INSTRUCTING STUDENTS ON HOW TO CONDUCT A MULTIPLE BURIAL SEARCH USING THE ELEMENTARY MICRO-SEARCH STRIP METHOD

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ABSTRACT: The original micro-search strip system was developed by Genswein and Harvey in 2002. Since that time, there have been significant advances in digital and three antenna beacon technology with the widespread use of the marking function to manage multiple burial scenarios. In the event of the marking feature failing or not being available, then an alternative search system must be applied. The elementary micro-search strip is one such technique and is suitable for rescuers at a novice or intermediate level. This paper revises the elementary micro-search strip teaching system proposed by Blagbrough and De Montigny in their paper from 2006 as well as methods and techniques that will assist student learning.

KEYWORDS: Avalanche, elementary micro-search strip, multiple burials, students, strip width,

1. INTRODUCTION

Avalanche beacon technology has seen significant changes in the last decade with digital three antenna beacons' and marking (flagging) features becoming the new norm. We acknowledge that marking beacons buried in close proximity is the most efficient method for rapid location. However, on occasions this system might not work, particularly when there is signal overlap or the searching beacon does not have the marking function. In these cases, the elementary micro-search strip technique is a very effective alternative that is adaptable to a variety of different situations.

The elementary micro-search strip works well for the wide variety of beacons that students bring to courses and provides a uniform and efficient system for teaching. This paper will discuss using beacons in the digital mode (not analog) only and is aimed at novice and intermediate users. More advanced systems of the micro-search strip have been developed by Genswein for experienced beacon users, but this method is not discussed in this paper.

2. METHOD

A debris area, 25 m\textsuperscript{2} to 30 m\textsuperscript{2} is marked out with two or three beacons buried at least 6 m apart, and no deeper than 50 cm. Probe targets are buried with the beacons. Students start at one corner of the debris area and proceed using the elementary micro-search strip method, with strip widths of 3 m to 4 m wide (Fig 1). Each beacon is found using a fine search and spiral probe method.

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with a spare probe, ski pole, or glove left to indicate a burial point. The rescuer then returns to their last point on the micro-search strip line before continuing to locate the other beacons.

3. TEACHING POINTS
For this method to be effective, students should be very proficient with single burial searches before moving on to the elementary micro-search strip method. Students who do not have a good understanding of the fundamental search systems will struggle with this exercise, as it is essentially a series of fine searches linked together.

A demonstration of the elementary micro-search strip method is worthwhile to start with. Leaving the beacons on the surface, during this demonstration, assists the students to see the methodology and search patterns being employed.

For multiple burials, we will always recommend students use the marking function on the beacon first, if possible. If the marking function is inoperable or inefficient (due to signal overlap issues), or the beacon does not have a marking feature, then the elementary micro-search strip should be employed.

Most units will indicate if there are multiple burials within the range of the beacon. Students are taught that if there is more than one beacon in the search area then the elementary micro-search strip method is to be used (assuming that marking is not possible).

Having previously taught students to use the direction indicators on the beacon for the coarse search, it becomes important now for them to ignore these as they move along the search strip lines and concentrate on the distance read out only. A useful teaching point is to get them to think of using the beacon like they would a metal or mine detector, homing in on the target when it is close by. A diagram of the number of intersecting flux lines in a multiple burial is a useful visual aid to help students comprehend the folly of trying to attempt to use induction line searching at this stage.

Students are encouraged not to rush this exercise. Success born of a methodical approach will produce confidence and ultimately more efficiency. Students should be encouraged to keep the search strip lines as straight as possible and strip widths 3 m to 4 m apart. Comparing this distance to two ski lengths or two arm spans gives the students a visual clue for judging distances and keeps the strip widths more accurate.

Students switch from the elementary micro-search strip to fine search method when their beacons’ distance read-out is 6 m or less. The fine search is carried out and the target is pinpointed using the spiral probe technique.

When a target is located, a spare probe, ski pole or glove is left to indicate the burial point. Doing this will help orientate the rescuer on the debris area and avoids them returning to beacons that have already been found. Rescuers must then return to where the micro-search strip was interrupted. Students continue with the elementary micro-search strip, fine search and spiral probe until the whole area is covered and all beacons are located.

4. FINDINGS
Students must have a good understanding of all the steps involved in performing an avalanche rescue. Teaching students how this particular exercise fits in to a large-scale avalanche search is essential.

Given the highly visual nature of digital beacons, students can all too easily adopt a ‘head down’ approach. It is important that rescuers remember to look around them for clues as well as to keep the search strip lines parallel, straight and accurate. Effective and efficient bracketing in the fine search is vital as the rescuer is not necessarily approaching the buried beacon on a particular flux line. Coaching good bracketing technique from the outset would be worthwhile if you are intending to teach the elementary micro-search strip system.

By keeping the search pattern fairly simple, students are successful and gain confidence in this seemingly complicated rescue scenario. More complex problems like deep burials or beacons in very close proximity can be introduced on longer courses or to students with more advanced knowledge and experience. Switching from digital to analog (if possible), adjusting the search strip width based on buried beacon density and the micro box search for very close burials are other techniques that could be taught, time permitting.

5. AVALANCHE RESCUE TRAINING TIPS
The elementary micro-search strip is a culmination of skills, brought together to resolve the relatively complex issue of multiple beacons buried in close proximity. We have had significant success teaching these skills by incorporating some of the methods and techniques listed below. A number of
these systems and exercises we developed ourselves, others were 'stolen' from peers and colleagues and our thanks go to them.

5.1 Targets

Goal: Use appropriate probe targets.

In this case, size does matter. It is important that the targets overtop the buried beacon are a reasonable size and will be hit when probing. Using a 30cm square shovel blade is an almost impossible target when the probe spread is 25cm. If rescuers know they have a small target they will reduce their probe spacing which is encouraging poor and inefficient technique. Our preferences for targets are:

- Backpacks;
- Rubbermaid box lids; or
- Plywood boards.

Each has its own advantages and disadvantages.

**Backpacks**

- Advantages: tactile target, reasonable size, portability and quantity in a group.
- Disadvantages: sustains damage, more time to bury, problematic in shallow snow-packs.

**Rubbermaid box lids and plywood boards**

- Advantages: reasonable size, robust, quick to bury, good in shallow snow-packs.
- Disadvantages: less tactile, less portable.

It could be argued that these targets should be even bigger (two packs or two lids) to represent a prone buried victim. In our experience we have found that rescuers have always hit the single targets when spiral probing is done correctly. As a consequence, doubling the size of the target seems unnecessary. When working in shallow snow-packs there is an advantage to have the beacon placed near the ground and the lid or plywood board buried at mid-pack. This separation from the ground makes it more obvious when there is a probe strike.

5.2 Probing

Goal: Efficient and accurate probing

Begin with a thorough explanation of putting the probe together as well as taking it apart. Discussing the pros and cons, length and design of various avalanche probes is also worthwhile.

Teaching points for the spiral probe technique include the following.

- Make sure students put the beacon back in its holster or a pocket before they start to probe. Both hands must be used for the probing to be effective.
- Don’t allow the beacon to just dangle on the elastic as it is possible for some beacons to be switched back to transmit.
- Encourage efficiency, but remind participants that some probes are sharp and care is required with the buried victim.
- Give a visual reference for what 25 cm looks like. An easy reference includes the width of a shovel blade or a large hand span.
- Keep the probe vertical. This becomes an issue on the 2nd or 3rd spiral circuit if the rescuer remains stationary. We teach walking around the outside of the spiral (facing in) as this does not disturb the existing probe holes which are your reference points.

5.3 Tripod

Goal: Optimum beacon and probing practice while giving individual coaching.

Once students are familiar with the functions of the beacon and have worked with a partner to locate a transceiver on the snow surface the group can be brought together to introduce the Tripod. The Tripod is a quick, fun and efficient exercise that gives the instructor an opportunity to give individual feedback to students.

While the instructor sets up this exercise students can get organized or take a break.

Beacons and targets are set out in a tripod shape about 30 m to 40 m distance from the group that is positioned at a central hub. Instructions for this exercise are as follows.

- All group members at the ‘hub’ switch their beacons off.
- When ready, individuals must switch their beacon on and go to ‘search’ mode.
- Proceed in one of three directions, or spokes, taking with them their probe.
- As each student walks away from the hub they will move out of range of the other buried beacons.
- Students then are to proceed with a coarse search to find their particular beacon.
As they near the target and proceed to a fine search, encourage students to shout “I need help” or “I need a probe and shovel here.”

Continue with the fine search and spiral probe technique until the target is hit, which signals the end of the exercise.

To make it less obvious for the next rescuer, participants should cover over the existing probe holes. After that they can switch off their beacon and return to the hub. Switching off the beacon now means the next student can begin the search on that ‘spoke’.

The instructor can stand at one of the burial sites and give individual coaching to each student. A group of six can often be cycled through this exercise in 15 to 20 minutes.

Common coaching points:

- Moving too slowly in the coarse search.
- Not lowering the beacon as they get close.
- Not shouting for a probe and shovel.
- Moving the beacon too slow or too fast during the fine search.
- Changing the beacon’s orientation
- Rescuers not moving their feet when bracketing in the fine search which often results in the beacon’s orientation changing and/or inconsistency in height of the beacon above the snow.
- Ensure the beacon is holstered once the rescuer commences probing.
- Rescuers must probe with both hands.
- Probing too slowly and making holes that are too close together or too far apart.
- Jumping back to using the beacon and not persevering with spiral probe search.

### 5.4 Split Group

**Goal:** Assist learning by increased participation, observation and peer feedback.

A group of six or eight can be split into two groups – rescuers and observers. Using the CAA companion rescue quick reference card as an aide-mémoire, the rescue team can formulate a plan while the observers under the instructors supervision, can organize the scenario. A successful scenario will include the following.

- Ensure burial beacons are switched on!
- Place beacons in a stuff sac or plastic box.
- Place plastic lid or plywood targets offset from the ground in shallow snow packs.
- Ensure the snow over the target is well stomped down.
- Clues left in appropriate places.
- Debris area is well defined.
- Any “victims” are well briefed and have their story organized.
- Observer’s beacons are switched off!

The rescue exercise can be timed and invite the observers to take notes and give feedback. Encourage the feedback to be constructive, concise and relevant. Once completed the group roles can be reversed and another and perhaps more complex scenario set up. Splitting the group like this does take time but the benefits are more active participation and increased learning by observation and positive feedback loops.

### 5.5 The Substitute

**Goal:** To introduce first aid in avalanche rescue

During a group rescue scenario, and as one of the targets gets recovered, the instructor or an observer can ‘flop’ into the excavated hole. On their chest is a note stating ‘I’m not breathing’. For extra realism, their head can be at an awkward angle or contain a mouthful of snow. The objective here is for rescuers to act quickly to recognize the problem and check the airway for obstructions or alignment. If that is done the “victim” can cough out the snow plug and/or take a gasp of air and start breathing. It’s a quick, easy and memorable lesson in the importance of first aid care in avalanche rescue.

### 5.6 “Jimmy’s Leg”

**Goal:** To reinforce the importance of investigating visual clues by pulling them out of the snow.

One of the targets (let’s call it “Jimmy”), is buried with no beacon, but has a ski or snowboard attached to it by a short piece of cord. Only the tip or tail of the ski or board should be visible. Other surface clues can be put out up or down slope of the burial site. Locating this on the upside of a tree or boulder can also be a good reminder about searching likely burial areas.

If rescuers diligently pull clues out of the snow while searching, they will recover the ski or snowboard and find that it is attached by a cord to something in the snow. At this point the instructor can tell them that it is “Jimmy’s leg”. The victim (target) can then be recovered. In our experience, “Jimmy” is often one of the first target’s to be recovered in rescue practices.
5.7 Jeopardy

Goal: To introduce the concept of triage in avalanche rescue.

In a multiple burial rescue scenario, one of the rescuers locates a target while probing. The target may well be a shallow burial, but the instructor informs the rescuer that the burial depth is actually 150 cm and they are to communicate a plan.

If they decide to proceed and shovel on their own, tell them that it will take them 30 minutes of digging and that they are required to stand at that location ‘time out’) for half an hour. If they ask for help, then two people are ‘timed out’ for 20 minutes and three people for 15 minutes. This exercise gets students to think critically about how they manage their time in a rescue and whether their efforts could be better spent searching for near surface burials.

Further discussion about triage could include terrain and the consequence of victims being swept over cliffs or through trees.

6. CONCLUSION

The authors continue to have good results and positive feedback teaching the elementary micro-search strip method to novice and intermediate students. Students like the systematic approach and straight line searching that this method uses. The system is also effective for the wide variety of beacons that students bring to a course.

The micro-search strip method remains a solid, alternative technique when the marking system has failed or is unavailable.

REFERENCES


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