

Advanced Tutorial

Tracker DTS Advanced Tutorial



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The Tracker DTS Advanced Tutorial provides detailed instruction on advanced techniques not included in our owner's manual and not usually taught in recreational avalanche courses. It is most effective when used with our vinyl flux diagram and the animated tutorials on our training video, "Tracker 101." These can be ordered from BCA by calling 800.670.8735.

For an efficient and fun practice environment, visit one of our Beacon Training Parks. See www.backcountryaccess.com/education to locate a site near you.

The Advanced Tutorial primarily addresses advanced pinpointing and multiple-burial techniques. It should only be used by instructors and students with extensive experience with the Tracker DTS. Those with experience with analog/audible based beacons must first have mastered the basic techniques addressed in the Tracker DTS owner's manual or Field Instruction Guide.

Target audience:

- Professional guides
- Avalanche educators
- Snow safety professionals
- Advanced recreationists

All must have extensive previous experience with the Tracker

Lesson 1: "Pinpointing on a Line"

Pinpointing on a line is an advanced technique that enables the searcher to reduce the area to be searched and probed to a single axis. This technique reduces the area to be probed along this axis to a very specific point. This is done by analyzing "spike" signals and distance readings along this axis and determining the orientation of the transmitting antenna. This technique is especially useful in deep burials. Pinpointing on a line is unnecessary when searching with three-antenna beacons, such as the Tracker2, as the third antenna is intended to eliminate "spike" signals.

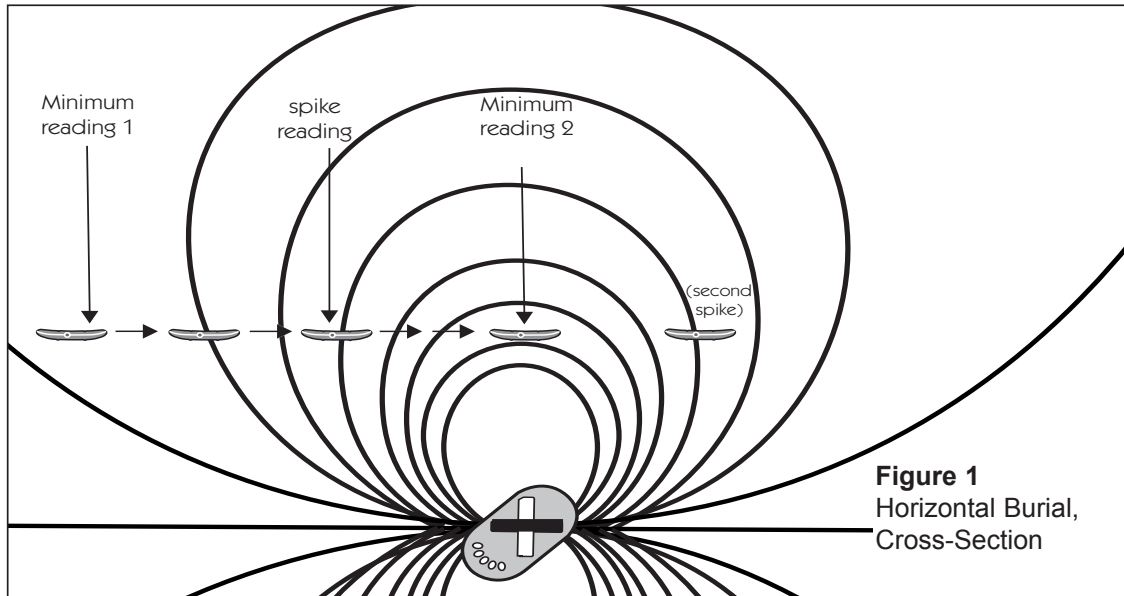
Before attempting this advanced technique, students must have learned to recognize the "spike" signal. The "spike" is where the signal suddenly and temporarily becomes weak. This is because the horizontal searching beacon is perpendicular to the vertical aspect of the flux pattern of the transmitting beacon. It can be recognized by a sudden increase ("spike") in the distance reading and a fluctuation in the directional display, often followed by no reading or "SE" in the display. Illustrating this important feature is best accomplished using the BCA flux diagram.

Flux diagram usage: advanced pinpointing

1) To illustrate the spike signal, hang the BCA flux diagram vertically. Attach a transmitting beacon to the diagram using the Velcro strip provided, making sure to place the transmitting antenna over the core of the diagram (Figure 1). For simplicity the first time, orient the transmitting antenna horizontally (parallel to the snow surface), as shown in Figure 1. Note that the transmitting antenna on the Tracker is oriented 45 degrees from the long axis of the case (under the Tracker logo on the convex side).

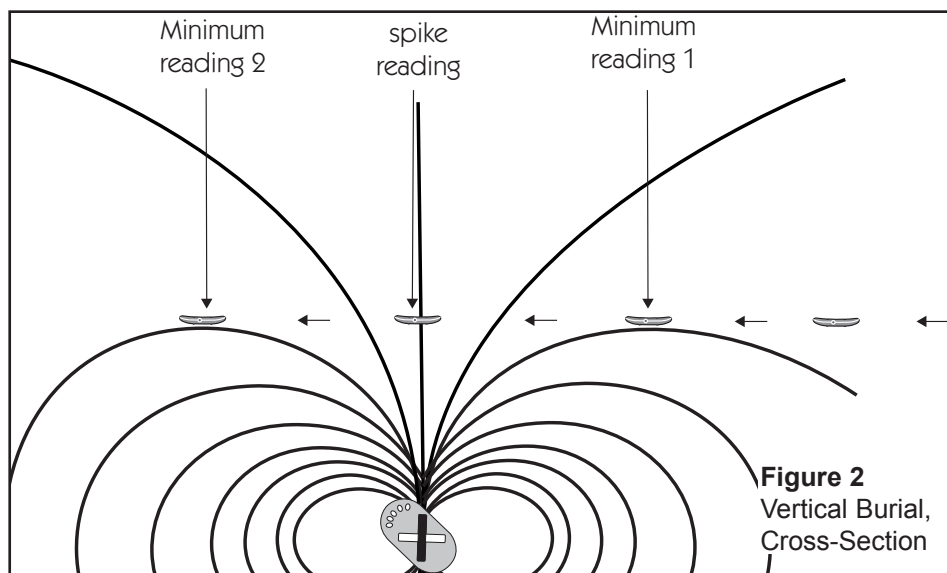
2) Approach the diagram with the searching beacon and transmitting antenna on the same plane. Note that there is no spike signal, as the searching beacon is always aligned with the flux line coming straight from the antenna. This is unpractical, however, because it would represent a transmitting beacon that is on the snow surface.

3) Now approach the transmitter as if it were buried, searching along a horizontal line 1-2 feet above the antenna. Note how the signal "spikes" where the flux lines curve upward and meet the searching beacon in a perpendicular orientation. Note the minimum reading after the spike. Note the second spike reading if you continue forward.



4) If the transmitting antenna is buried horizontally, there will be two spikes and the lowest distance reading will be between them.

5) Now re-hang the flux diagram with the transmitting antenna oriented vertically. Note that there is only one spike reading and it is directly over the antenna. There are two minimum readings on either side that are very similar to each other.



6) Observe the following rules of thumb:

- If there is one minimum reading and two spikes, the transmitter is roughly horizontal. At the lowest distance reading, keep the receiving beacon horizontal and bracket on either side of the flux line, ignoring the directional lights. Probe at the lowest reading found.
- If there are two minimum readings and only one spike, the transmitter is roughly vertical. Minimum reading 1 will be very similar to minimum reading 2. At the spike, orient the Tracker vertically and bracket on either side of the flux line, ignoring the directional lights. Probe at the lowest distance reading found. **(Novices should keep it simple: keep their beacon horizontal and probe either minimum in an expanding spiral pattern.)**
- In most cases, the antenna will be oriented somewhere between horizontal and vertical. There will usually be two spikes (one more obvious than the other) and the minimum reading will be found closer to one. If the orientation is unclear, simply begin probing at the lowest distance reading.

Exercise I: Deep burials/pinpointing on a line

1) Bury a transmitter at least one meter beneath the snow surface. Closer to the surface, place a backpack, shovel blade, or wooden target that can be recognized as a body when probing.

2) Approach the pinpoint area from various distances and directions and clearly identify the spike signal. If the flux line is still curving when you first encounter the spike, step back and try again until a straight approach is defined. (Note that the display will flash "SE" when rapidly moving the Tracker backward. This should not be confused with the spike). Once a straight line has been established, draw a line or place a long object on the snow in that direction.

3) Now identify the location of the second spike signal and/or the minimum readings along the flux line. You should then be able to determine the orientation of the buried transmitter. After bracketing once perpendicular to the line, you should be able to strike the target with a probe.

Lesson II: Advanced Multiple Burials/Special Mode

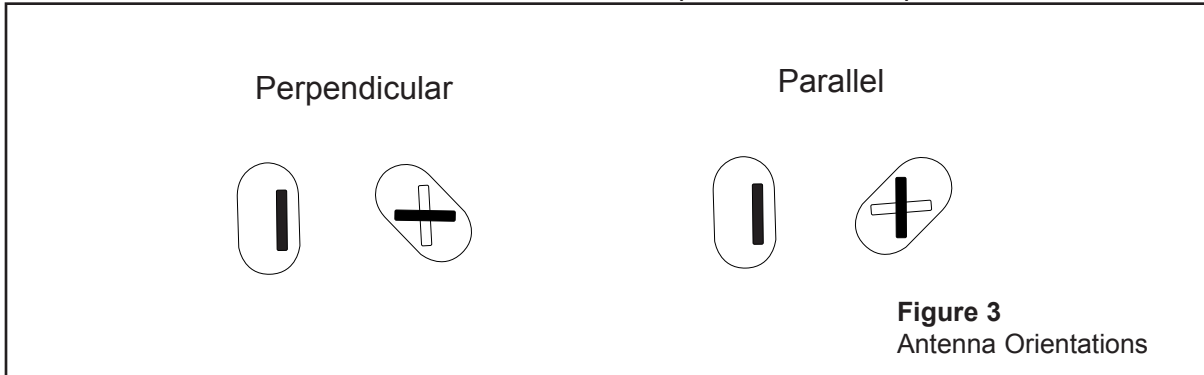
Most multiple burial situations can be solved as single burials done by one person "in series" or by several people "in parallel." Advanced multiple burials primarily involve "special case" situations in which the victims are in close proximity, there are plenty of shovelers available, and it is not possible or practical to turn off the found victims' beacons. These mainly concern commercial guiding operations where adequate shoveling manpower is available and one guide must locate several victims. "Special case" multiple burials are extremely rare in the recreational setting. For more information on multiple burial statistics, case studies, and experiences in the field, see "Digging Deeper: The Real Issues in North American Multiple Burials," found at www.backcountryaccess.com/research.

Special (SP) mode is an advanced feature which can significantly reduce the time spent searching for a second signal during a multiple burial. It is only used after pinpointing the first signal, and if that transmitter can't be turned off. SP mode provides the searcher with information which allows the searcher to "break away" from the closer, stronger signal without performing the Three-Circle (see Tracker DTS Field Instruction Guide) or Micro Search Strip methods or returning immediately to the primary search path.

Special mode deactivates the Tracker's signal strength filter, enabling it to display the distance and direction of weaker signals that are farther away. It also makes the Tracker more directionally sensitive by narrowing the Tracker's search "window" to the center three lights. This way, you can "mask" out the found beacon by rotating away from its flux line.

Exercise II: Special mode

1) To illustrate proper use of SP mode, place two transmitters about five meters apart, visible on the snow surface. First, place their transmitting antennas in the perpendicular orientation, as shown in Figure 3, so the two signals clearly appear in different directional windows. (The black rectangle represents the transmit antenna within a single-antenna beacon and a Tracker, respectively.) If possible, use transmitters of different brands, as shown. This will enable students to experience various pulse rates.



- 2) After pinpointing the first signal, remain at the point where you obtained your lowest distance reading. It is essential to avoid entering SP mode at the spike.
- 3) With the center search light still engaged, enter SP mode. Keep the first signal centered in the display for several pulses. This will prevent losing track of the first signal or confusing it with the one for which you are searching.
- 4) Slowly rotate the Tracker in search of another signal. The first signal will disappear once it is no longer inside the reduced Special mode window.
- 5) Rotate the Tracker gradually in your hand. Do not sweep it with the arms. If you rotate too quickly, you can pass right over the signal of the beacon being searched. Sweeping (instead of rotating) will unnecessarily alter the distance readings and potentially cause the searcher to lose track of the first signal.
- 6) Once the second signal is engaged, center it in the search lights and note the distance. Move slowly in the direction the Tracker is pointing and pay careful attention that the number in the display window is decreasing. If the number increases, go in the opposite direction.
- 7) Once you know the approximate distance and direction of travel, look for trends in the shape of the flux line. As you move forward, if the lights to the right of center engage, you know the beacon is off to the right. Similarly, if the trend is a sharp curve to the left, you know the beacon will be sharply to the left. It is helpful to follow the flux line until it stops curving.
- 8) With distance, direction and curving trend information, you should have enough information to get close enough to the second beacon to isolate it using SE mode. When you believe you are closer to the second beacon than the first, toggle back to SE mode (Figure 4).
- 9) Often, while moving along the flux line in SP mode, you will encounter an area where the flux patterns of the two signals will be parallel; directional information will be shown in the same directional window. At some point the distance readings might be very similar, making it difficult to determine which signal is the one for which you are searching. In this case, "punch" through this intersection and continue in the direction you have been searching. Toggle back into SE mode once you believe you are closer to the second

Secondary search

With any transceiver, the more transmitters that are buried, the more complex the secondary search becomes, especially if they are all within the receive range of the searching unit. For simplicity, it is helpful not to stray too far from the primary search pattern—and to return to that pattern after each secondary search.

- 1) Once you have detected and pinpointed the first victim, look for the next closest victim using SP mode. If the next signal is within 20 meters, attempt to isolate and pinpoint that signal. If the distance reading is greater than 20 meters, continue on your 20-meter primary search grid.
- 2) Once the second signal is pinpointed, and no more signals are detected using SP mode, return to your original fine search point (where you abandoned the primary search) and resume your original primary search pattern.
- 3) In close-proximity situations, it is essential to go into SP mode as close as possible to the found beacon. Enter SP mode at the lowest possible distance reading, as close to the snow surface as possible. This creates a more noticeable difference in the distance readings for each transmitter.
- 4) In situations where many beacons are buried all within a small area, it can be difficult to pinpoint on a line. This is because you will be starting the search for each beacon from a very close distance; therefore the flux lines will probably be curved and overlapping. In multiple burial situations, it is often simpler to pinpoint using the bracketing method.

“Backup” techniques

In close-proximity multiple burials, it can sometimes be difficult to isolate signals by “breaking away” with SP mode, then isolating in SE mode. Sometimes, upon re-entering SE mode, you may find yourself back at the first signal. This is most likely to happen when the two beacons' antennae are oriented parallel to each other (as shown in Figure 3).

If you experience this difficulty, use the Three-Circle Method discussed in the Tracker DTS Owners Manual and Field Instruction Guide. However, only one circle will be necessary, as you have already determined the approximate distance to the next signal (using SP mode). Enter SE mode and walk in a radius about 3/4 of that distance. When the second signal is detected, pinpoint by bracketing as close to the snow surface as possible.

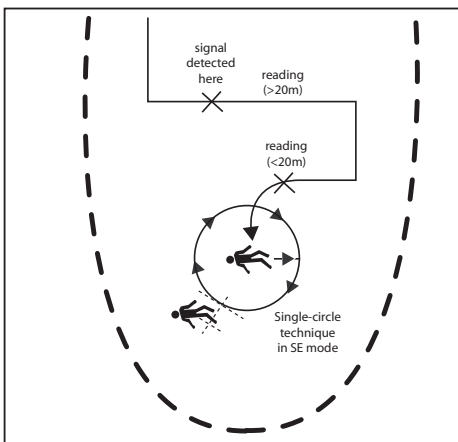


Figure 6
Single-Circle, Close Proximity Search

In worst case scenarios (mainly guiding exams), you may encounter a phenomenon sometimes called "flux line salad." This is when more than two signals are detected all in close proximity, using SP mode, and the distance readings are similar enough so they are difficult to distinguish from each other. In this case, use the Three-Circle or Micro Search Strip method.

Remember that distance readings will always be greater for a vertically buried transmitter than for a horizontal one, even if they are buried the same distance from the searcher. For this reason, it is always important to maintain a tight circle; a victim with a vertically oriented transmit antenna may be closer than their distance reading indicates. It is also important when doing close proximity searches to keep the receiving beacon as close to the snow surface as possible.