

Multiple Beacon Searching For the Masses: A Standardized Approach For Avalanche Educators

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Abstract: Teaching complex multiple burial scenarios for single searchers in recreational avalanche courses needs to be standardized. Every avalanche beacon on the market has its own function which aids in multiple burial searches, but it's nearly impossible for avalanche instructors to stay current on the different designs and limitations of each model. Since there are an infinite number of multiple burial scenarios that can occur, a standardized approach must be applied when teaching recreational users multiple burial searching. The standardized approach contains the following four steps: 1. Definition of the search area, 2. Search the entire debris field with a thorough and systematic primary search, 3. Apply the Three Circle Method for close-proximity multiple burials (this serves as a "backup" to the various multiple burial functions found on current beacons), 4. Return to the "abandoned point" of the primary search pattern after each beacon or group of beacons is found. The standardized approach has two key benefits: it is easy to teach to recreational users and it is beacon neutral.

KEYWORDS: multiple burials, avalanche educators, Three Circle Method, primary search, standardized approach.

1. INTRODUCTION

In a survey given to 60 avalanche instructors of the CAA (Canadian Avalanche Association) and AIARE (American Institute for Avalanche Research and Education), the following questions were asked related to avalanche courses and beacon use:

1. What types of avalanche courses do you teach?
2. Do you teach multiple burial searching with an avalanche beacon in your courses?
3. If you answered yes to question #2, please explain your techniques in teaching multiple burials and give an example of a multiple burial scenario you may use to drill the students.
4. Do you feel you are adequate in using or teaching multiple burial searching with all the current models of avalanche beacons on the market? If not, what would help you?

All survey participants answered that they do teach multiple beacon searching and many different techniques were described to explain how multiple burial searches were taught. However, 70% of the participants answered that they were not familiar with all current models of avalanche beacons and that their multiple burial search instruction was biased by the beacon with which they were most familiar. When responding to the

second question of the survey, Rick Schroeder of the CAA summarized the problem of modern multiple burial instruction for avalanche educators: "This is becoming more of a challenge with changing technology and transceivers with different functions. With analog units I use search strips and the corkscrew method. With digital units it becomes a function of which units are being used." A standardized approach for multiple burial searching that is beacon neutral is the best way to make ease of instruction and ease of learning multiple burials a reality for avalanche educators and their students.

2. DAV/THREE CIRCLE METHOD

The Deutschen Alpenverien (DAV) is the largest mountaineering organization in the world. Based in Munich, Germany, the club has over 680,000 members, many of whom ski tour or climb in avalanche terrain. In order to teach all of their members effective techniques in multiple burial searching, the Three Circle Method was developed by IFMGA guide Chris Semmel and began to gain acceptance in 2004.

The Three Circle Method is a simple technique for solving multiple burials that occur within an 18m diameter, thus addressing close proximity or semi-close proximity multiple burials. It is important for avalanche educators to teach this method because it is beacon neutral and allows

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the instructor to focus on teaching multiple burial searching rather than getting confused by different beacon technologies and how those technologies can be applied to multiple burials. The Three Circle Method makes it possible to do multiple burials without using the special functions available on most modern avalanche beacons. Instructors should teach the Three Circle Method and make it the responsibility of the students to learn the multiple burial functions of their beacon.

The Three Circle Method utilizes the strengths of signal processing by digital beacons but also allows analog beacon users to participate in the method by isolating signals with the volume control. The Three Circle Method is simple: if the searcher suspects there is more than one signal in the area, he must first pinpoint the first signal. The searcher then walks 3m out from the first signal and walks a complete circle 3m away and around the signal. If no other victims are found along this circle, a second circle 3m out from the first needs to be completed looking for other victims. Lastly, a third circle 3m from the second needs to be completed (Figure 1).

Figure 1
Courtesy of Chris Semmel and Georg Sojer

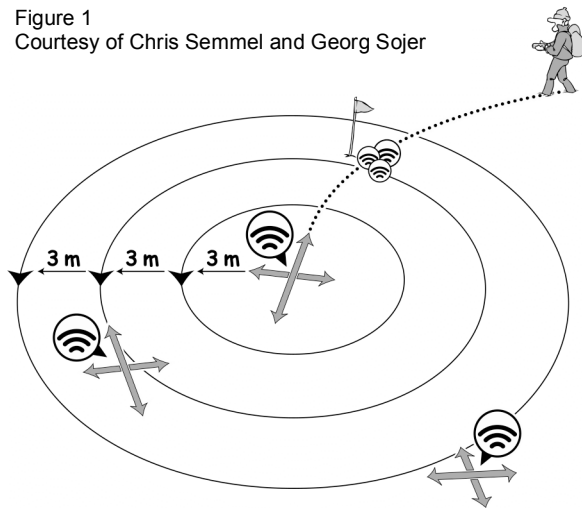
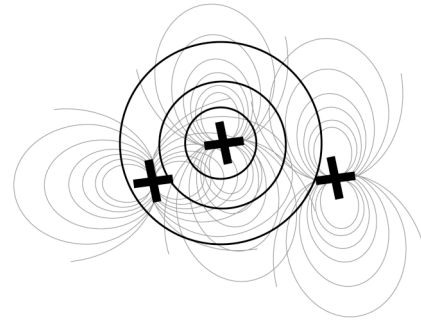


Figure 2 is a view of the Three Circle Method with beacon flux lines applied. This perspective makes it easier to understand how the searcher can walk upon the different transmitting signals while searching in a circle. IFMGA guide Chris Semmel calls this a “flux line salad.”

Figure 2



A few important points to teach students:

1. This method should only be performed if there is enough human power for excavation of the first victim, allowing the searcher to continue looking for other victims.
2. The method is not complete until the searcher has walked all three circles and pinpointed all signals within or near the 18m diameter.
3. It is possible to find signals outside the last circle. If this happens, the searcher should pinpoint those signals and then return to the circle and complete walking around it.

Now that we have an understanding of the Three Circle Method, we can apply it to a standardized approach for teaching multiple burials.

3. DEFINITION OF THE SEARCH AREA

The first step in a standardized approach to teaching multiple burials is to define the search area for the students. This is a fundamental and important step but it is commonly taken for granted and neglected when teaching beacon searching skills. All avalanches contain the following information: a crown, left and right flanks, and a debris pile. Translating this to students is simple: “we know where the avalanche started, we know where it ends, and we know where the sides are, now we need to search that area.” There is no need for students to be searching random spots and chasing signals outside of a poorly defined search area.

4. THOROUGH AND SYSTEMATIC PRIMARY SEARCH PATH

The second step in a standardized approach to teaching multiple burial searching is for the searcher to walk a primary search path from the starting point (last seen point or crown) with a 20m search strip width. As this pattern is walked,

signals will be encountered. The searcher should abandon the primary search path and enter the secondary search when a strong signal with a reading of 20m or less appears on the beacon screen (analog beacon users can turn down their volume and estimate 20m according to the range written on the volume knob). The reason we choose 20m or less is because it is a safe distance that will likely not miss signals that are drifted or of a poor transmit orientation. Drifted beacons or poorly oriented beacons send signals that can be weak or impossible for some beacons to receive. As an example, if a searcher were to abandon a primary search path at a 40m reading, the searcher could possibly miss other beacons that are closer to the searcher but with signals that are weaker.

5. THREE CIRCLE METHOD/RETURN TO PRIMARY SEARCH PATH

After abandoning the primary search path for a signal, the searcher should pinpoint the signal. If it's determined that no other signals are in the vicinity, the searcher should return to the point where the primary search path was abandoned. But if it's determined that multiple signals are in the area, the Three Circle Method should be used. This is the third step in the standardized approach. After the multiple burial is solved, the searcher should return to the point where he abandoned the primary search path. That's the final step in the standardized approach. Returning to the primary search path where it was originally abandoned is an important, strategic move that needs to be emphasized to students. It is common for the searcher to resume the search slightly below the signal or signals just found. This is a mistake and leaves gaps in the search area that are not covered by the searcher. Again, the crux move is to **return to the primary search path after pinpointing one signal or solving a multiple burial.**

The flow of the standardized approach to multiple burial searching can be seen in figure 3.

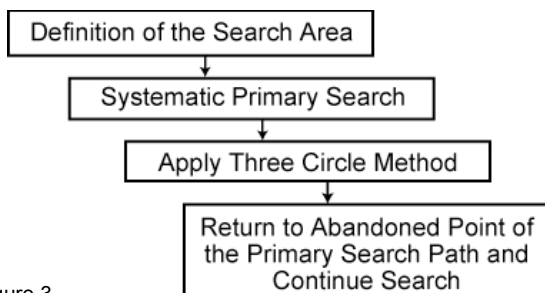


Figure 3

6. HYPOTHETICAL NORTH AMERICAN HELICOPTER SCENARIO

Figure 4 is a complex multiple burial with 12 signals to find. We call this the North American Helicopter Scenario and use scenarios similar to this for training purposes at Backcountry Access. Practicing these scenarios over the past several years made it possible to grasp the Three Circle Method and taught us about the infinite number of multiple burial scenarios that can occur.

A standardized approach to multiple burial searching is applied to this scenario and is broken into three sections for explanation:

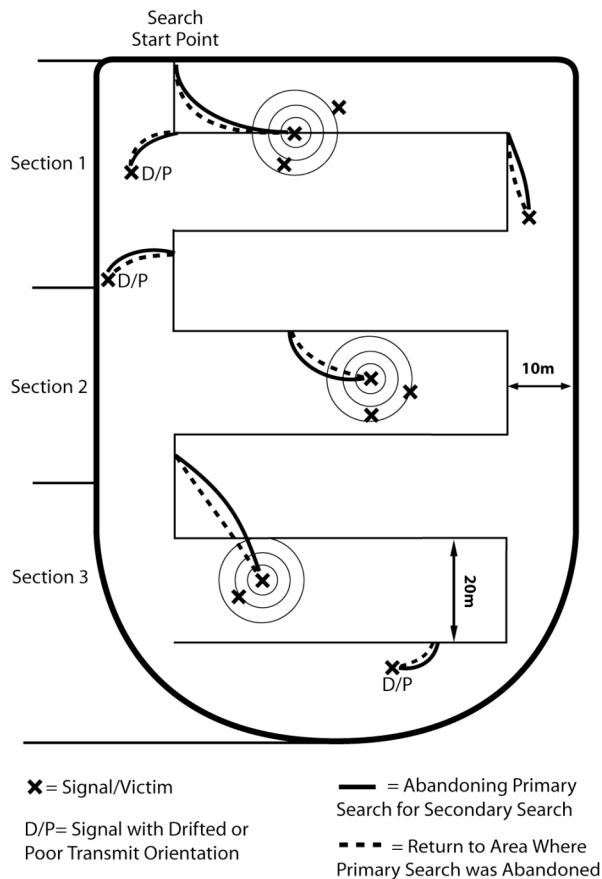
Section 1: The searcher starts searching at the top of the slide path and immediately encounters a strong signal 20m or less. The primary search path is abandoned for that signal. It becomes apparent to the searcher that it is a multiple burial since there is more than one signal, so the Three Circle Method is applied. After the multiple burial is solved, the searcher must return to the point where the primary search path was abandoned (dashed line). Without returning to the primary search path it would be likely that the D/P signal (signal with drifted or poor transmit orientation) would be missed. And even after the D/P signal is found the searcher must return to the primary search path and continue. Note that six beacons are found within roughly 45m.

Section 2: A clean and simple example of the Three Circle Method. Notice that the searcher returns to the point where the primary search path was abandoned before continuing the search.

Section 3: The Three Circle Method for a double burial. In this section it's important for the searcher to return to the abandoned point to see if there may be any beacons along the far right of the search path (searchers right). Once it's determined there are no other beacons in that area, the searcher continues and is rewarded with a single search at the end.

7. CONCLUSION AND DISCUSSION POINTS FOR AVALANCHE INSTRUCTORS ON MULTIPLE BURIAL SEARCHING

1. No two multiple burials are ever the same. There are an infinite number of scenarios that can occur. A standardized approach with a defined search area, systematic primary search, Three Circle Method for close-proximity multiple burials and returning to the



5. It is unlikely a single searcher can save multiple lives in a multiple burial if they are in a remote area without helicopter assistance. This is because the majority of time spent on an avalanche rescue is spent excavating the victim. Without additional manpower, it is difficult for a single rescuer to make more than one live recovery.

References:

Semmel *et. al.* Lawinen-Verschütteten-Suche, Munich, Germany: DAV, 2005.

Semmel and Stopper, Orten mit Methode, DAV Panorama, 2004.

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point where the primary search was abandoned is the best approach to train for diverse multiple burial searches. A standardized approach is also the easiest to teach.

2. When teaching a standardized approach, it is important to mark the point where the primary search path is abandoned and to mark each beacon found. Keep the beacons transmitting and move on! We've come a long way from the idea of turning off the first victims beacon. The searcher(s) need to move on and keep searching while the rest of the party excavates.

3. Different methods for multiple burial searching have been developed over the years and all of those are valid. But 95% of the market using avalanche beacons is made up of recreational users so a simple and standardized approach should be taught.

4. 45% of reported avalanches in North America were multiple burials in the 2005/2006 season; 36% in Switzerland. Multiple burials are a reality, prepare your students and encourage them to train as much as possible.