AVALANCHE TRANSCEIVERS: USES, LIMITATIONS AND STANDARDS

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1. INTRODUCTION

A first and quick glance on a snow surface will, simultaneously, show reality and illusion. It depends on the prior knowledge of the observer. What the observer is able to see, would like to see and/or wish to see is exclusively determined by their level of snow knowledge and short-term goals for the day at hand.

Snow, made from water just as tears, can provide either high stability powder skiing or slab snow with a high probability of triggering an avalanche.

A good way to insure a safe and fun filled day of backcountry skiing is to:

- Take an avalanche course!
- Be aware of the avalanche danger at hand!
- Develop a reasonable balance between risk and fun!
- Practice with your avalanche transceiver

The large helicopter operations are exemplary in their responsible working of snow craftsmanship by being able to balance risk and fun.

Avalanche experts suggest that you carry an avalanche transceiver, probe pole and shovel at all times in the backcountry. However, the reality is different!

2. USE OF AVALANCHE BEACONS

Avalanche accidents happen every year where no avalanche equipment is used: transceiver, shovel or probe. A good example is the slab avalanche that occurred on December 28,1999 at Ötztal, Austria. This event indicates that some people still do not use beacons to increase their probability of survival. The result of this self-triggered slab avalanche was: four people were caught, three people totally buries; two people killed and one person rescued by the help of an avalanche dog after being buried for about two hours in 1.3 meters. Subsequent use of transceivers would have given a higher chance of survivability for the two people who died.

3. LONG RANGE

A second example demonstrates the impact of a huge and tremendous slab avalanche. It occurred in March 1988 in Jamtal, Austria. Twenty people were caught. It seems to have been triggered by itself and not the group. Eight people were partially buried, twelve people were totally buried (some were about six meters deep) and six people were killed. The remaining six people were rescued with the help of transceivers. It was the benefit of the transceiver's long range capacity that enabled the rescuers to save the lives of these six people. A long range (large width of search strip) helps to create a quick and efficient search for the first signal (with a minimum of rescuers). This time saved could save lives, as it did in this avalanche.

4. MULTIPLE BURIALS

A third example occurred December 1999 in Jamtal, Austria. It demonstrated that even though the avalanche debris was small (20m x 10m), thirteen people were buried up to 1.3 m deep.

Modern beacons have to guarantee a safe and simple pinpoint search, even when thirteen or more people are buried in a small area.

The two examples from Jamtal, Austria show us that there is on average avalanche size and that it is ridiculously unrealistic to statistically reduce the size of an avalanche rather than increasing the transceiver's range.

5. SAFE, QUICK AND FOOL-PROOF SWITCH TO RECEIVING MODE -- FOOL-PROOF HANDLING

A fourth example demonstrates three self triggered tiny little slab avalanches (Heidelberger Hütte, Austria; 50x 20m; 40 x 15m; 20 x 5m). The debris size was 5 x 5 meters. Three people were killed in these avalanches. The only girl that survived was not able to switch from transmitting to receiving mode. So, she stood on the debris with a transmitting beacon, unable to save the three

buried victims. So, all three people were killed.

It is necessary for any current beacon to provide a "user friendly" ability to switch easily, quickly and safely to receive mode. Therefore, the Ortovox safety switches are best, as there is no accidental fumbling with buttons and knobs that can be inadvertently reset.

6. WIDTH OF THE SEARCH STRIP

Up to the present time, the search strip width was defined by forty percent of the maximum range. So, transceivers with a maximum range of 80m would have a 32m search strip width. Beacons that only work digitally do not provide as high a range as beacons with digital-analogue capacity. Therefore, manufacturers are attempting to create a new method for calculating the search strip width rather than creating a more efficient beacon.

These manufacturers suggest that the maximum range is the width of the search strip. This means that a beacon with a maximum range of 80 m should provide a search strip width of 80 m. ORTOVOX believes this strategy is dangerous! The chances of passing the victim are greatly increased! For your own safety we recommend a search strip width of maximum 60 m, or to be sure, to keep the proven and reliable 40% rule (40% of the maximum range = search strip width). The 40% method is conservative, but very safe!! This search strip width provides overlap in all directions with the necessary coverage to avoid missing the buried victim.

The essential standards from the point of the user are:

- Carry avalanche transceiver with you and check it daily. Use no rechargeable, take only high-quality Alkaline batteries and change them as necessary. Be trained and familiar with your transceiver.
- Carry avalanche shovel and probe.
- Use a transceiver with a long range.
- Use a transceiver which guarantees a safe and precise multiple burial search, if necessary.
- It is a must for a transceiver to incorporate safety switches.
- User friendly transceivers do not incorporate complex programs.

7. STANDARDS

The present standards are still valid - nonetheless, some important changes should be considered.

TEST CRITERIA FOR AVALANCHE TRANSCEIVERS

Recently, new types of avalanche transceivers have come onto the market. The introduction of the new equipment has made it necessary to bring Standards into line with the new techniques in some areas, since they are currently based exclusively on an acoustic principle.

1. Establishment of technical safety requirements with regard to the techniques used by the new equipment
1.1 Determining Range
1.2 Criteria for use with Multiple Victims
1.3 Establishment of Technical Safety Criteria for Switching Between Transmitting and Receiving.
1.4 Definition of Compatibility
1.5 Definition of Width of Search Strip

2. Establishment of Test Criteria
2.1 Range
2.2 Multiple Victims
2.3 Compatibility
2.4 Search Time
2.5 Handling

Re. 2.1 Establishing Range:

Transceivers of the same model were tested fro best and worst antenna coupling positions (tested visually and acoustically). Best antenna coupling position: Antenna are both horizontal to one another. Worst positioning: The worst antenna coupling position is transmitting antenna vertical, receiving antenna horizontal. If we need to determine the worst position, than it does not make sense to use a "half-worst" coupling position, e.g. antennas parallel. If the transmitting antenna is vertical, you have the greatest advantage with the fewest failures! Suggestion: At least 8 testers walk in a direct line towards the transmitting transceiver and establish the distance of the first signal to be received both visually and acoustically.

Disregard both the best and the worst results, and average out the remaining 6 results.

Re. 2.2 Multiple Victims

(See also Standard 3.11: Changes in the Reception Signal!) As set down in Standard EN 282, in the case of multiple victims, when using equipment based on the principle of variable emitted volume, the change in the signal received is used to carry out the search.

With the new techniques, a reliable search for further victims has to be guaranteed, without the need to turn off the first transceiver found.

Re. 2.3 Compatibility

Definition: Regardless of the technology used, equipment produced by different manufacturers must be compatible in the areas of the reception signal (frequency, modulation and carrier wave) as well as range.

Since the width of the search strip is determined by the minimum range of a piece of equipment, devices with widely differing ranges are not compatible (see Standard EN 282, Point 1, area of application: Purpose of the Standard).

Re. 2.4. Search Time

The total search time is comprised of:

a) Preparation time
b) Coarse search (search for the first signal)
c) Fine search and pin point search and location

Establishing the search time is obviously dependent upon the competence of the searcher and their familiarity with the equipment. The established search times must therefore be interpreted very carefully. It is however well known that devices with a longer range offer a shorter search time than devices with a smaller range.

Re: a) Measuring the preparation time (as far as this is dependent upon the device used). A group of 8 people carrying their transceivers under their clothing as laid down in the instructions are told without warning to begin searching-e.g. by calling "avalanche." The time measured will be that required for all participants to turn their equipment to "receiving" mode to start the coarse search.

Re: b) Measuring the time required for the coarse search: Two transceivers of the same model (one beacon is on transmitting mode; one beacon is on receiving mode) on a clearly defined avalanche field (e.g. 50x50m). During the search, the width of search strip recommended for that device will be maintained (see search strategy). The coarse search will take a meandering form, since this is the only way to measure the distance between the two points by counting steps. The meandering format ensures the first signal is received. The time measured will be that from the start to the first clear signal.

Re: c) Measurement for the time for the fine search and for the pinpoint search. The time measured will be from the point at which the first clear signal is received (= Reception of the first clear signal).

Re: 2.5 Handling

Generally speaking, judging the handling of a device is a very personal matter which depends upon the individual skills and preferences of the tester. During the evaluation the following areas should be considered:

Securing the device on the body:

- Is there a hip and shoulder belt?
- How secure is the device against loss during the search?
- Can it be put on while wearing gloves?
- Stability?
- Comfort during the test?

Changing from "transmitting" into "receiving" mode:

- How easy it is to turn on or over while wearing gloves?
- Can it be turned off accidentally?
- Can it be switched over accidentally?
- The practicality of an automatic switch-over from send to receive needs to be discussed.
- Comfort - especially during the test period.
- Specific technical details such as operating errors, battery controls, transmitting controls, receiving controls etc.