Searching in Parallel: Harnessing Manpower in Transceiver Rescues

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ABSTRACT: Searching in parallel is a technique that can be used in avalanche rescue scenarios where manpower and leadership are abundant and the number of buried victims is unknown. It is especially applicable at ski resorts and by search-and-rescue teams. The technique involves using as many searchers as possible with the objective of narrowing each rescuer's search strip width. The rescue leader adjusts the search strip width according to the size of the debris area and the number of available searchers. Each searcher commits to the coarse and fine search only after their distance reading is lower than their designated search strip width. This eliminates redundancy and ensures that each searcher locates a different victim. If more than one victim is buried, then these search strips can be adjusted by the rescue leader, if necessary, after each victim is pinpointed.

Searching in parallel reduces the necessity of using complex multiple-burial search methods and technologies. It can be used to harness large pools of relatively unskilled searchers with only basic training in the technique. Searching in parallel is more feasible than in the past due to the simplicity of modern digital avalanche transceivers. It should be considered for use by rescue teams and in professional avalanche courses, but only after the basics have been mastered, such as single-victim searching, probing, and shoveling.

1 INTRODUCTION

Research in Switzerland (Harvey et. al, 2008), Austria (Stopper et. al., 2008) and North America (Edgerly, 2008) has shown that complex multiple-burial transceiver searches are extremely rare, especially among recreational groups. In fact, interviews with rescuers involved in real transceiver searches have shown that the most challenging aspect of the search is shoveling, not beacon searching, even in cases involving more than one buried victim. In those cases, the beacon search is performed either as several beacon searches solved consecutively "in series" by a single rescuer or performed simultaneously "in parallel" by multiple rescuers.

Searching in series is quite intuitive and has been taught for many years. Shoveling is now being taught in many avalanche courses in both North America and Europe. Searching in parallel, however, is rarely taught. In professional courses (and guiding exams), great attention is often focused on one person searching for several victims, as opposed to several persons searching for one or more victims. Searching in parallel addresses the latter situation. It should be considered for use by professionals working in environments where manpower and leadership are abundant. These mainly include ski resorts, search-and-rescue teams, and large guiding operations.

2 SEARCHING IN PARALLEL

Searching in parallel is often taught in avalanche courses mainly in the context of the signal search (formerly called the "primary search") with several rescuers available to search with transceivers. The object is to thoroughly search the area for either a transceiver signal or visual clues indicating the victim's location. The search must be performed systematically enough so that no likely burial areas are missed or are left outside the effective receive range of the rescuers' transceivers.

Traditionally, if more than one beacon-equipped rescuer is available, students are taught to keep a distance of 20 (or 40) meters between searchers, or the search strip width of their transceiver. Search strip width is defined as twice the effective (or "minimum") receive range of the transceiver (it can be thought of as the "diameter" of the beacon's worst-case receive range, while effective range would be the "radius").

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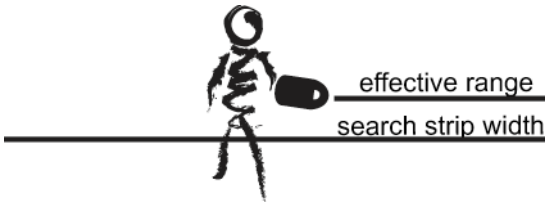


Figure 1. Search strip width is twice the effective range of the transceiver.

2.1 Single searches

Starting at the last-seen-area or the top, bottom or side of the debris pile, the rescuers move through the area in this formation until a signal is detected. At this point, the rescuer who engages the signal then performs the coarse search (formerly called the "secondary search), and the fine search (formerly called the "pinpoint search.") In some cases, such as guided scenarios, the most experienced beacon searcher will often take over the final phases of the search while less skilled members prepare to probe and shovel or await further instructions from the rescue leader.

In most cases there is only one completely buried victim, so all resources are then focused on the excavation phase. However, there is currently no prevailing formal technique for teaching students how to continue the search in multiple burial situations once the first victim is pinpointed–or in situations where the number of buried victims is unknown.

2.2 Multiple burials

In actual avalanche incidents, searching in parallel for multiple victims has shown to be intuitive and effective (Edgerly, 2008), especially when adequate manpower is available for excavating the victims. As long as the victims are not in close proximity, then rescuers naturally end up pinpointing and excavating the victims in parallel rather than in series. If the victims are buried within close proximity, however, then searching in parallel can be less intuitive. This issue can be overcome by adjusting the search strip width between searchers to reflect the number of searchers and width of the debris area rather than using the standard search strip width of 20 (or 40) meters. By reducing the search strip width, then the probability will increase that different searchers will end up excavating different victims, rather than all the searchers being led to the same victim.

Figure 2. Searching in parallel requires a designated search leader. The search leader must keep the rescuers aligned and restricted to their search strips. They must not commit to the coarse and fine search until their distance reading is less than or equal to their designated search strip width. (Photo of Austria Mountain Rescue Team by Michael Alterdinger.)

2.3 Adjusting search strip width

When searching in parallel, generally the rescuers should be distributed equally in a line across the debris area. However, this depends on the scenario: in many cases a last-seen-point or suspected likely burial area might dictate focusing on a particular zone. The goal is to take advantage of as many searchers as possible to enable the smallest possible search strips. One searcher should always be dispatched immediately, ahead of the rest of the team, to perform a "hasty search" for obvious surface clues and transceiver signals.

For example, if the debris area is 40 meters wide and 5 searchers are available, then one rescuer should be dispatched on a hasty search and the remaining 4 rescuers should be organized in a line with a distance of about 10 meters between them. The two outer searchers would keep a distance of about five meters to the edges of the debris area. Now the searchers advance in parallel (or *en echelon*) over the debris area.

All searchers advance straight ahead until one searcher receives a signal with a distance reading less than or equal to their assigned search strip width. For example, if the distance is 10 meters between the searchers and one searcher receives a signal with a distance reading of 45 meters, he will continue straight ahead until he receives a distance reading of 10 meters or less. From that point, he then commits to the coarse and fine search, following the flux line to the fine search area. This prevents searchers

from committing to the signal too early and therefore crossing into other rescuers' lanes, possibly missing areas within their own, now abandoned, lane. If enough manpower is available, then more than one person can commit to this signal: one to search and another to help excavate.

In the case that there are still victims to be found–or the number of victims is unknown–then at least one rescuer (more, if possible) should begin excavating the located victim. If adequate manpower remains, then the leader can then readjust the search strip widths to take into account the remaining number of searchers. For example, if the debris area is still 40 meters wide, but there are only 3 rescuers still available, then the search strip widths between them then become 15 meters instead of 10 meters. Or the 10-meter strips can be maintained and the search strips on each side can be increased to 10 meters each.

Searching in parallel must be coordinated by a strong leader who walks in front of the group, providing orders. The leader must avoid taking part in the rescue, if manpower allows. He must be willing to stop and restart the process if rescuers become disorganized. Preferably the team will have practiced the technique in training sessions so it is automatic when performed live in the field.

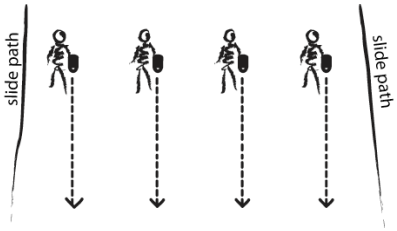
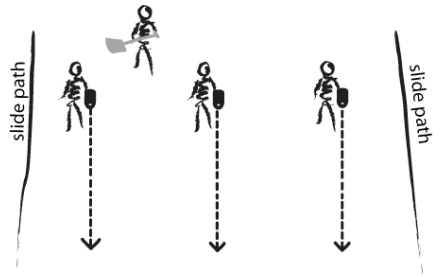


Figure 3. Once a victim is found, at least one searcher begins excavating while the others continue the search, using a readjusted search strip width, if necessary.



2.4 Strengths and weaknesses

In field exercises organized by technical representatives from Backcountry Access, Inc. (BCA) and the Austria Mountain Rescue Team (Salzburg region), searching in parallel has been demonstrated to be extremely effective. In exercises in Colorado, British Columbia, Munich, Germany, and Dachstein Glacier, Austria, up to seven victims have been located in less than five minutes–and excavated within the critical time period of 15 minutes. Searchers were more likely to locate victims apart from each other, reducing redundancy in the search process.

There are, however, some limitations to searching in parallel. There must be enough searchers to adequately cover the debris area: preferably enough to reduce the search strips to ten meters or less. If there is a lack of rescuers, then searching in parallel is not appropriate, as most of the manpower and time will be needed to excavate the first victim (Jarry, 2008) or–if triage is performed–then to excavate the victim deemed most likely to survive.

In heavily traveled areas such as ski resorts and mechanized guiding terrain, manpower is in relative abundance. Therefore searching in parallel is quite feasible–especially in the modern era of digital transceivers, as relatively little training is required to search in this manner. Since no "grid" or "bracket" searching, or sensitivity adjustments, are required with digital beacons, then searchers can simply be instructed to move through the debris and call out the distance readings on their beacons.

Finally, for searching in parallel to be effective, there must be an experienced organizer. This person determines the search strip widths and allocates manpower. Without a strong leader, it can be difficult to keep the rescue group coordinated. Leadership is a skill that requires aptitude, so it can be challenging to teach.

3 CONCLUSION

Searching in parallel is a technique that holds great promise for situations in which manpower is relatively abundant. It is particularly suitable for use at resorts, by search-and-rescue teams, and at large guiding operations, where both manpower and leadership are readily available. Development of this technique is especially appropriate considering the increase in in-bounds avalanche burials that occurred in North America during the 2008-09 season.

This technique has been demonstrated to be effective in exercises organized by BCA. However, it is still in development. The authors invite all avalanche instructors to test this tech-

nique in field trainings and learn more about its advantages and disadvantages. Searching in parallel should be considered for future use by rescue teams and in professional avalanche courses–but only after participants have mastered existing techniques for single burial searches, probing, and shoveling.

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