Getting to Know Your Spartan Locating System

**415R Controls Overview**

- **ON/OFF:** Press to turn on. Press again to turn off.
- **ANT SEL:** Selects single, twin, null, or left/right arrow antenna modes.
- **Up Arrow:** Press to increase manual gain incrementally from 20% to 80%.
- **Down Arrow:** Press to decrease manual gain incrementally from 20% to 80%.
- **Mode:** Selects operating frequency.
- **Depth:** Press once to estimate depth of properly located signal source. Press and hold to show amount of current on the target line in milliamps.
- **Frequency Display:** See "Frequency" below.
- **Signal Strength Display:** Signal strength is shown by bars at top of display and in numeric display.
- **Gain Display:** Gain (amount of signal amplification) is shown by bars below signal strength indicator. Gain increases to the right.
- **Depth Display:** Estimated depth displays when DEPTH button is pressed. Estimated current on target line is displayed in mA when DEPTH button is pressed and held. The higher the number, the higher the current on the target line.
- **Receiver Battery Level Display:** Three segments mean that batteries are at full power. One segment means that batteries are at low power. No segments and a flashing outline means that you should change batteries immediately.

**415T Controls Overview**

- **ON/OFF:** Press to turn on. Press again to turn off.
- **Power Output:** On power up, transmitter defaults to low power output. Press once to switch to high output. Press again to return to low power output.
- **Green LED:** Indicates low power output.
- **Red LED:** Indicates high power output.

**Startup Tips**

**Installing the Batteries**

**415R**

Use six C-cell alkaline batteries in receiver.

To install:

1. Unscrew battery cover.
2. Insert batteries as shown.
3. Close cover and tighten screw.
4. Check operation.

**415T**

Use six D-cell alkaline batteries in transmitter.

To install:

1. Unscrew battery cover.
2. Insert batteries as shown.
3. Close and tighten battery cover.
4. Check operation.

**Choosing Signal Type**

**Active:** There are three ways to place active signals on a target line with a transmitter. **Direct connection** (preferred method) requires a connection to be made directly onto target line. **Inductive clamp** requires placing a clamp around target line. **Broadcast induction** sends current into all lines near the transmitter.

**Beacon:** Beacon signals allow nonmetal pipe tracing.

**Passive:** Some utility lines emit detectable signals that are picked up from the environment. These passive signals can be power signals or radio signals.

**Choosing Antenna Configuration**

The **415R** receiver has three antenna configurations. Use the information below to determine the antenna configuration that best fits your job.

- **Twin peak:** Response is highest at strongest signal. Advantage: most precise; disadvantage: less range.
- **Null:** Response is lowest when receiver is over the line. Advantage: sharp response; disadvantage: easily distorted in congested areas.
- **Left/Right:** Displays arrows to guide the operator to the line. Advantage: easy to use; disadvantage: easily distorted in congested areas.

**Frequency**

The **415R** receiver detects passive signals around 50/60 Hz power. It also detects active 65 kHz signals placed on a line by a transmitter and 512 Hz beacon signals.

The **415T** transmitter sends 65 kHz frequency signals.

Use the information below to determine the transmitter frequency that best fits your job.

- **Lower frequencies travel farther than higher frequencies.**
- **Higher frequencies couple onto lines more easily.**
- **Higher frequencies also couple onto lines other than the target line more easily.**

**Modes**

- **Power (50 or 60 Hz)**
- **Transmitter (65 kHz frequency)**
- **Beacon (512 Hz frequency)**
## Operating Your Spartan Locating System

### Active Location - Direct Connect

**NOTICE:** Turn off transmitter when connecting or moving ground stake.

1. Drive ground stake.
2. Plug cable into transmitter.
3. Hook black lead to ground stake.
4. Hook red lead to line.
5. Turn on transmitter.
6. Check battery level.
7. Choose frequency and shutoff time.
8. Walk in an arc approximately 25\(^\circ\) (7.5 m) around transmitter.
9. Hold the receiver so that the handle points toward the transmitter, as shown.
10. Identify location of line by finding the spot with the strongest signal response.

### Active Location - Inductive Clamp

1. Plug cable into transmitter.
2. Place clamp around line.
3. Turn on transmitter.
4. Check battery level.
5. Choose frequency and shutoff time.
6. Walk in an arc approximately 25\(^\circ\) (7.5 m) around transmitter.
7. Hold the receiver so that the handle points toward the transmitter, as shown.
8. Identify location of line by finding the spot with the strongest signal response.

### Active Location - Broadcast

1. Remove cable, stake, clamp and any other metal objects from transmitter.
2. Place transmitter parallel to and directly above suspected line as shown.
3. Turn on transmitter.
4. Check battery level.
5. Choose frequency, power level, and shutoff time.
6. Walk in an arc approximately 25\(^\circ\) (7.5 m) around transmitter.
7. Hold the receiver so that the handle points toward the transmitter, as shown.
8. Identify location of line by finding the spot with the strongest signal response.

### Passive Location

1. Turn on receiver.
2. Select frequency and antenna configuration.
3. Make a visual check of the site for signs of buried lines such as recent trenching, buried line markers, overhead lines that run down pole and underground, gas meters, valve sights, and drains or manhole covers.
4. Search the site by walking a grid pattern while holding receiver close to the ground. Keep the receiver vertical.
5. Move the receiver over the detected signal to find the strongest signal response. If using a peak antenna mode, rotate the receiver until the signal is strongest. Strongest signal indicates line direction.
6. Walk along the suspected path while moving the receiver back and forth across the area.
7. Sweep, focus, and trace all detected signals in the area. Mark line paths with colored paint or flags.

### Beacon (Sonde) Location

1. Install beacon batteries and attach beacon to plumber’s snake or flex rod.
2. Turn on receiver.
3. Set antenna configuration and signal source, and select beacon frequency.
4. Place the beacon into the pipe and move it down the pipe.
5. To locate the beacon, circle over its approximate location in the pipe.
6. To identify the location of beacon, find the spot with the strongest signal response.
7. Rotate the receiver to determine which direction the beacon runs. Receiver indicates the strongest signal when handle is perpendicular to the beacon.
8. Press DEPTH button. When estimating depth with a beacon in nonmetallic pipe, depth shown will be to the center of the beacon, not to the top of the pipe.
9. Continue to track the beacon and take depth readings. Mark pipe location with paint. Turn on receiver.

**IMPORTANT:** Receiver must have appropriate beacon frequency installed to display accurate depth estimate.

### Error Messages

**Transmitter**

Red LED with No Tone

If red LED flashes with no tone in direct connect or induction clamp mode, the unit has detected a short in one of the leads or on the target line.