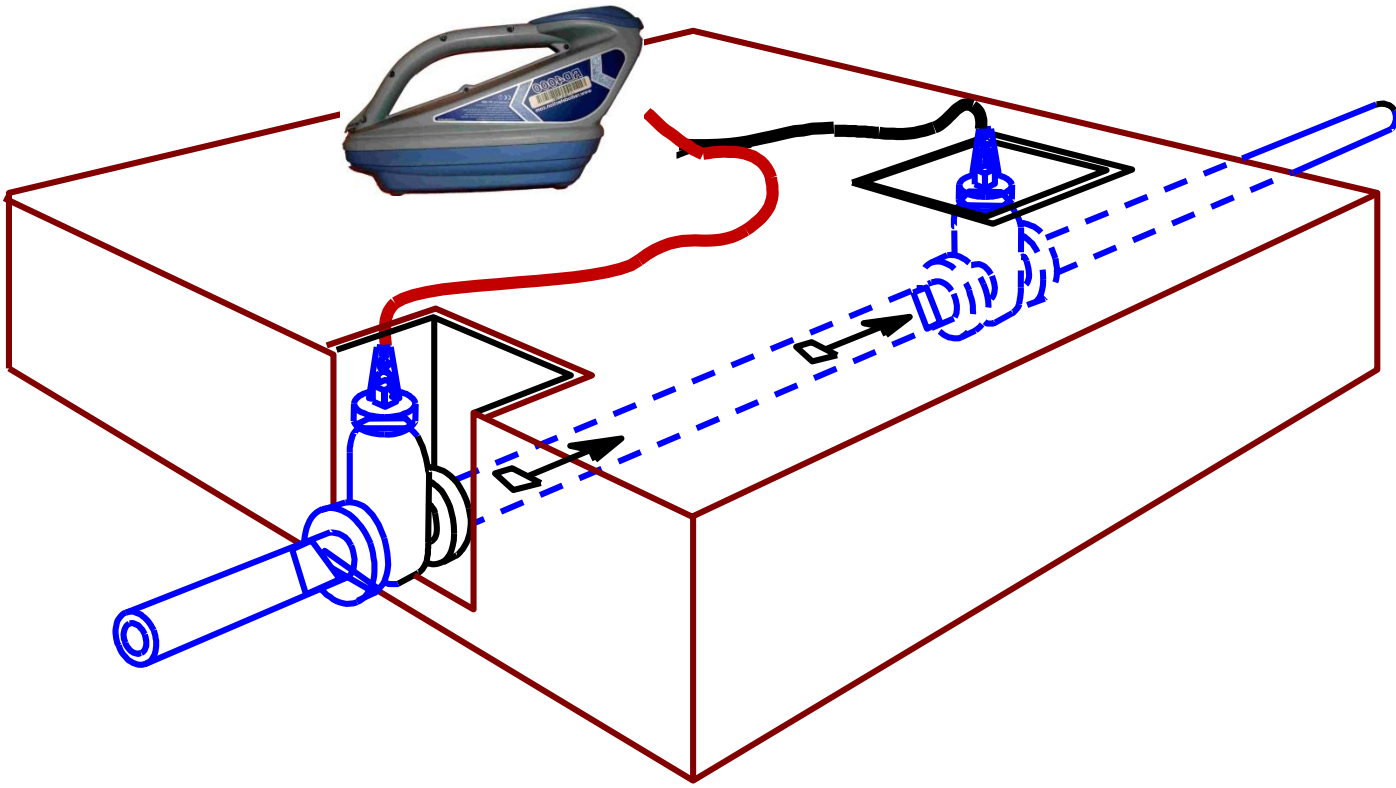
Double Ended Transmitter Connection



- Wires and pipe are better conductors than dirt
- Better signal isolation
- Stronger signal

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Improving Grounding

- Select position **away** from other utilities without crossing them
- **Ground other end** of utility if needed
- Add **water** to dry soil
- **Multiple** stakes & jumper
- **Longer** stakes
- **Double** ended connection
- **Clean** connection point

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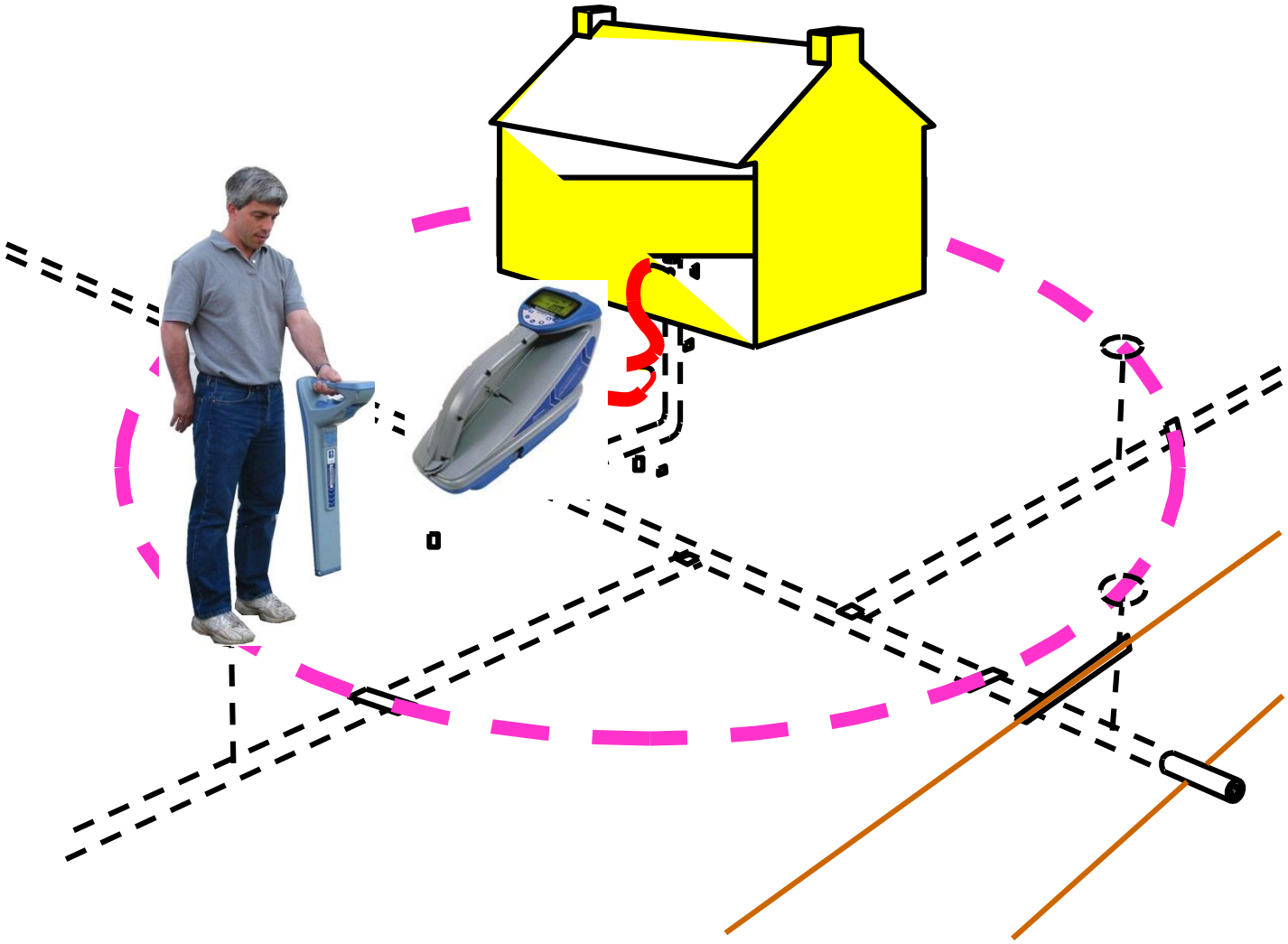
Connection



1. Circle around the signal source
2. Mark all signals.
3. Repeat

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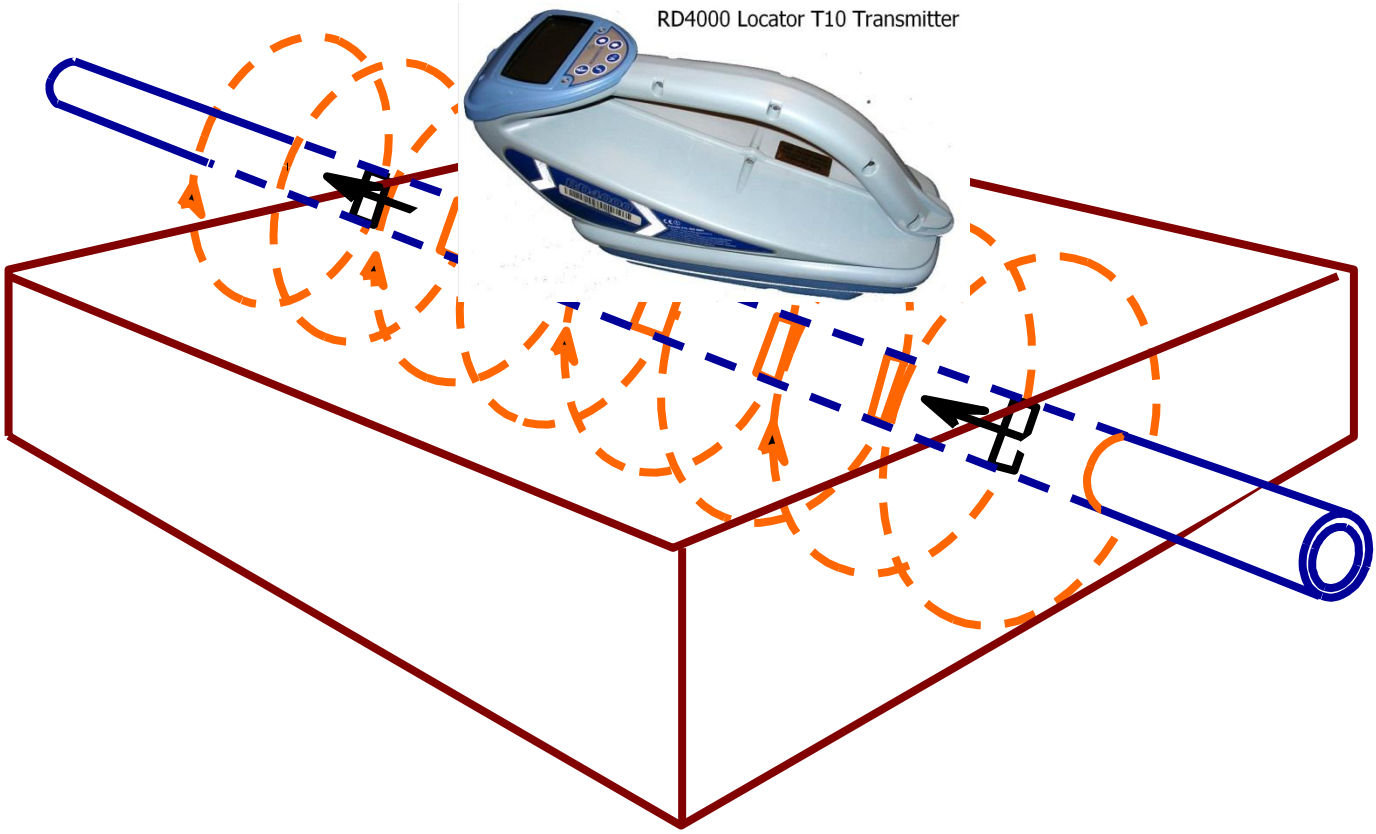
Induction



Quick, easy

Place parallel and above

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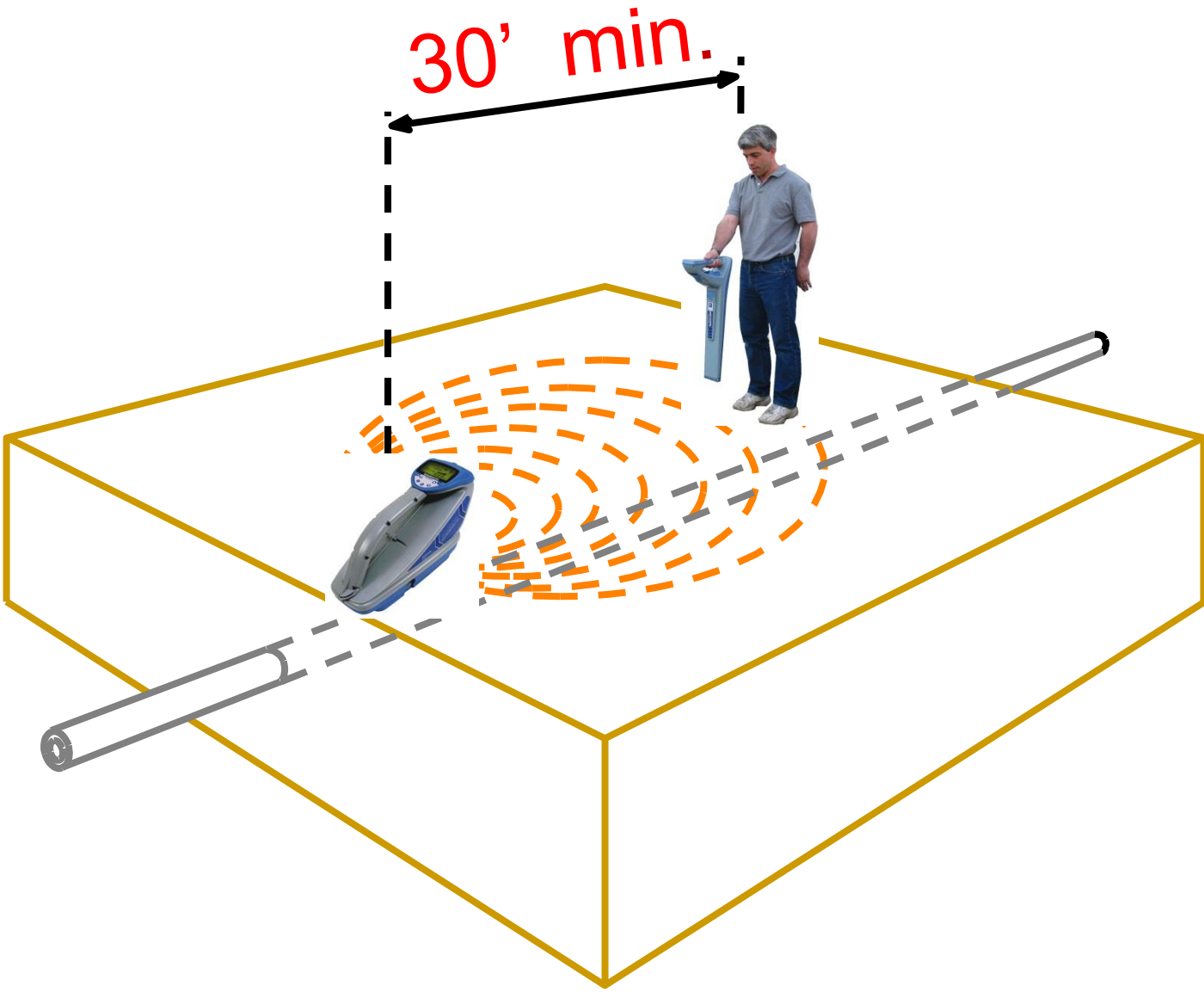
Induction Separation Distance



Test by pointing receiver at transmitter

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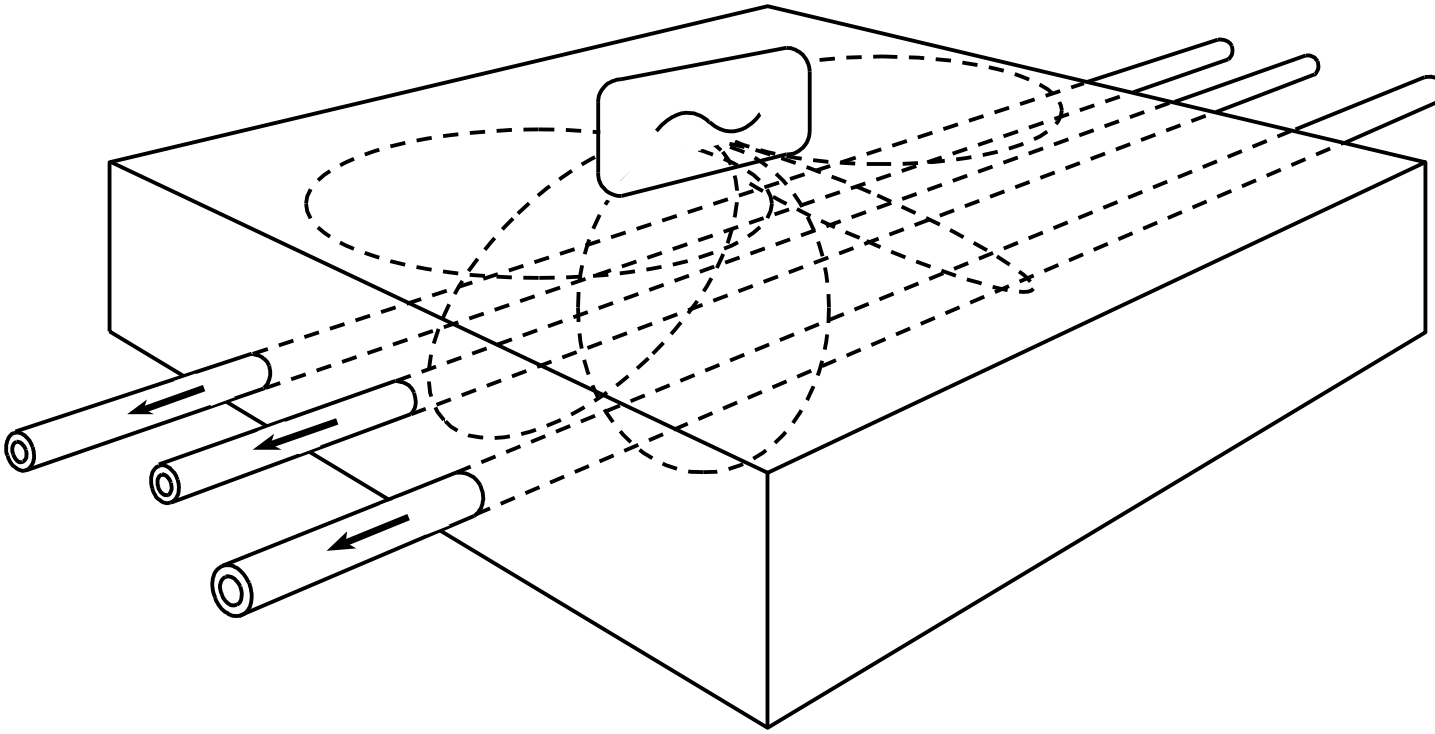
Induction



Induction energizes all metallic conductors close to the transmitter.

- Does not identify well.

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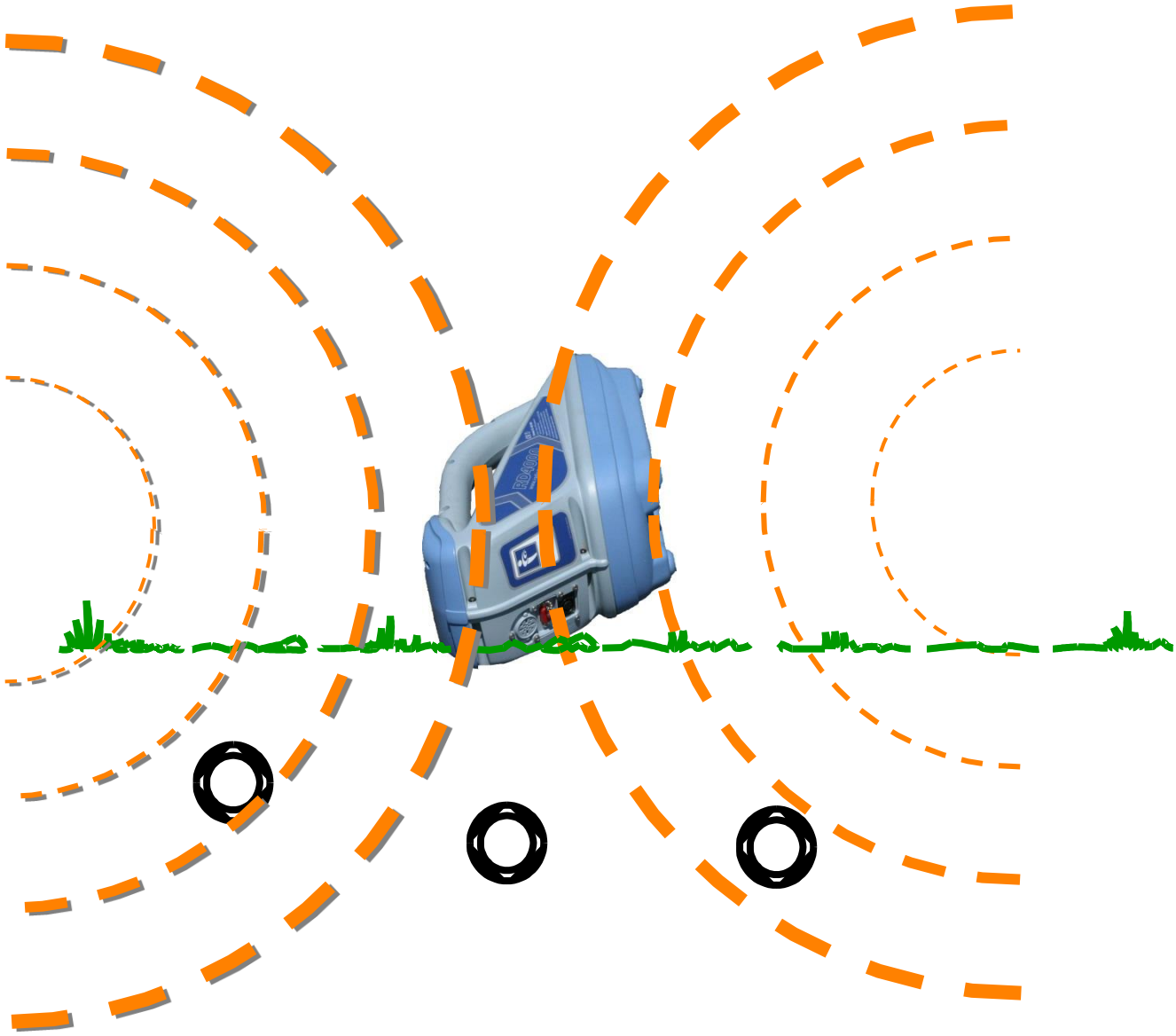
Side box Induction



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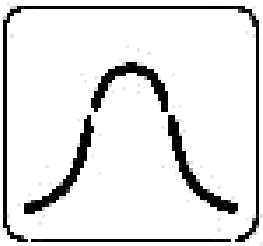
Antennas / Modes

Differential Peak =
Bottom Signal
- top signal



Differential Peak

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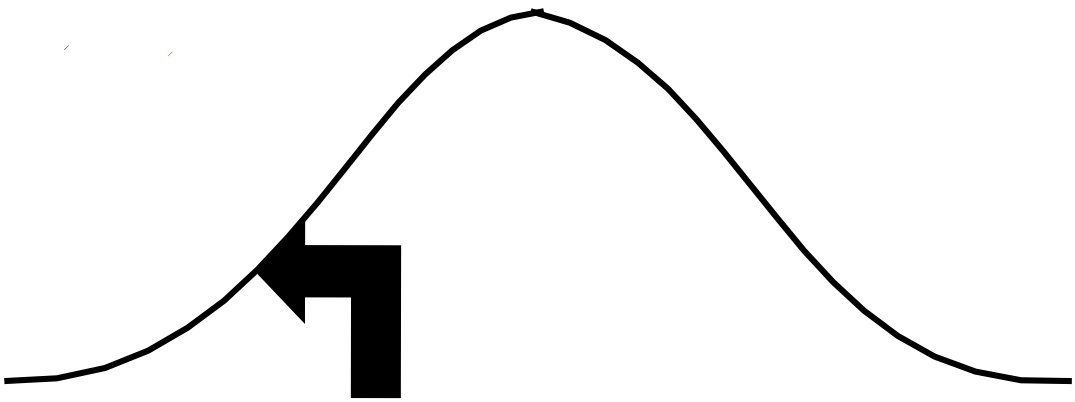
Receiver Signal Shape



Dual Peak

Accurate signals are symmetrical

Dual Peak – Most Accurate

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Antennas / Modes

Single

Horizontal Peak

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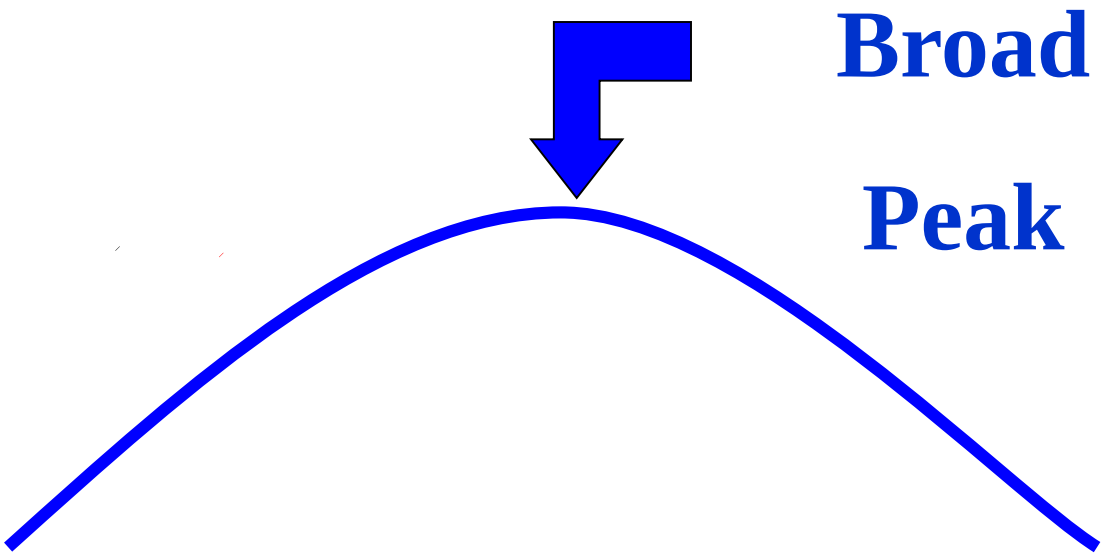
Receiver Signal Shape



More sensitive

Accurate signals are symmetrical

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Single Peak Antenna

Accuracy

More than Null

Less the Differential Peak

More Sensitive

A. Closer to utility

B. Upper peak antenna signal is not subtracted from single peak antenna

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Guideance Mode

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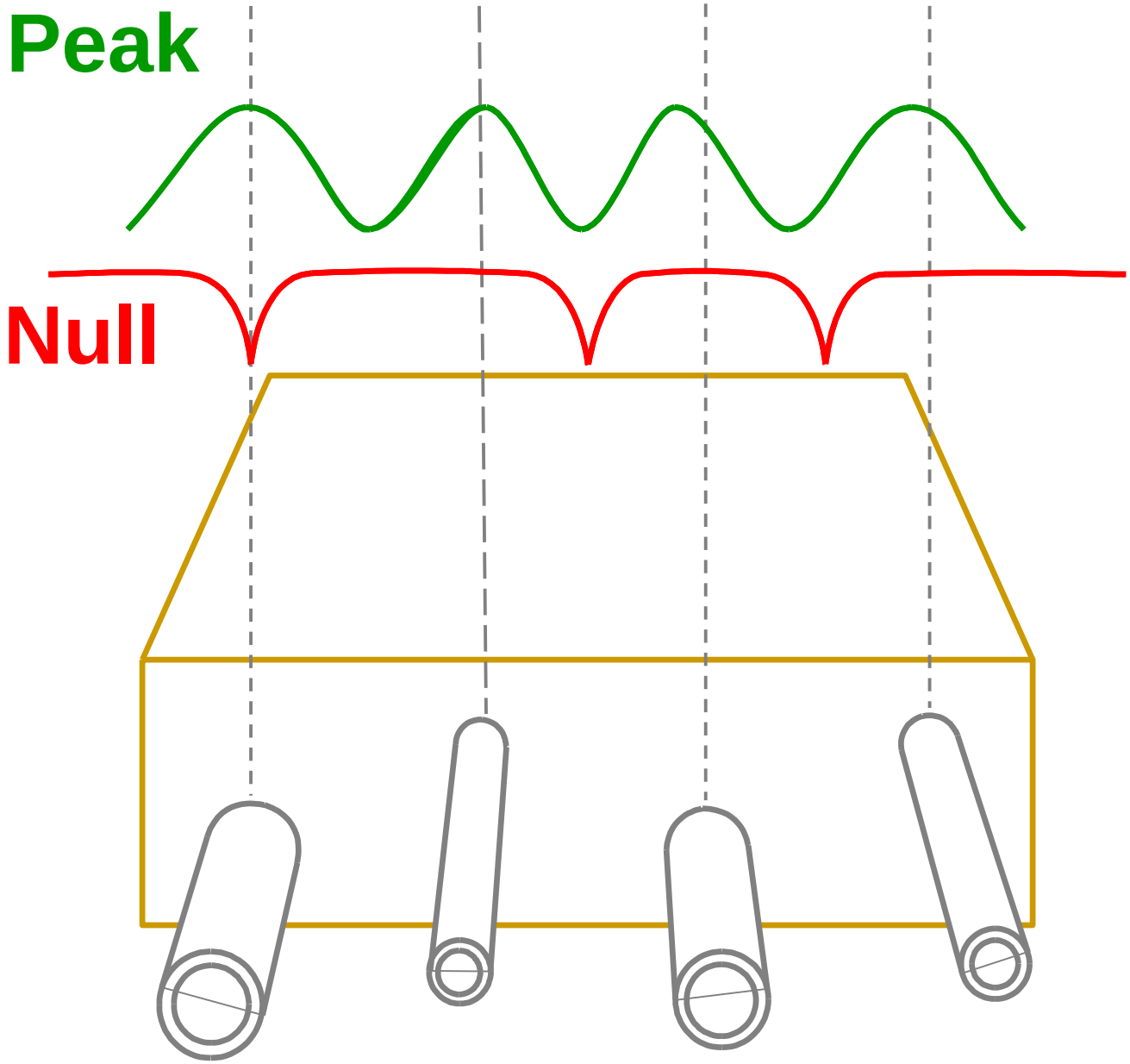

Null is often **misleading**.

Peak is more reliable.

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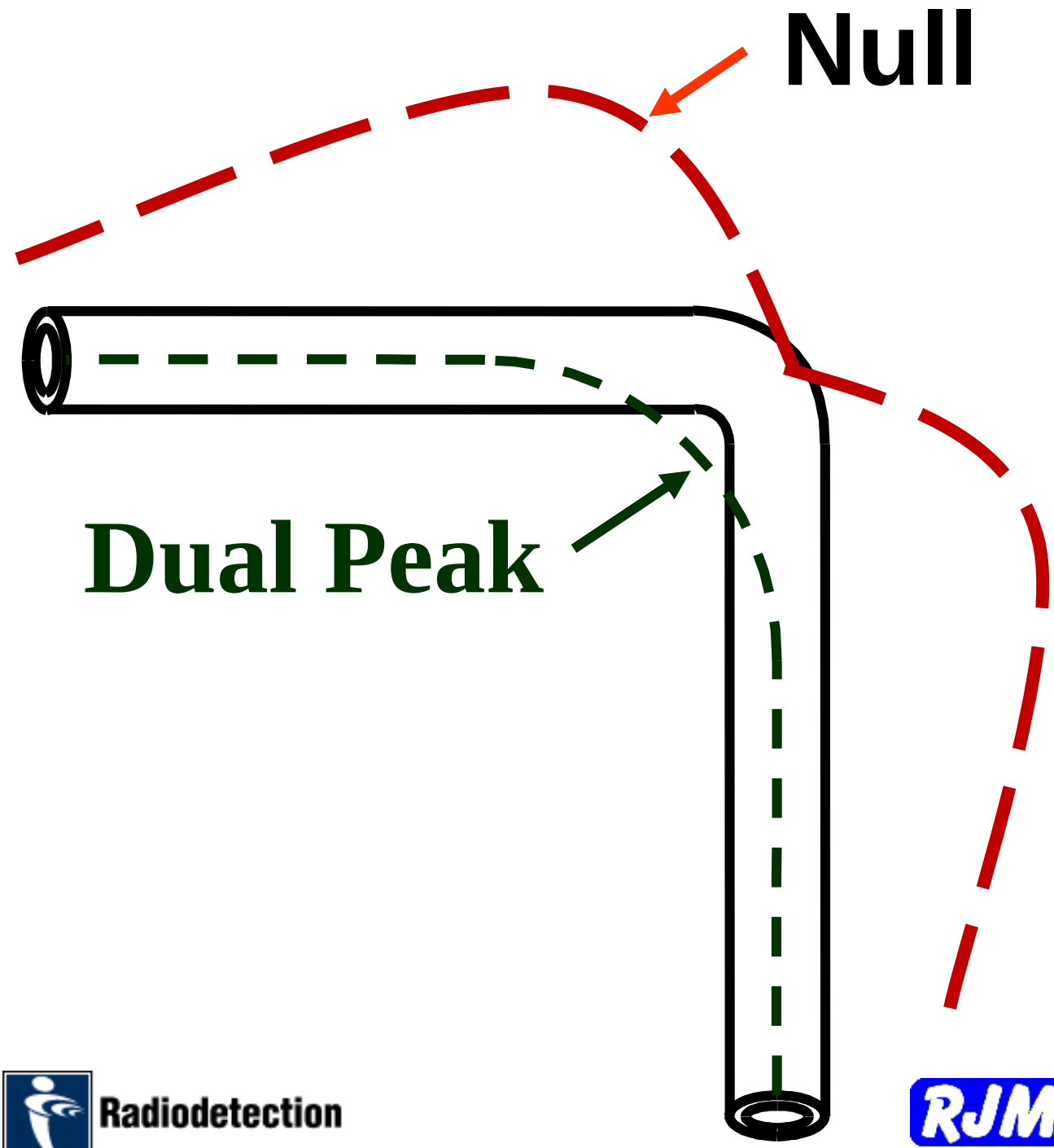
Peak and Null Errors in Bends.



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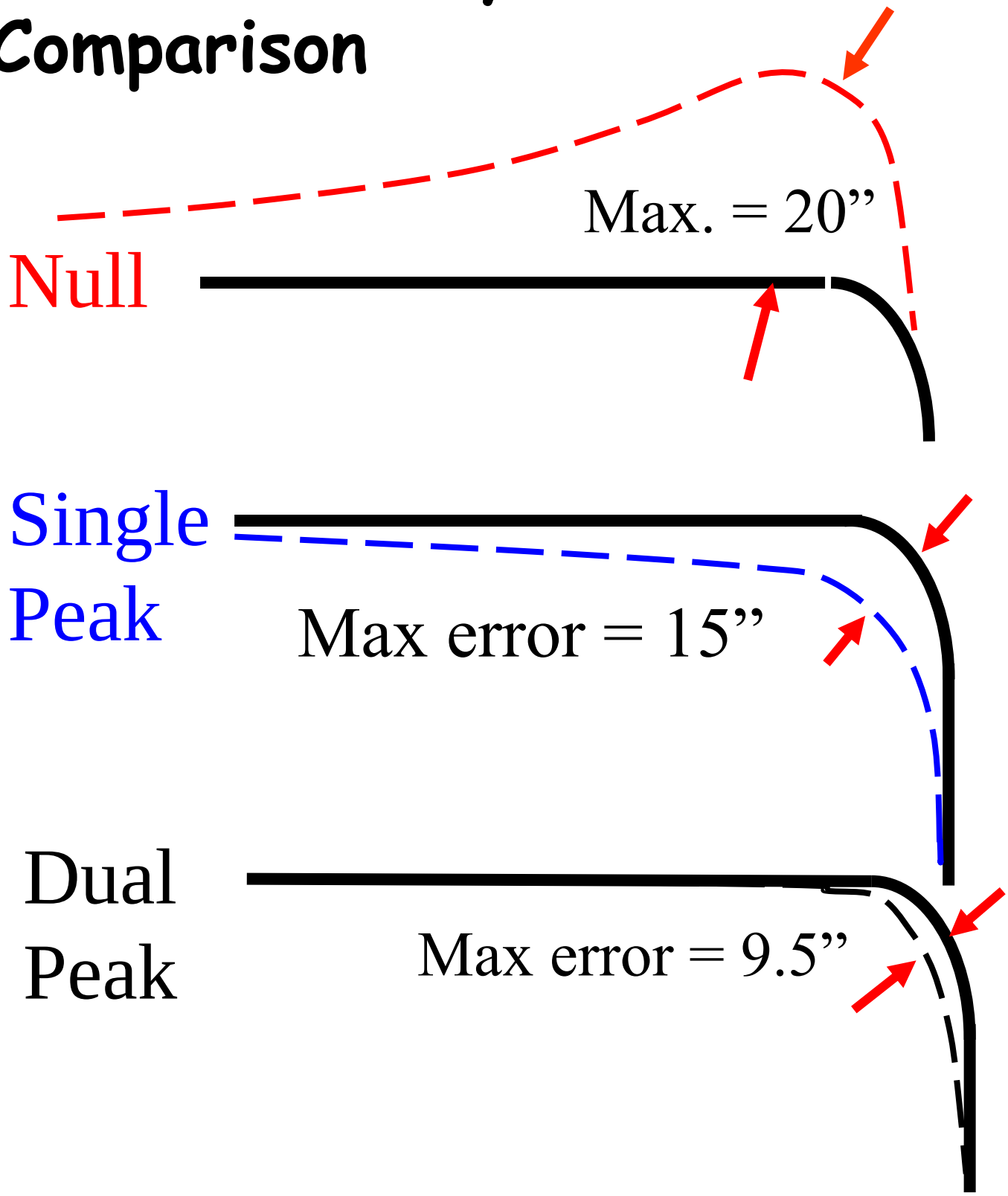
Mode Accuracy Comparison



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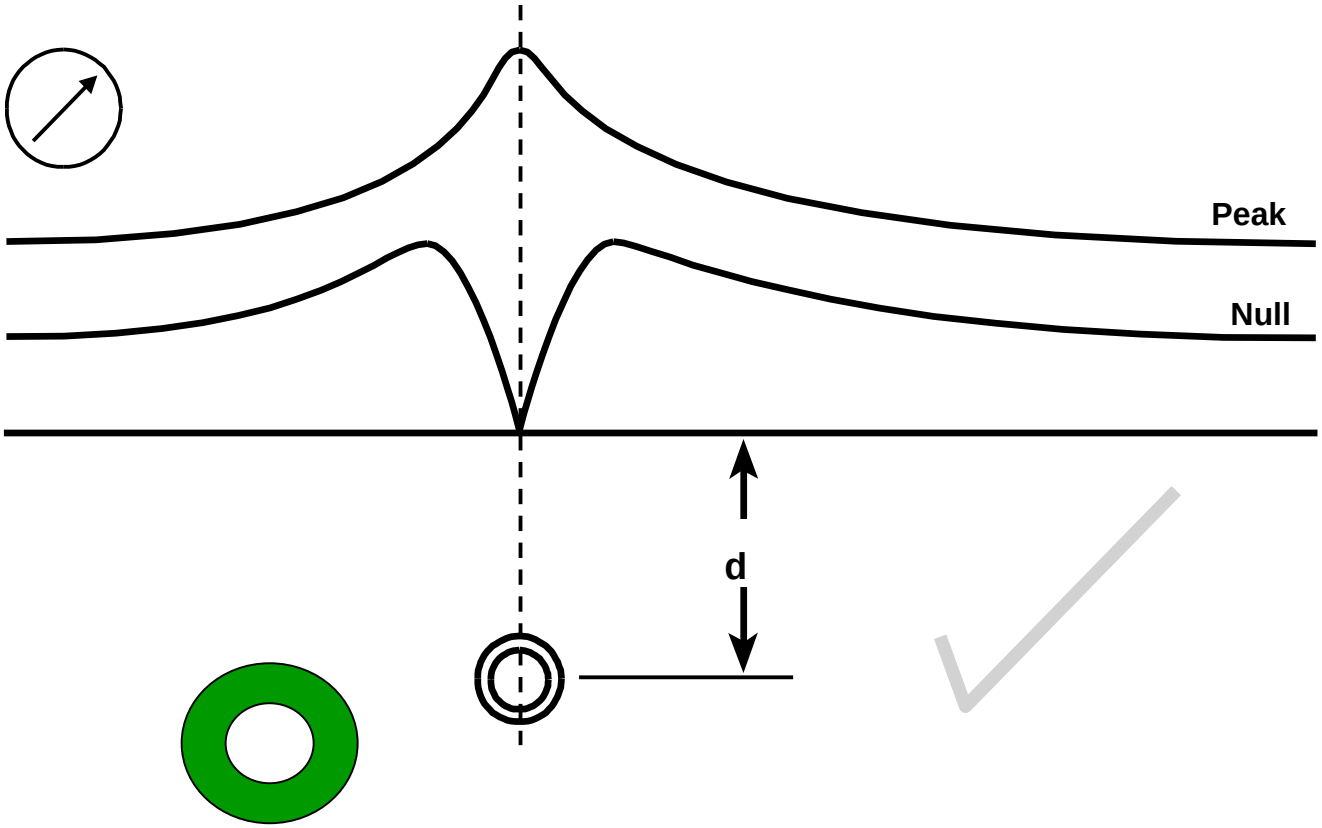
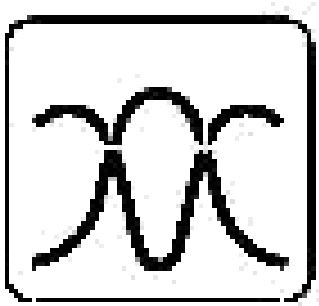
Distortion and Depth





Peak / Null

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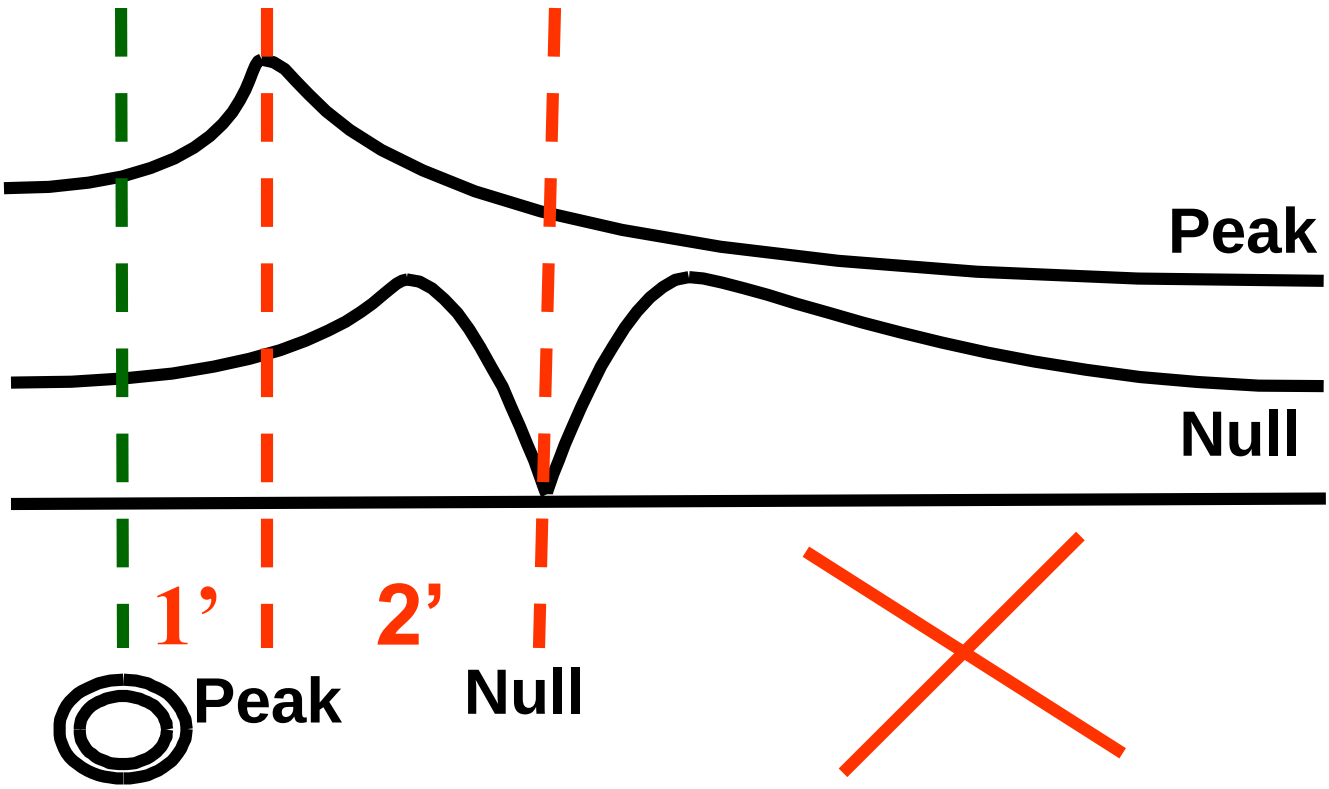
Location Estimation



When peak and null modes show different locations:

- ❑Isolate signal to improve accuracy.
- ❑Estimate actual location ½ distance between peak and null

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True Locator Test

- Verify position and depth functions using a isolated utility with an accurately known position and depth.

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Identification by Elimination

- To identify target utility, find others first.
- Induction Ring can be used to apply signal to utilities without access to utility

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Depth Measurement Check

Does measured change = actual change?

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Use All Your Clues

- Locator signal
- Look for above ground utility information: valve boxes, pedestals, transformers, junction boxes, trench, light poles, trench depressions
- As Builts
- Memory
- Avoid assumptions

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Specialized Locating Accessories

- Transmitter Induction Clamps
- Sondes
- Push rods
- Plug connector
- Live cable connector
- Stethoscope antennas
- Double depth antennas
- Current Direction
- External power cable
- Clamps

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Recommended Basic Locating Accessories

- Water or salt water
- Jumper
- Second and third ground rod
- Knife, sandpaper and cleaners
- Maps
- Hammer
- Black paint
- Spare batteries
- "C" clamp
- Safety vests, traffic cones

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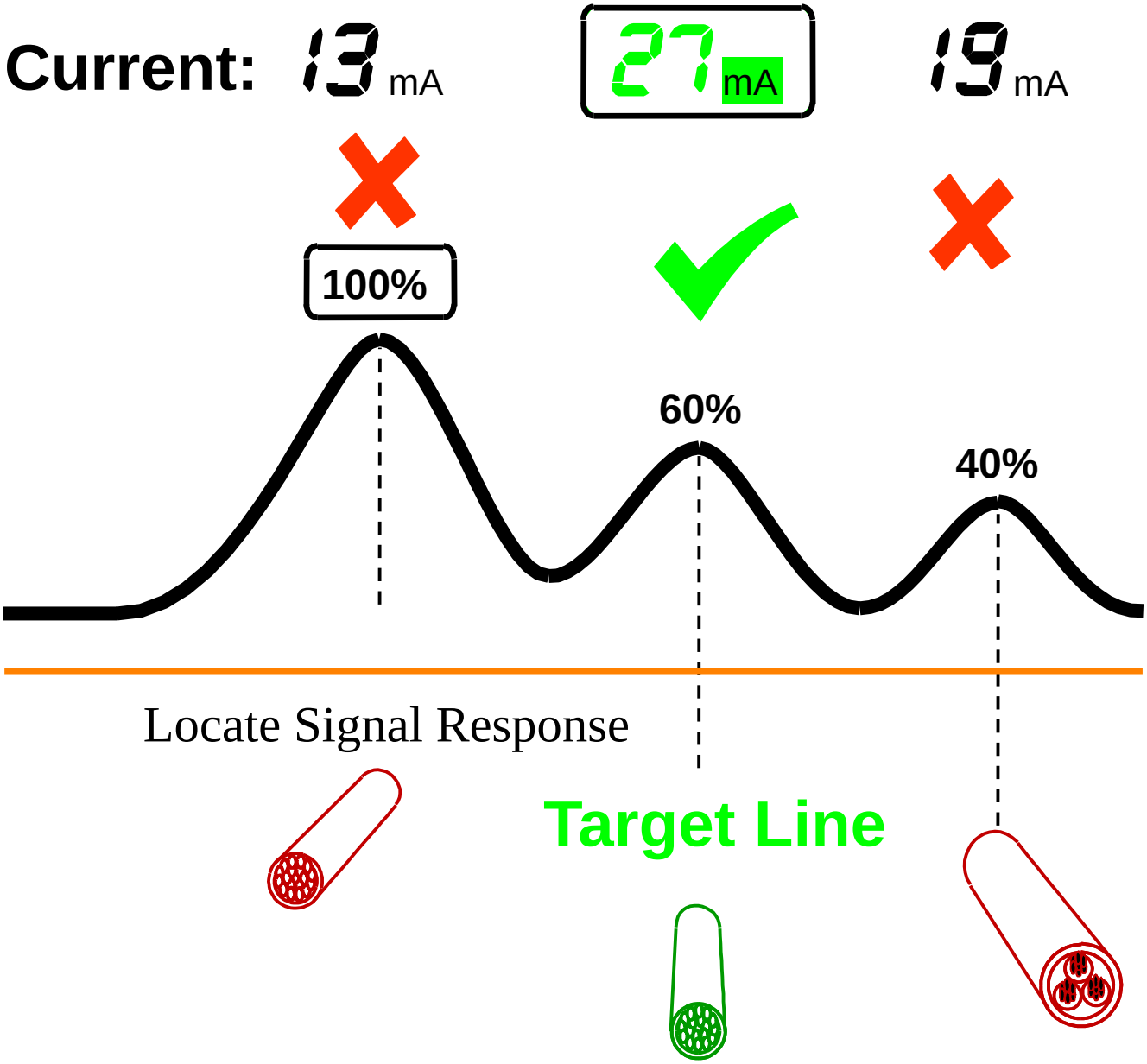

Line with Signal applied has highest transmitter current independent of depth

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Summary

- Use the lowest frequency and output setting that provides an usable signal for the best accuracy.
- Compare the peak and null locations to verify locate accuracy.

Radiodetection RD5100 H20

- Easier Guidance Mode
- Lower prices than VM810
- Auto Depth
- Auto Current Measurement
- 3 year warranty
- Withstands water spray
- Rechargeable batteries included in receiver
- Rechargeable and Alkaline D-cells included in transmitter

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Radiodetection RD7100

- Guideance Mode
- Optional GPS
- Utility orientation display
- Null antenna arrows and peak together
- Lower price than RD4000 and RD8000, same price as RD7000
- %28 lighter than RD4000
- TruDepth
- 3 year warranty
- Withstands water jets
- Power line warning
- Rechargeable Li-ion Batteries or quick change to Alkaline D-cells
- Calibration Verification in your office

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16 Ways to Locate Plastic Pipe

- Digging
- Water Pulse Generators
  - RD500
  - Sewerin Stopper
  - PWG2
  - RD Electronic Transonde
- Sewerin Knocker
- Ground Penetrating Radar
- Ultratrac APL (Acoustic Pipe Locator)
- Sondes in Pipes
  - Sondes
  - Ferret
  - PipeMic
  - Camera
- Duct Hunter
  - Mini Duct Hunter
  - Directional Insertion Tool
- Marker Balls
- Markers
  - Posts
  - Surface markers

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Digging

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RD1100 & RD1500

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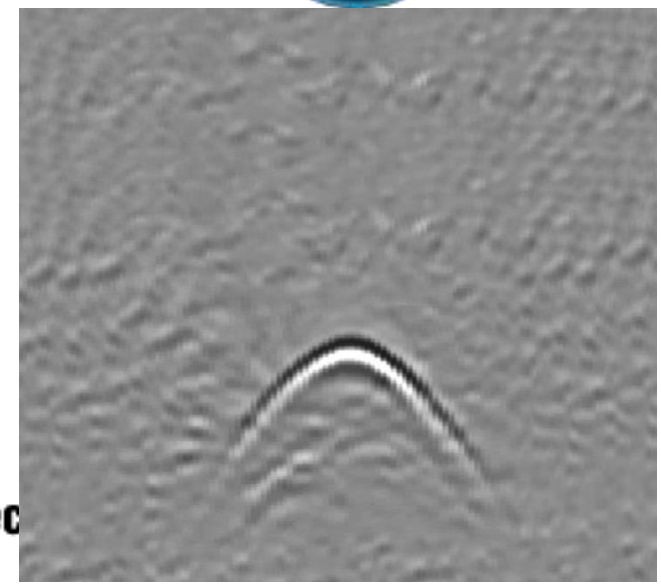
Ground Penetrating Radar



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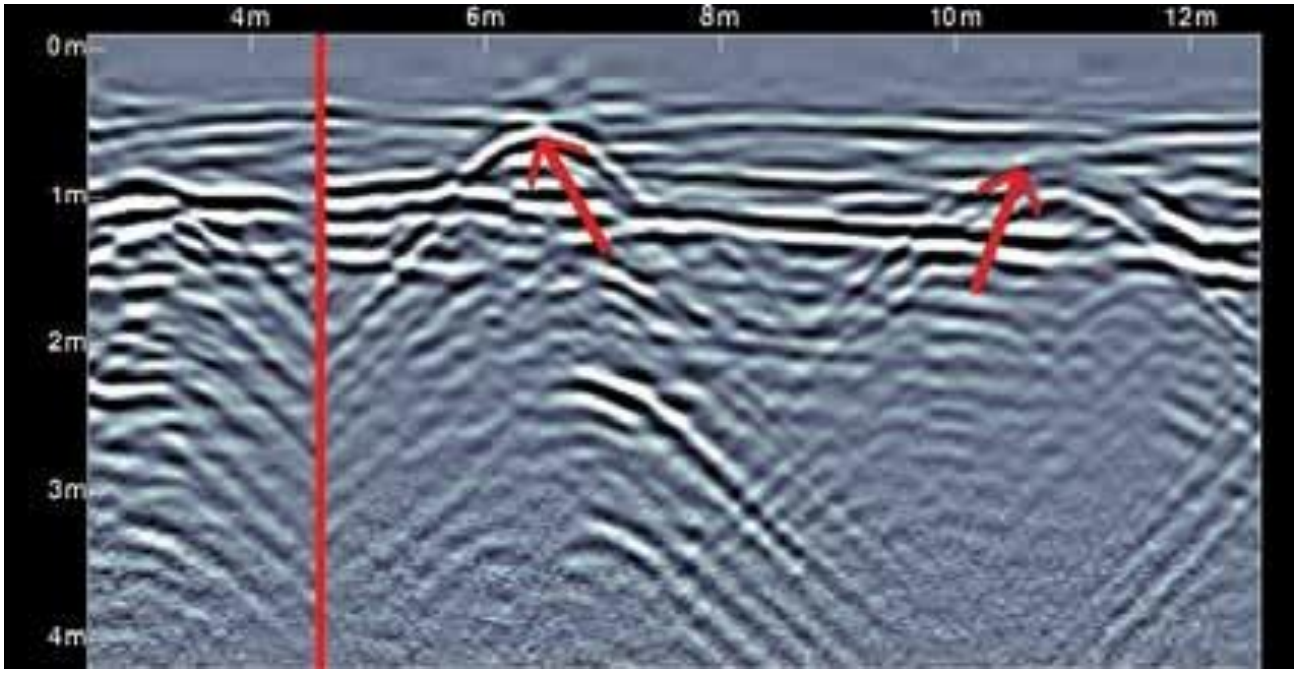
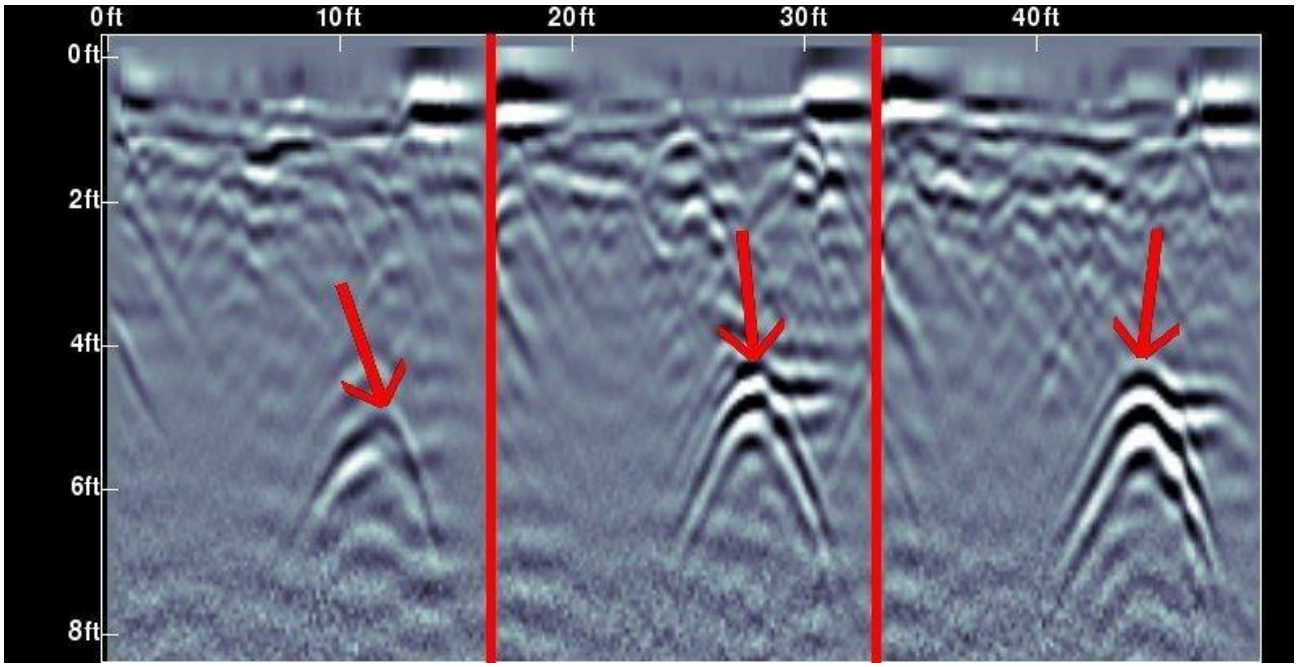
GPR Display





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RD1500 GPR GPS Track

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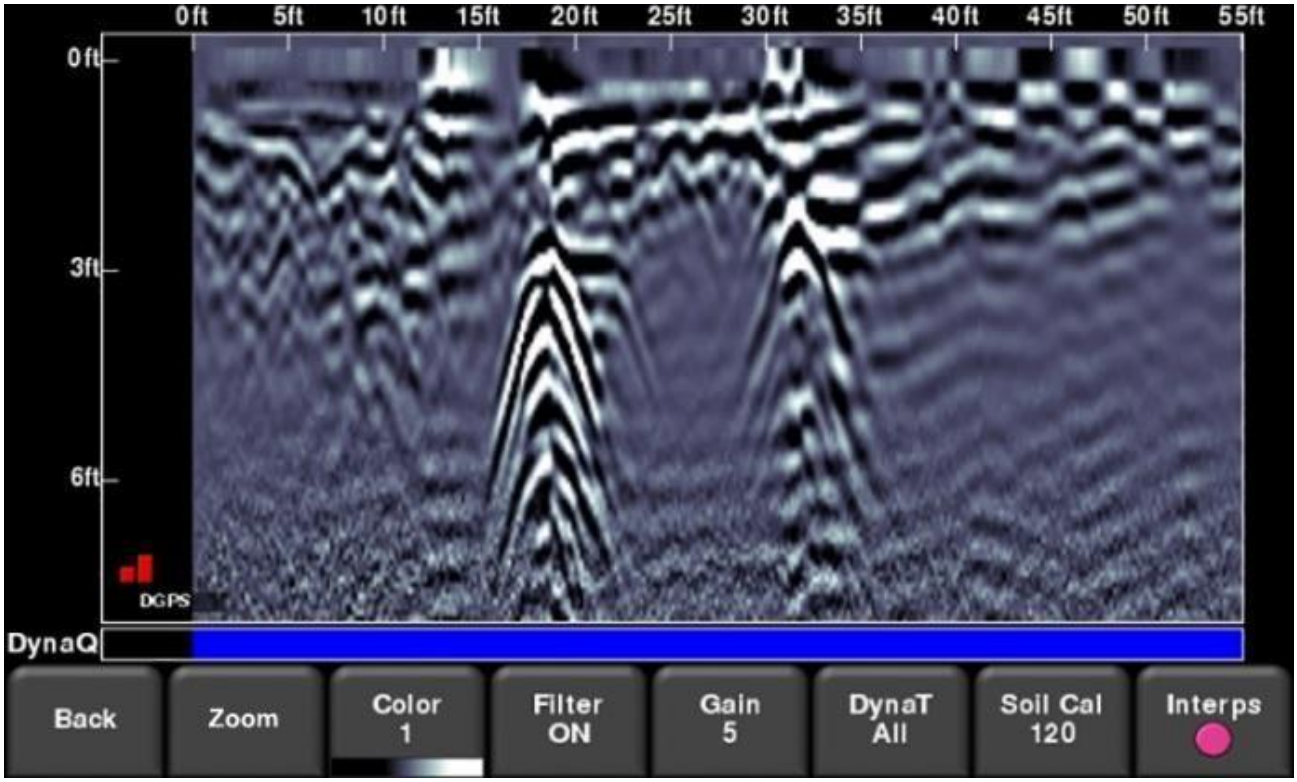
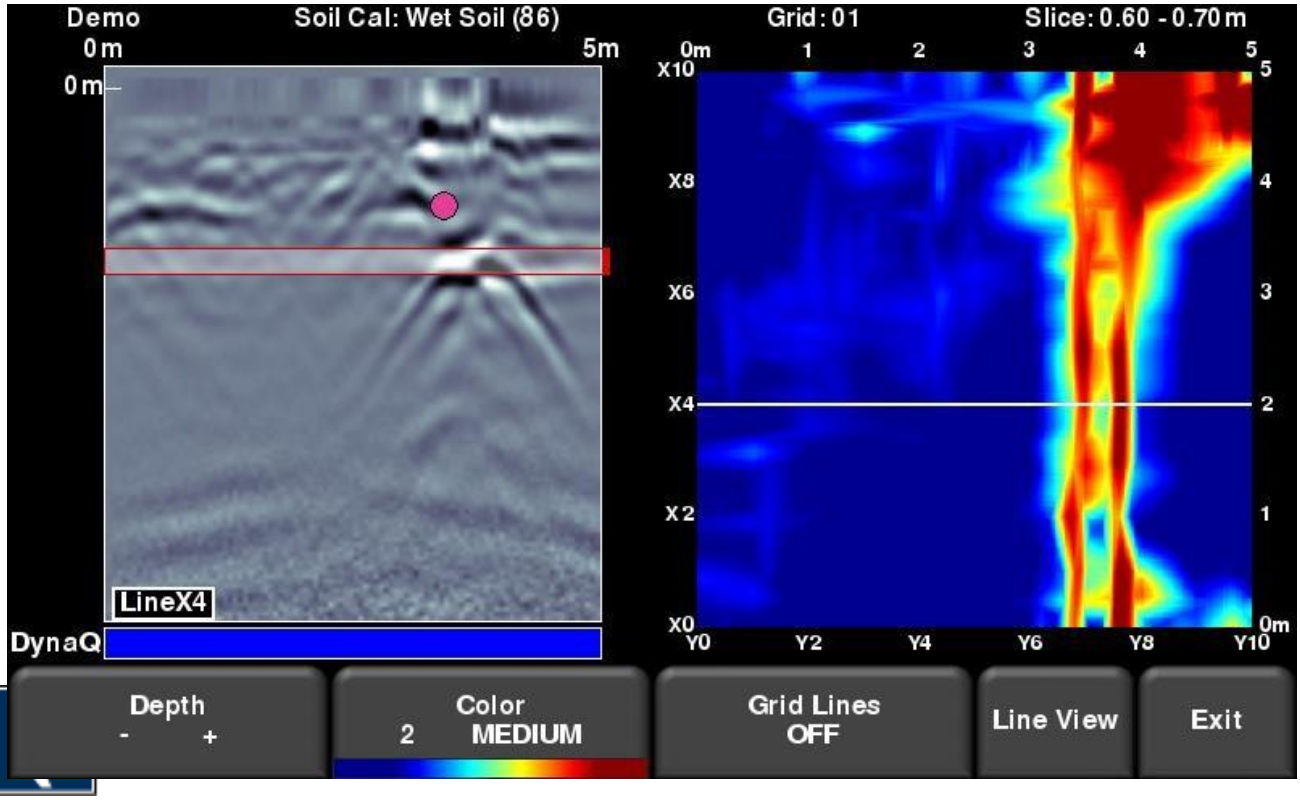

0ft
5ft
10ft
15ft
20ft
25ft
30ft
35ft
40ft
45ft
50ft
55ft
0ft
3ft
6ft
DGPS
DynaQ
Back
Zoom
Color
1
Filter
ON
Gain
5
DynaT
All
Soil Cal
120
Interps


Demo
Soil Cal: Wet Soil (86)
0m
5m
0m
LineX4
DynaQ
Grid: 01
Slice: 0.60 - 0.70m
0m
1
2
3
4
5
X10
X8
X6
X4
X2
X0
Y0
Y2
Y4
Y6
Y8
Y10
5
4
3
2
1
0m
Depth
- +
Color
2 MEDIUM
Grid Lines
OFF
Line View
Exit

Ground Penetrating Radar

- Works well in low conductivity soil (sandy)
- High conductivity soil adsorbs the signal quickly and limits the depth (clay)

- RD1100: $13,800

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Water Pulse Generators

- **Electronic Transonde**
- **Sewerin Stopper**
- **Radiodetection RD500**
- **FAST PWG/2**

Sewerin **AC 200**, **A200**, A100, FAST **M300D** leak Detectors are designed for tracking plastic pipe pulse sounds

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Plastic Pipe Locating

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Plastic Pipe Locating

SEWERIN

Technologies for leak detection.

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Plastic Pipe Locating Sewerin Stopper & Knocker

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Sewerin Knocker

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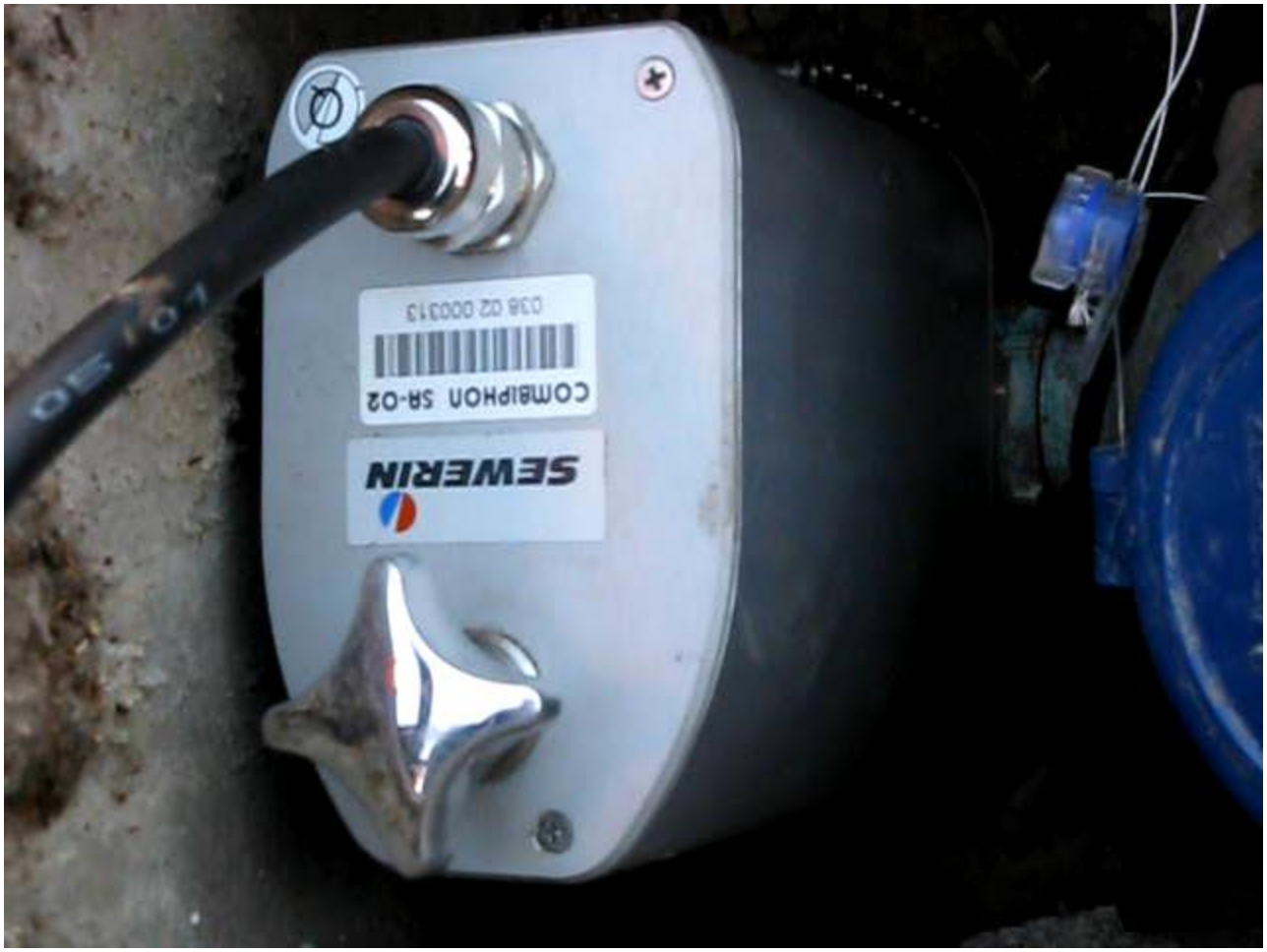
Sewerin Knocker in Action



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Sewerin Knocker

- Attaches around the pipe with a chain.
- Control of sound intensity and speed
- No connection to water system needed
- Finds all types of pipes
- Quick installation
- Simple operation
- Uses same controller as the “Sewerin Stopper”

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Radiodetection Electronic Transonde

Radiodetection

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Radiodetection
Electronic Transonde

Radiodetection

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RD Electronic Transonde

- **Locates all pipe materials with clean water**
- **Simple: connect to hydraunt, hose bibb, meter box and turn on**
- **Follow with listening device**
- **Pipes can remain in service**
- **30 psi to 115 psi pressure range**
- **Only $1220**

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RD500 Water Pulse Generator

The RD500 creates about 5 psi pulse

- Connect the RD500 to meter base, hydrant, hose bib
- Adjust until it pulses
- Follow maximum sound with leak detector

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FAST PWG2

- Two pulse intensity levels
- Electronically controlled
- 2- year warranty

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Acoustic Pipe Trackers

- Leak detectors designed for plastic pipe locating:
  - Sewerin AC 200
  - Sewerin A200
  - Sewerin A100
  - FAST M300D

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Utlratrac APL
How It Works

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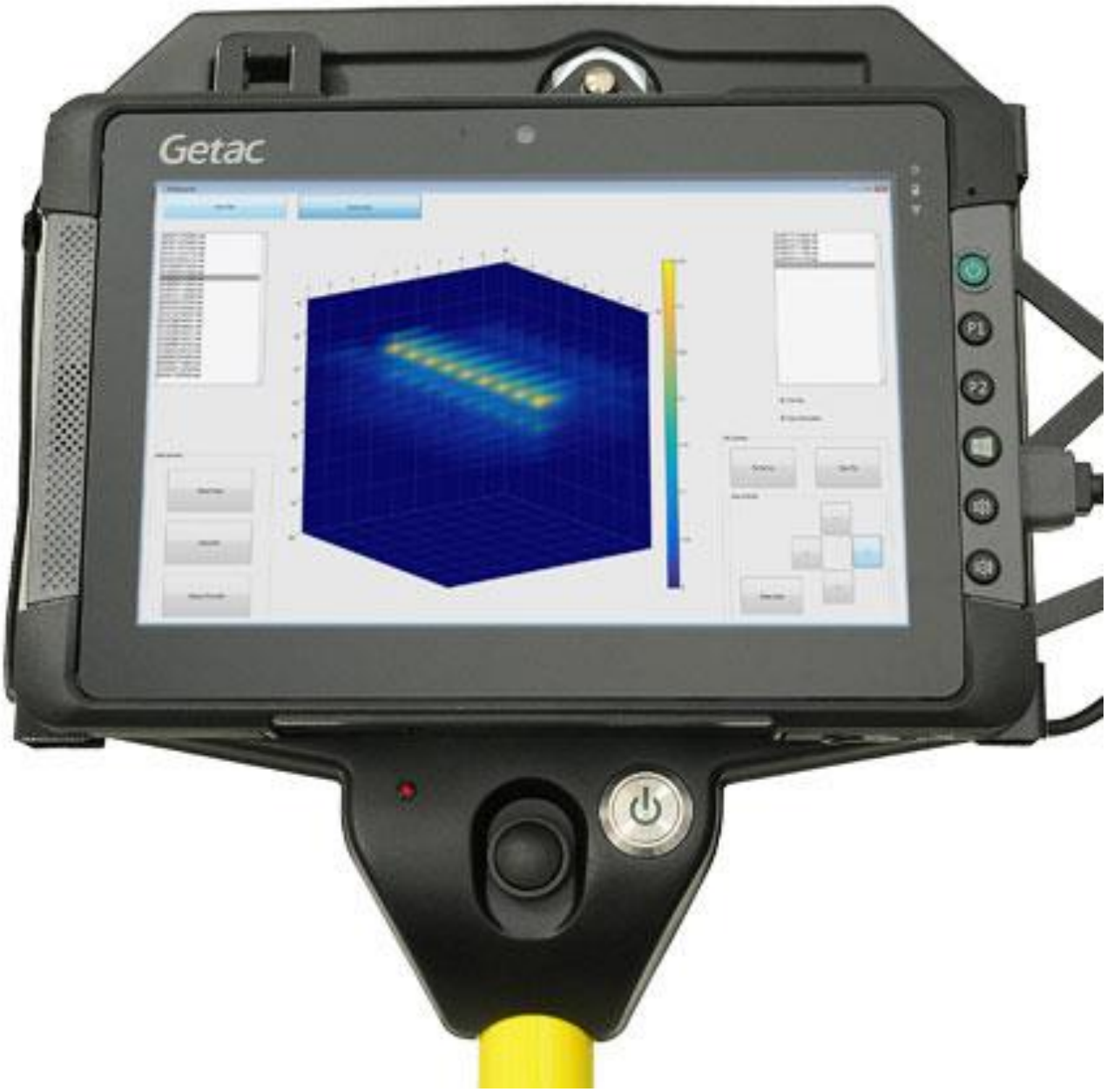
Ultatrac APL Display



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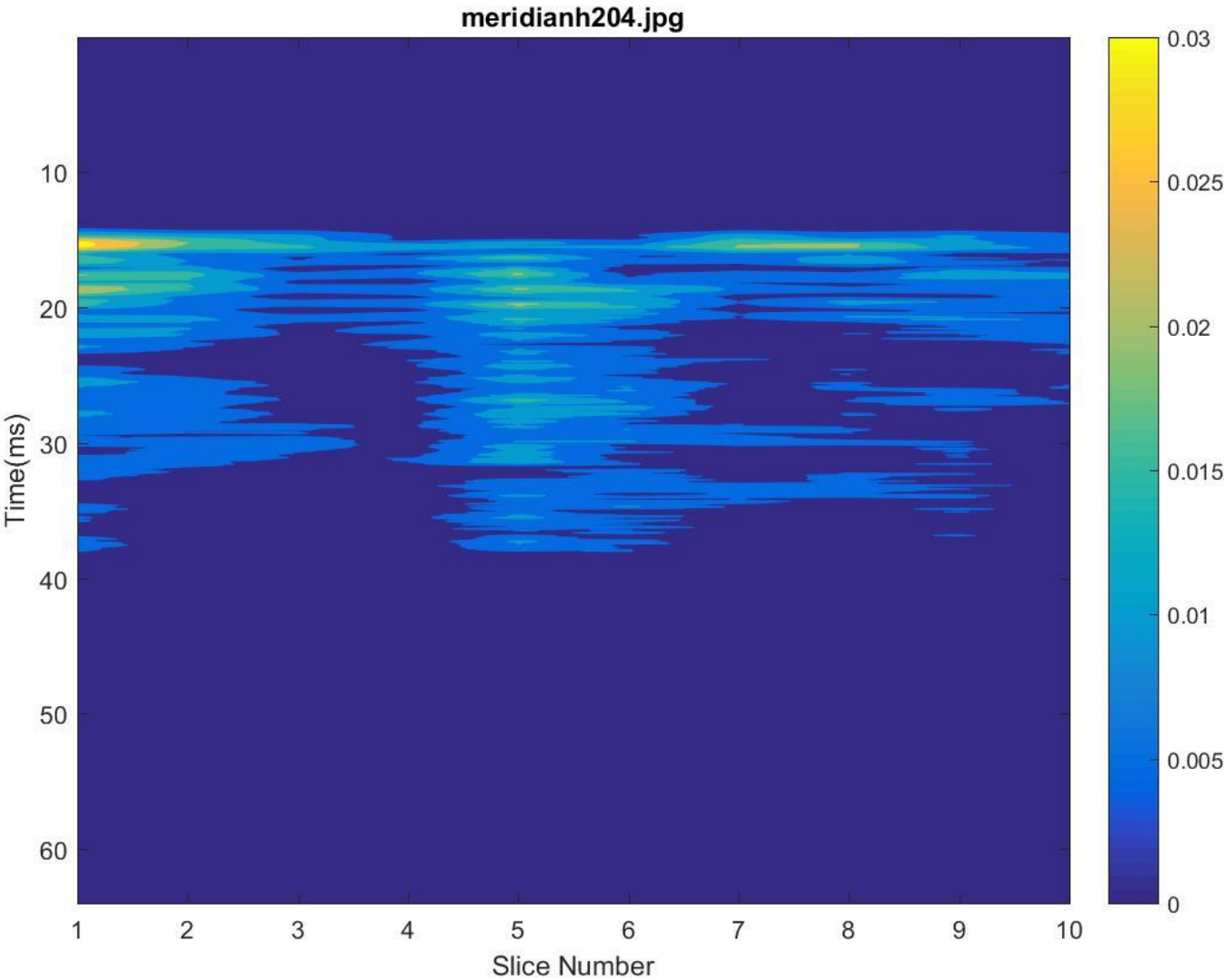
Ultratrac APL



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Ultratrac APL

- Finds pipes of all materials
- No connection to pipe needed
- Works clay where GPR doesn't
- Easy guided step by step operation
- Pipe location depths:

  1/2" pipes at 12" to 30"

  2" pipes at 12" to 48"

  4" pipes at 12" to 96"

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Ferret

Radiodetection

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PipeMic

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Marker Posts

- 3 sided for better view
- Pops up again
- Cold weather tough

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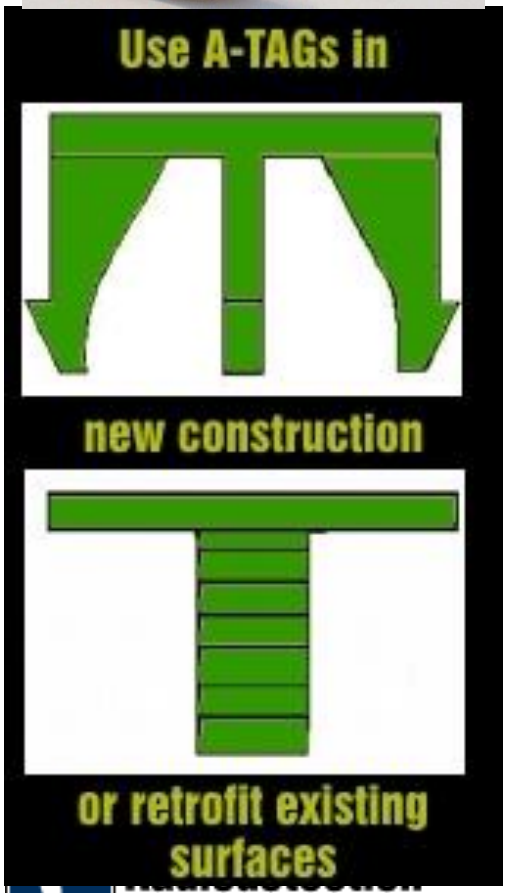
Surface Markers



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Questions?

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