

TROUBLESHOOTING GUIDE

Successful troubleshooting begins with a field observation.

Field Observation 1 – No or Little Signal Current (mA) generated on the buried line.

Section	Information
What You're Seeing	The transmitter indicates little or no output current, or the current is much lower than expected for the conductor being located.
Possible Electrical Causes	Poor transmitter connection; poor grounding conditions; high circuit resistance; open conductor; broken tracer wire; damaged cable shield; insulated joint or flange; poor bond; long ungrounded tracer wire; connected to the wrong conductor.
Try These Solutions	Verify the transmitter is connected to the intended conductor; clean and tighten all connection points; improve the grounding electrode; relocate the ground stake if necessary; lower the transmitter frequency; move to another access point; use an In-Line or Closed-Loop Connection when available; temporarily ground the far end of an isolated tracer wire when practical; verify conductor continuity.
Electrical Principle	Locate current can only flow through a complete electrical circuit. Every improvement either lowers circuit resistance or improves the return path.
Similar Examples	Long tracer wires, damaged cable shields, isolated steel pipe, insulated pipeline joints, abandoned conductors, and poorly bonded electrical systems.
Before Continuing	Do not begin tracing until adequate locate current has been established.

Field Observation 2 – The Signal Became Weak or Disappeared

Section	Information
What You're Seeing	The locate was progressing normally when the receiver suddenly reported a much weaker signal or no detectable signal.
Possible Electrical Causes	Current division; ground fault; open conductor; broken tracer wire; damaged cable shield; signal distortion; signal interference; utility crossing; incorrect receiver frequency; receiver sensitivity too low.
Try These Solutions	Return to the last confirmed locating point; verify receiver frequency; increase receiver sensitivity if necessary; continue slowly toward the area where the signal changed; look for tees, splices, valve boxes, pedestals, transformers, test stations, or utility crossings; reconnect beyond the affected area if another access point is available.
Electrical Principle	Locate current normally decreases gradually with distance. A sudden change usually indicates that the electrical circuit or electromagnetic field has changed.
Similar Examples	Gas service laterals, fiber splice enclosures, electrical transformers, cable pedestals, tracer wire breaks, insulated pipeline joints, and utility crossings.
Before Continuing	Determine why the signal changed before placing additional locating marks.

Field Observation 3 – I'm Following More Than One Conductor

Section	Information
What You're Seeing	The receiver identifies two or more conductors carrying the locating signal.
Possible Electrical Causes	Current division; bonded conductors; shared grounding; bridge splice; cable tap; pipe tee; parallel metallic utilities; inductive coupling.
Try These Solutions	Return to the last confirmed locating point; determine where the additional conductor first appeared; compare estimated locate current on each conductor; lower the transmitter frequency if practical; isolate bonded conductors when permitted; move the transmitter connection beyond the branching point if possible; verify the intended conductor before continuing.
Electrical Principle	Locate current follows every available conductive path. When multiple conductive paths exist, current divides among them according to their electrical resistance and impedance.
Similar Examples	Steel gas mains with service laterals, bonded communication cables, electrical duct banks, common grounding systems, and fiber-optic cable sheaths.
Before Continuing	Identify which conductor carries the intended locating signal before placing additional locating marks.

Field Observation 4 – The Signal Jumped to Another Utility

Section	Information
What You're Seeing	The receiver begins following a nearby conductor instead of the utility originally being located.
Possible Electrical Causes	Inductive coupling; shared grounding; metallic bonding; parallel utilities; high transmitter frequency; long parallel utility alignment.
Try These Solutions	Return to the last confirmed locating point; lower the transmitter frequency; compare estimated locate current; compare utility direction; move the transmitter connection if practical; verify the conductor using a second locating method.
Electrical Principle	Electromagnetic energy can induce locate current onto nearby conductors without a direct electrical connection. If sufficient induced current exists, the receiver may begin following the adjacent conductor.
Similar Examples	Parallel electric and communication cables, steel gas mains adjacent to power ducts, tracer wires beside metallic utilities, and congested utility corridors.
Before Continuing	Confirm that the receiver is still following the intended conductor before continuing the locate.

Field Observation 5 – The Locate Changed After Passing a Valve, Tee, Joint, or Splice

Section	Information
What You're Seeing	The locate was stable until passing a valve, tee, mechanical joint, cable splice, bridge splice, or service connection. Beyond that point, the receiver indicates changes in signal strength, estimated locate current, estimated depth, or utility direction.
Possible Electrical Causes	Current division; additional conductive paths; bonded conductors; grounding point; change in conductor construction; signal distortion.
Try These Solutions	Stop where the receiver information changed; return to the last confirmed locating point; pinpoint the conductor again; compare Peak and Null responses; compare estimated locate current before and after the feature; compare estimated depth; identify the physical feature responsible for the change; continue tracing only after understanding why the receiver information changed.
Electrical Principle	A tee, splice, bridge splice, or service connection creates another path for locate current. Current follows every available conductive path. Beyond that point, less current may remain on the conductor being traced because some current has divided onto another conductor.
Similar Examples	Gas service laterals, water service connections with tracer wire, communication cable bridge splices, electrical junctions, bonded cable sheaths, and branch circuits.
Before Continuing	A change in receiver information immediately beyond one of these features is often normal. Determine whether the change resulted from current division before assuming a locating problem exists.

Field Observation 6 – The Receiver's Peak and Null Location Indicators Do Not Agree

Section	Information
What You're Seeing	The Peak and Null responses identify different horizontal locations.
Possible Electrical Causes	Signal distortion; signal interference; current division; nearby conductor; utility crossing; metallic fence; large metallic structure; tee; splice; bond; grounding point.
Try These Solutions	Return to the last confirmed locating point; pinpoint the conductor again; determine where the disagreement first begins; compare estimated locate current; compare estimated depth; look for nearby metallic structures or utility features; continue only after determining why the field changed.
Electrical Principle	Peak and Null responses agree when the electromagnetic field is symmetrical. Signal distortion changes the field shape, causing the Peak and Null antenna systems to calculate different horizontal positions. Signal interference can also affect one or both locating responses by introducing unwanted electromagnetic energy into the receiver.
Similar Examples	Utility crossings, cable splices, pipeline tees, electrical substations, chain-link fences, guardrails, reinforced concrete, and congested utility corridors.
Before Continuing	Do not assume either the Peak or the Null response is correct. Determine why they disagree before placing additional locating marks.

Field Observation 7 – The Receiver's Estimated Depth Changed Drastically

Section	Information
What You're Seeing	Estimated depth suddenly becomes deeper or shallower than expected.
Possible Electrical Causes	Actual change in utility depth; signal distortion; signal interference; current leaving the conductor; ground fault; nearby conductor; utility crossing.
Try These Solutions	Return to the last confirmed locating point; pinpoint the conductor again; compare Peak and Null; compare estimated locate current; look for utility crossings, road crossings, railroad crossings, rivers, drainage crossings, or changes in construction depth; continue only after determining why the depth changed.
Electrical Principle	Estimated depth is calculated from the measured electromagnetic field. Any condition that changes the shape or symmetry of that field can change the calculated depth, even when the actual depth of the conductor has not changed.
Similar Examples	Road crossings, railroad crossings, utility crossings, grounding points, fault locations, signal distortion, and changes in utility installation depth.
Before Continuing	Never rely on a single depth reading. Evaluate estimated depth together with the other receiver information.

Field Observation 8 – The Receiver's Estimated Locate Current Changed

Section	Information
What You're Seeing	Estimated locate current suddenly increases or decreases while tracing the same conductor.
Possible Electrical Causes	Current division; grounding point; ground fault; service connection; tee; cable splice; bonded conductor; signal transfer; receiver following another conductor.
Try These Solutions	Return to the last confirmed locating point; determine where the current changed; compare Peak and Null; compare estimated depth; look for service laterals, tees, splices, grounding points, or utility crossings; verify the conductor being followed; continue tracing only after understanding why the current changed.
Electrical Principle	Estimated locate current helps determine whether the receiver is still measuring the intended conductor. Current commonly decreases after passing a tee or service connection because some locate current has divided onto another conductor. Current may also change near grounding points or faults where current leaves the conductor and returns to the transmitter through the earth.
Similar Examples	Steel gas mains with multiple services, bonded communication cables, electrical distribution systems, grounded cable shields, faulted conductors, and branch circuits.
Before Continuing	Treat sudden changes in estimated locate current as valuable information. They often identify locations where the electrical circuit changed and should be investigated before continuing the locate.

Field Observation 9 – The Receiver Indicates a Different Direction Than Expected

Section	Information
What You're Seeing	The receiver suddenly indicates a change in direction even though the utility is expected to continue along its previous route.
Possible Electrical Causes	Signal transferred to another conductor; current division; utility branch; utility crossing; signal distortion; nearby metallic structure; receiver following an adjacent conductor.
Try These Solutions	Return to the last confirmed locating point; pinpoint the conductor again; compare Peak and Null responses; compare estimated locate current; compare estimated depth; look for tees, bends, service connections, crossings, or nearby utilities; verify the route using a second locating method if necessary.
Electrical Principle	The receiver follows the electromagnetic field, not the buried conductor. If the field changes direction because current divided, transferred, or became distorted, the receiver will faithfully report that change.
Similar Examples	Gas mains with service laterals, communication cable branches, electrical duct banks, bonded cable systems, and congested utility corridors.
Before Continuing	Confirm the receiver is still following the intended conductor before changing the marked route.

Field Observation 10 – Other Signals Are Affecting the Locate

Section	Information
What You're Seeing	The receiver responds to signals that do not appear to originate from the transmitter. Signal strength may fluctuate, multiple signals may be detected, or the audible response becomes unstable.
Possible Electrical Causes	50/60 Hz power current; cathodic protection current; radio frequency energy; nearby electrical equipment; overhead power lines; induced current from adjacent conductors.
Try These Solutions	Verify the receiver is operating in the correct locating mode; verify the receiver frequency matches the transmitter; compare the active locate with Passive Power, Passive Radio, or Cathodic Protection modes; reduce receiver sensitivity if necessary; confirm the receiver is following the transmitted locating signal before continuing.
Electrical Principle	The receiver measures any electromagnetic field within its operating range. Passive signals may exist on conductors that are not connected to the transmitter and may compete with the intended locating signal.
Similar Examples	Energized electric distribution systems, overhead transmission lines, cathodically protected steel pipelines, communication systems, and industrial facilities.
Before Continuing	Verify that the transmitted signal remains the dominant signal being measured by the receiver.

Field Observation 11 – Signal Interference Is Affecting the Receiver

Section	Information
What You're Seeing	The receiver becomes unstable, signal strength fluctuates unexpectedly, or the locate becomes difficult to repeat within a specific area.
Possible Electrical Causes	Overhead power lines; large electric motors; variable frequency drives; electrical substations; radio transmitters; strong passive electromagnetic fields.
Try These Solutions	Compare receiver behavior before entering, within, and beyond the affected area; reduce receiver sensitivity if necessary; verify the locate after passing the suspected interference source; compare with another locating method if uncertainty remains.
Electrical Principle	Signal interference is unwanted electromagnetic energy that reduces the receiver's ability to distinguish the transmitted locating signal. Unlike signal distortion, interference does not change the transmitted field—it competes with it.
Similar Examples	Overhead transmission lines, operating air-conditioning units, industrial electrical equipment, radio transmitters, and large electric motors.
Before Continuing	If receiver operation returns to normal after passing the interference source, the transmitted locating signal likely remained unchanged.

Field Observation 12 – Signal Distortion Is Affecting the Locate

Section	Information
What You're Seeing	Receiver information changes within a localized area. Peak and Null responses separate, estimated depth changes, estimated locate current changes, or the locate becomes difficult to repeat.
Possible Electrical Causes	Current division; nearby metallic conductors; utility crossings; bonded utilities; metallic structures; tees; splices; grounding points.
Try These Solutions	Return to the last confirmed locating point; determine where the distortion begins and ends; compare Peak and Null responses; compare estimated locate current; compare estimated depth; identify nearby utilities or metallic structures influencing the electromagnetic field; continue tracing only after understanding the cause.
Electrical Principle	Signal distortion occurs when the shape of the transmitted electromagnetic field changes. Because receiver calculations assume a reasonably symmetrical field, changes in field shape can affect the calculated location, depth, and estimated locate current.
Similar Examples	Congested utility corridors, utility crossings, bridge splices, pipeline tees, large metallic structures, reinforced concrete, and bonded conductors.
Before Continuing	Distinguish between signal distortion and signal interference . Distortion changes the shape of the transmitted field. Interference introduces unwanted electromagnetic energy that competes with the transmitted field. The troubleshooting approach is different for each.