

Advanced Tutorial

Tracker DTS Advanced Tutorial



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-Tracker DTS Advanced Tutorial -

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. This can be ordered from BCA by calling (800)670-8735.

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/acoustic based beacons must first have mastered the basic techniques addressed in the Tracker DTS owner's manual or Instruction Guide.

Target audience:

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

All must have extensive previous experience with the Tracker.

Lesson 1: Advanced "Pinpointing on a Line"

Pinpointing on a line is a basic technique that enables the searcher to reduce the area to be searched and probed to a single axis. Advanced pinpointing on a line 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.

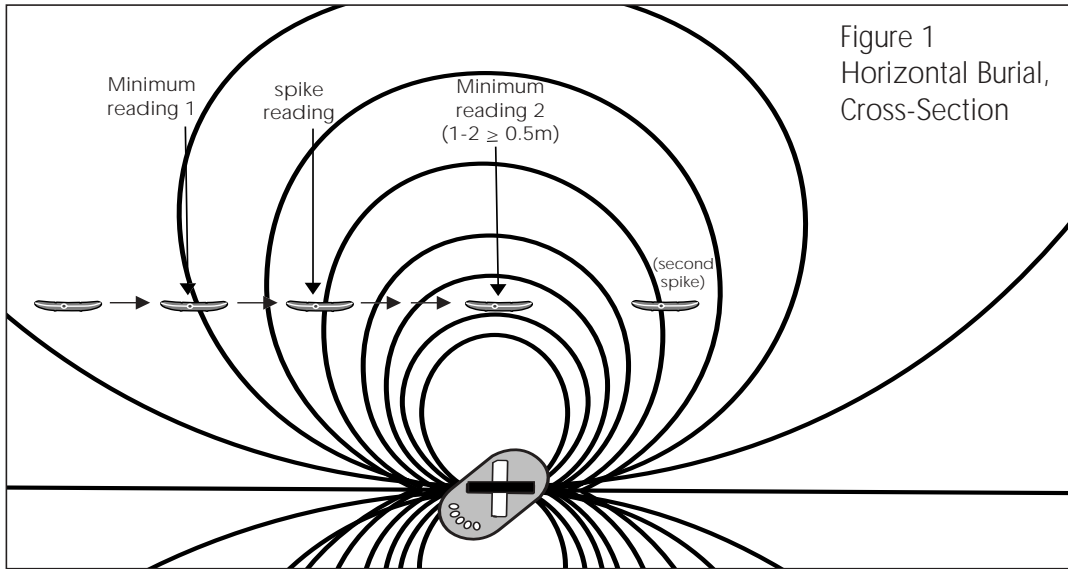
Before attempting this advanced technique, students must have mastered establishing a straight pinpoint line (see Tracker DTS Instruction Guide). They must also learn to recognize the "spike" signal. The "spike" is where the signal suddenly and temporarily becomes weak. This is because the horizontal 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, for instance, on a wall. In the field, a probe can be placed through the top sleeve, then held up 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

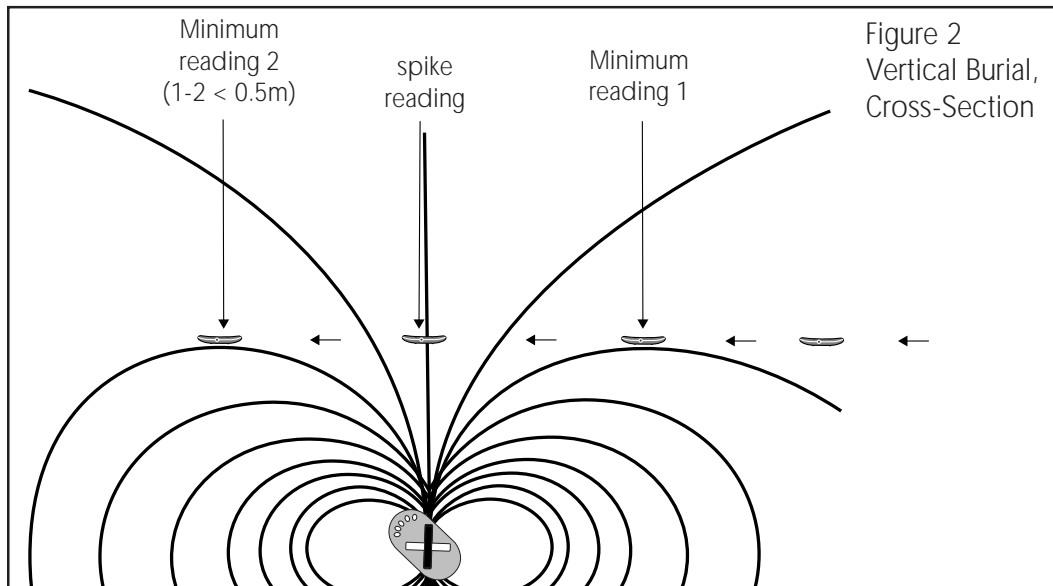
the antenna. This is unpractical, however, because it would represent a transmitting beacon that is on the snow surface.

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 are two spikes, the transmitter is roughly horizontal. Minimum reading 2 will probably be at least 0.5 meters less than minimum reading 1. 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 is only one spike, the transmitter is roughly vertical. Minimum reading 2 will be very similar to minimum reading 1. 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.
- In most cases, the antenna will be oriented somewhere between horizontal and vertical. There will usually be two spikes and the minimum reading will be found closer to one spike than the other. If the number of spike readings is unclear, probe 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

Advanced multiple burials primarily involve situations in which there are more victims than beacon searchers, and it is not possible to turn off the found victims' beacons. These mainly concern commercial guiding operations where guests are not trained to aid in the beacon search and one guide must locate several victims.

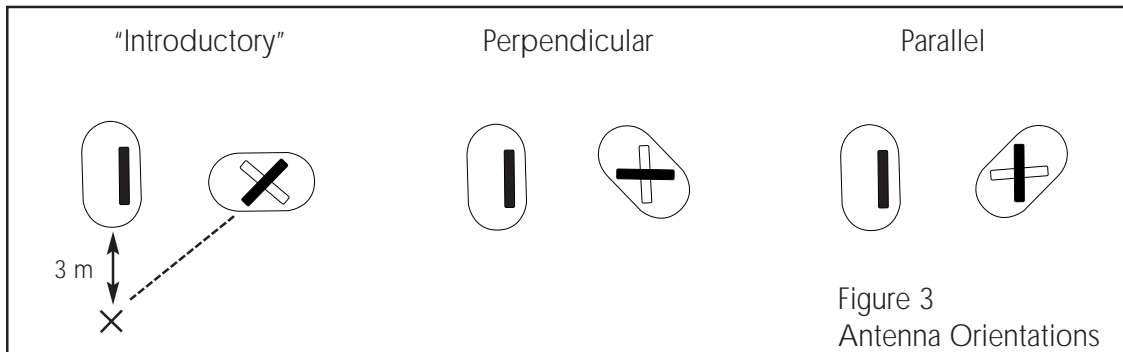
Special (SP) mode is an advanced feature which can significantly reduce the time spent searching for a second signal during a multiple burial. It is only used after pinpointing the first signal, and if that transmitter can't be turned off. SP mode provides the searcher with information which allows the searcher to "break away" from the closer, stronger signal without having to return 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.

Special mode can also be used during the beginning of the secondary search to determine how many other signals might be present. This is useful if the searcher has reason to believe that the Tracker has immediately isolated the closest signal without showing the others.

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 “introductory” 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.) In the “introductory” orientation, the second beacon’s antenna is aimed at the point where the searcher will enter SE mode, about three meters back from the first beacon. If possible, use transmitters of different brands, as shown. This will enable students to experience various pulse rates.



2) After pinpointing the first signal, walk back three meters on the flux line, or outside any possible spike signals. It is helpful to plant your feet here and square your shoulders to the beacon just pinpointed. (It can be more effective to enter Special mode directly on top of the found beacon, providing the searcher can identify and avoid the spike signal. This is discussed in Lesson III.)

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.

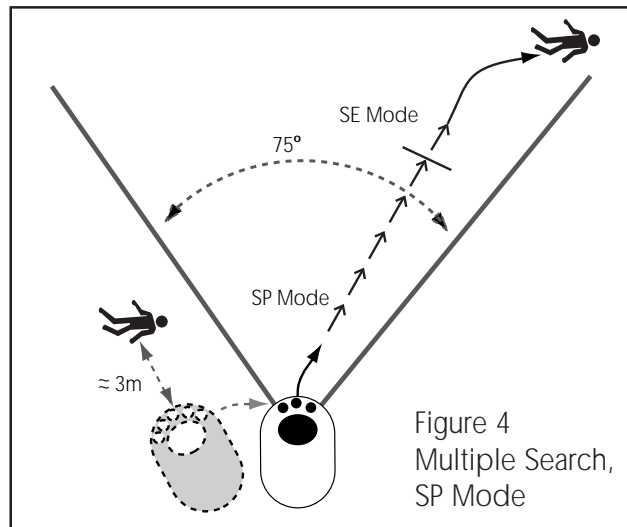
4) Slowly rotate the Tracker in search of another signal. The first signal will disappear once it is no longer inside the reduced Special mode window.

5) Rotate the Tracker slowly 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 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 beacon.

10) A good rule of thumb is to move 3/4 of the distance between the two beacons before switching back to SE mode.

11) Next, place the transmitting antennas perpendicular or parallel (Figure 3), so that both signals will appear in the center search window, with differing distance readings. Carefully follow the curving flux line until you can isolate the second beacon.

12) Sometimes it can be difficult to see the second signal if the two signals are parallel, or if the searcher is slightly out of range of the second beacon. Check for a signal on all four sides of the first transmitter until a second signal is found. If none is found, the searcher must return to the fine search point and continue with the primary search in SE mode.

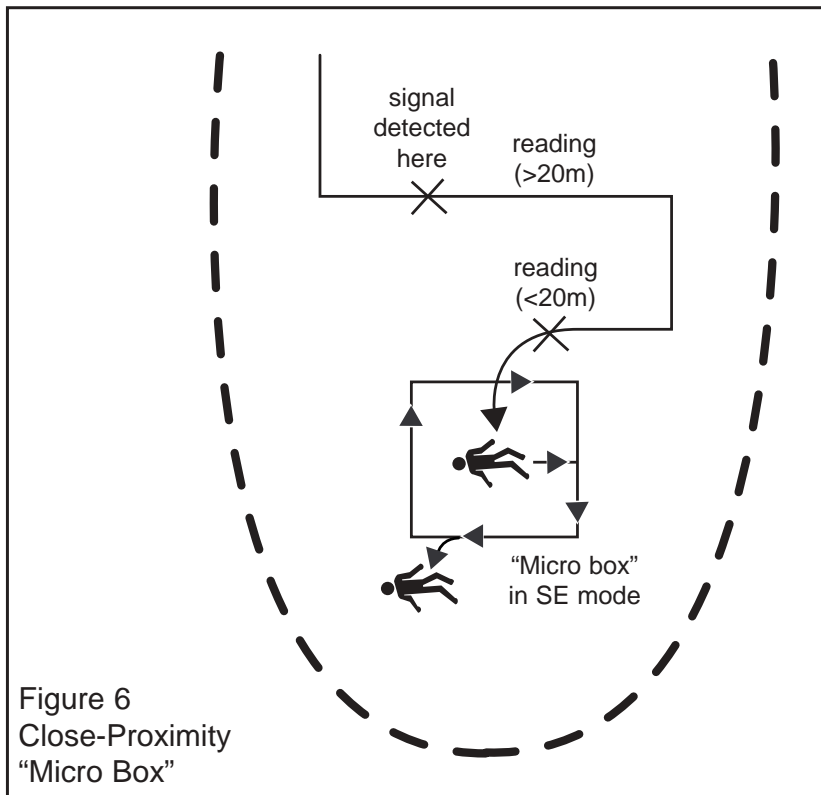
2) Once the second signal is pinpointed, and no more signals are detected using SP mode, return to your original fine search point (where you abandoned the primary search) and resume your original primary search pattern.

3) In close-proximity situations, it is helpful to go into SP mode as close as possible to the found beacon. This will create a more noticeable difference in the distance readings for each transmitter. Place the Tracker on the snow surface directly on top of the found beacon, or at the lowest distance reading. Make sure you are "in front" of the spike reading (less than three or more meters away) instead of "behind" the spike reading (three meters away) before going into SP mode. This should only be attempted if you can easily identify and avoid the spike signal.

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 with each other. Often it is 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. This is because flux lines curve sharply close to the transmitter and can be difficult to follow. If you experience this difficulty, try one of the following "backup" techniques to isolate the next signal, using SE mode.



- "Micro box" - With the searching beacon in SE mode and as close as possible to the snow surface, walk in a box surrounding the found transmitter (Figure 6). The radius of this "micro box" should be defined by the distance reading to the second transmitter. At the found transmitter, go into SP mode to obtain a distance to the second transmitter. Take 3/4 of that distance and perform the "micro box" in that approximate radius, using SE mode.

When the second signal is isolated, pinpoint by bracketing. If you still cannot isolate the second transmitter, increase or decrease the size of the box.

- "Micro grid" - With the searching beacon on the snow surface, grid the area in SE mode, using narrow search strips of approximately one to five meters, until the second beacon is isolated. This method is helpful if you suspect a victim nearby, but do not have a distance reading for that transmitter.

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 conservative search strip width or "micro box"; a victim with a vertically oriented transmit antenna may be closer than their distance reading indicates.