


ICAR Congress 2012

Problems in training and on rescue missions - the wide variety of avalanche rescue beacons (RB)



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Agenda

1. Case study
 2. The wide variety of avalanche rescue beacons
 3. Problems in training and on missions
 4. The new “Alpine Rescue Manual”
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1. Case study: Hasliberg Bernese Oberland



Avalanche Mägisalp Hasliberg

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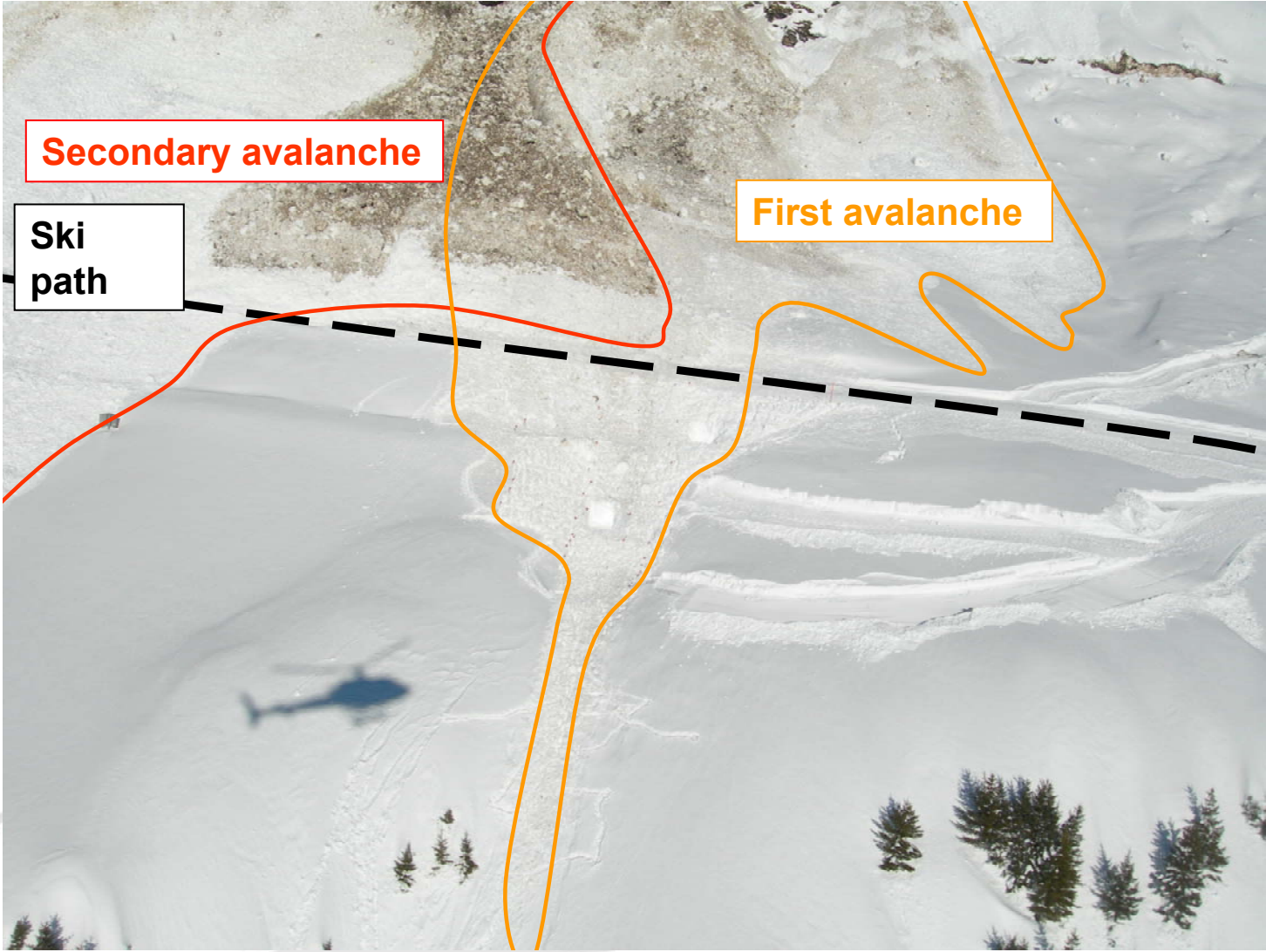
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2. The wide variety of avalanche rescue beacons



3. Problems in training and on missions

Efficient training is not possible with the wide variety of devices



3. Problems in training and on missions

On an avalanche rescue mission, the rescuers are under great stress and must be able to operate the device without any loss of time.



4. Presentation of the new Alpine Rescue Manual

2008 Initial clarifications

Cooperation between: **Swiss Alpine Rescue, ARS**

Canton Valais Rescue Organisation KWRO

Swiss Army

2009 Table of contents, authors commissioned (various rescuers)

2010 – 12 Compilation of text and drawings

End of September 2012: Publication, on sale online via the website



Alpine Rescue Manual

Basic training:

Bergsport Winter	SAC-Verlag
Bergsport Sommer	SAC-Verlag
Erste Hilfe	SAC-Verlag
Formation Canyoning Ausbildung	International Federation of Mountain Guides Associations (IFMGA)



Organised rescue:



Alpine Rescue Manual

First edition:

1500 German

600 French

400 Italian

200 English

Format: A5



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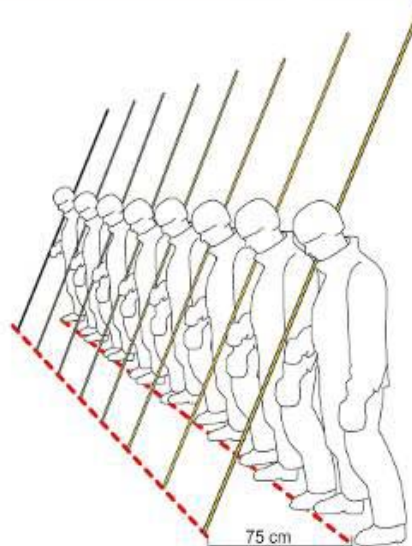
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 2. Fundamentals
 3. Improvised rescue techniques
 4. Rescue techniques (Parts 1-3)
 5. Avalanches
 6. Helicopters
 7. Rescue dogs
 8. Incident command
 9. Communication
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Total number of pages

5 Avalanches

ALPINE RESCUE MANUAL



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5.1 Introduction

To ensure that buried victims can be found as rapidly as possible, it is advisable to follow a set procedure for an avalanche rescue. Speed, anticipation and organisation are of central importance for a rescue mission and are decisive for the survival of the avalanche victims.

An organisation chart and checklists show the rescuers the best way to proceed.

5.2 Organisation

The size of the incident fundamentally determines the number of people who need to be deployed on the different tasks. The bigger the incident, the more differentiated the functions will be.

Fig III Organisation chart

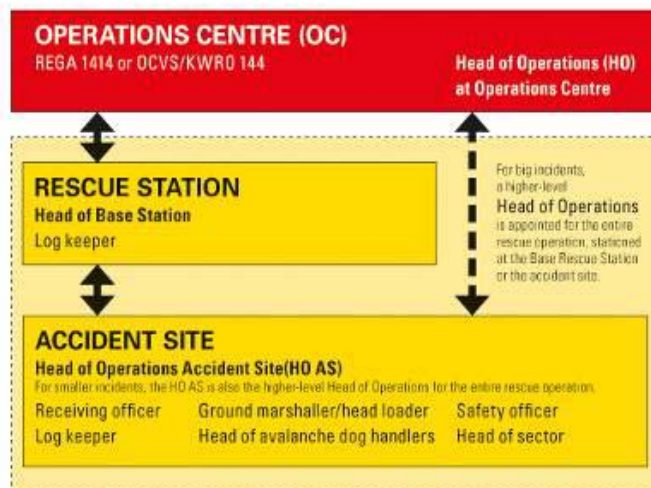
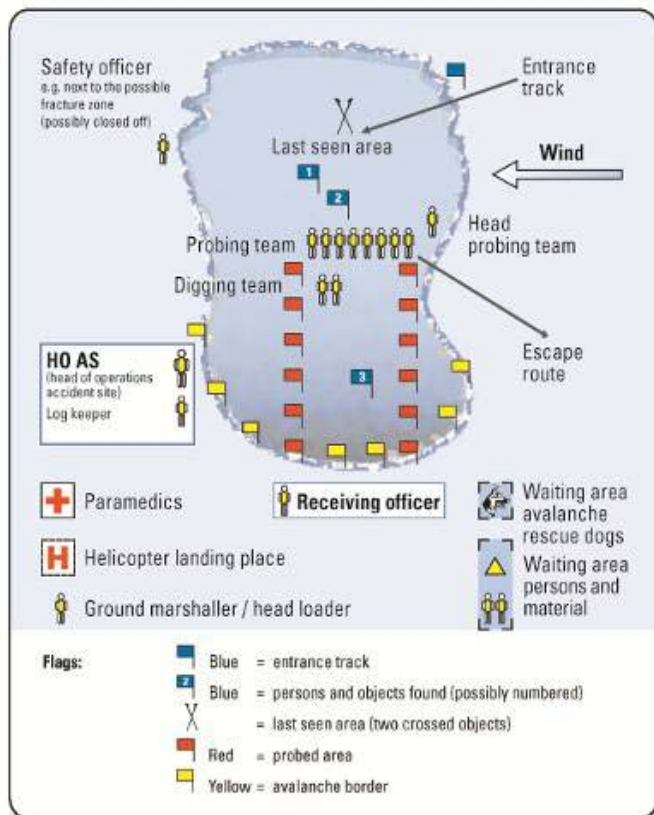


Fig 1.11 Organisation chart for the accident site

A clear structure is necessary to ensure that an overview can be maintained at all times:

- The zoning must be quite clear, with the back areas (waiting and material/equipment areas, helicopter landing point, etc.) being kept clearly and consistently separate from the avalanche field.
- Sufficient distance must be maintained between the back areas and the avalanche field with the specified entrance routes.
- Only people with clearly allocated tasks may be present on the avalanche field.



5.2.1 Functions

5.2.1.1 The operations centre (OC) – Rega 1414 or OCVS/KWRO 144

The alarm is generally sent to the operations centre (OC). The operations centre deploys the different resources (helicopter, rescue station team, avalanche dog team, etc.) in line with its internal procedures. During the rescue mission, the operations centre provides support in organisational terms for the on-site emergency personnel.

5.2.1.2 The rescue station

The rescue station is the deployment point for the individual rescuers (as per the rescue station's alarm procedure). In the case of avalanche rescue missions, a **Head of Base Station** for the rescue station is deployed down in the valley at the location where the accident has taken place. He coordinates and organises the resources on the spot, liaising with the operations centre and the Head of Operations Accident Site:

- ▷ Rescuers
- ▷ Rescue equipment
- ▷ Dog teams
- ▷ Medical personnel
- ▷ Others ...

Additional human resources

- ▷ Ski-resort rescue service
- ▷ Ski schools
- ▷ Fire brigade
- ▷ Army
- ▷ Others ...

Additional transport resources

- ▷ Cable cars and ski lifts
- ▷ Snowmobiles
- ▷ Others ...

Additional tasks of the rescue station

- ▷ Keeping a written record (log)
- ▷ Questioning witnesses and looking after them up to the end of the operation
- ▷ Organising a care team

Communication

- ▷ Maintaining the link to the operations centre and the accident site
- ▷ Informing the authorities
- ▷ Informing the media (see Chapter 9.2, p. 18)

5.2.1.3 Accident site

Head of Operations Accident Site (HO AS)

The Head of Operations Accident Site leads the rescue mission and holds responsibility for it. He deploys the appropriate search resources and coordinates the operation. In the event of large-scale incidents, a higher-level head of operations is deployed, who then holds overall responsibility.

The Head of Operations Accident Site specifies suitable **rescuers for the following tasks:**

- ▷ Receiving officer
- ▷ Safety officer
- ▷ Head of avalanche dog handlers
- ▷ Log keeper
- ▷ Head of sector (for large-scale operations)

Important:

A radio link must be ensured between the members of the rescue team and the partner organisations.

The Head of Operations Accident Site instigates and delegates **immediate measures at the accident site:**

- ▷ obtain an overview, if possible by flying over the site (possibly with a rescue beacon switched to receive mode)
- ▷ assess the safety of the rescuers using the checklist: "Risk check avalanche cone"
- ▷ attend to survivors and question them
- ▷ immediately question any witnesses on the spot:
 - Time the avalanche occurred?
 - Number of victims buried by the avalanche?
 - Has a search already been performed by eye and ear, rescue beacon and RECCO®?
 - Entrance track and last seen area?
 - Sequence of events during the accident?
- ▷ observe the wind direction (deployment of avalanche dog)
- ▷ immediate search: by eye and ear, avalanche dog; the rescue beacon and RECCO® can be used on foot or out of the helicopter right from the start
- ▷ if more than one helicopter has been deployed: specify the approach/ departure paths
- ▷ once the immediate measures have been launched, send feedback to the operations centre and/or base station: size of the incident, additional resources required and estimated duration of mission

General recommendations regarding the organisation of the accident site:

- ▷ once the search with rescue beacons has been completed, switch the rescuers' personal rescue beacons to TRANSMIT mode
- ▷ attend to and protect those involved in the accident
- ▷ store objects that are found separately and keep a record of them
- ▷ close off the avalanche field and potential fracture zone
- ▷ keep radio communications short and precise

The Head of Operations Accident Site must take **further measures** if the rescue mission is a lengthy one (more than one hour):

- ▷ continuously reassess the deployment of the search resources and the rescue team's own safety
- ▷ send feedback to the operations centre and/or base station
- ▷ conduct coarse probing
- ▷ document and flag the following:
 - entrance track **blue flag**
 - persons and objects found **blue flag** (possibly numbered)
 - last seen area **two crossed objects** (skis, sticks, flags)
 - probed area **red flag**
 - avalanche edge **yellow flag**
- ▷ replace team, request additional rescuers
- ▷ request additional equipment/possibly lighting
- ▷ request food and drinks
- ▷ plan and secure withdrawal
- ▷ search surrounding area
- ▷ conduct fine probing
- ▷ dig by hand or with snow grooming vehicles

Receiving officer

The receiving officer supports the Head of Operations Accident Site in organisational and technical matters:

- ▷ designation of suitable rescuers as:
 - ground marshaller/head loader
- ▷ definition of the following necessary areas (ensuring an easy overview and sufficient distance from the avalanche cone):
 - helicopter landing point
 - medical point (triage point)
 - waiting area for persons and equipment
 - waiting area for avalanche dogs
- ▷ reception, registration and information for newly arriving rescuers
- ▷ division into teams and governing the replacement of team members

5.4 Risk assessment

Rescue missions in winter are frequently conducted under difficult weather conditions and with an increased risk of avalanches, as well as under enormous pressure of time. The rescuers must not be exposed to an unnecessary risk during the operation. We use the following checklist as an aid in assessing the risk.

5.4.1 Checklist "Rescue mission in winter"

This checklist is not a universally binding set of rules for rescue teams but rather a tool to assist in decision-making when risks are being assessed. The standardised decision-making process makes it possible to cut down on misjudgements or perception traps during an emergency rescue mission.

Fig. 514 3 x 3 Rescue mission in winter

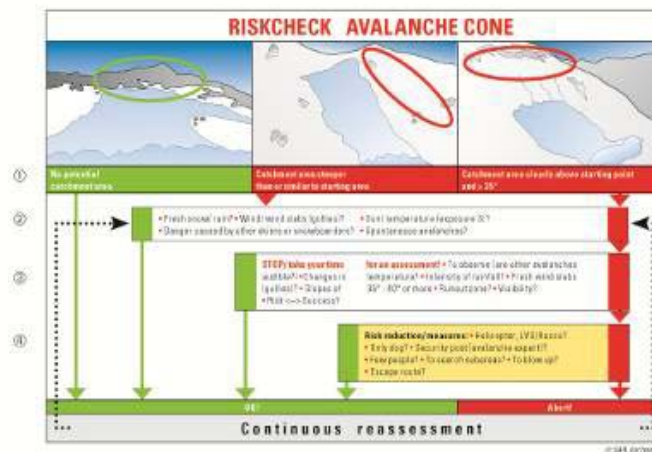
The front side of the checklist shows the "3 x 3 Rescue mission in winter".

The checklist is used for the systematic collection and evaluation of information. The three factors of "Conditions", "Terrain" and "Human factor" are assessed at three different levels. The situation is observed on an increasingly detailed basis at the progressive levels, ensuring that the 3x3 acts as a filter and cuts down on errors. The checklist is designed to support those involved in taking decisions and to ensure that these decisions can be readily comprehended and substantiated.

3x3 RESCUE MISSION IN WINTER			
	Conditions	Terrain	Human factor
Before the mission	Course of the winter	Knowledge of the region	Deployment, material
ALARM			
Planning and on-site operation	Danger of avalanches? (Fresh snow, rain, wind, warmth)	Potential starting areas? (Slope, exposure, altitude)	Personal equipment? Team? Perception trap? Tunnel vision? Decision?
RISKCHECK			
Continuous re-assessment	Fresh snow or rain? Wind slabs? Inevolution? Visibility? Spontaneous avalanches?	Change of perception? Change of mission?	More people? Different rescuers? Resources exhausted? Pressure from outside?

Fig. 516 Risk check "Avalanche cone"

On the rear of the checklist card is the "Risk check avalanche cone" which has been designed specifically for use during avalanche rescue missions. The risk check has deliberately been kept short so that it can also be used under pressure of time during a mission.



The checklist is worked through from top to bottom:

- ▷ green means: no danger, implement the action.
- ▷ red means: stop, potential danger, check next point.
- ▷ ① terrain: is there a catchment area for secondary avalanches?
- ▷ ② have we any problems in respect of the points listed?
- ▷ ③ is there a problem under ②: stop!
Take the time to conduct a detailed assessment.
- ▷ ④ if, after a detailed assessment, there is a problem under ③, the risk can be reduced through selective measures. If the implemented measure does not bring about the necessary risk reduction, then the action must be terminated.

Important: The situation must be continually re-assessed while the action is being carried out.

5.6.3 RECCO®

5.6.3.1 Introduction

RECCO® is a system used worldwide to rapidly locate buried avalanche victims. The two system components – reflector and detector – allow victims to be located through harmonic radar, but are not a substitute for rescue beacons. The RECCO® system permits a faster professional search and increases the chance of buried victims being located while still alive. The RECCO® system is used exclusively by organised rescue teams.

5.6.3.2 Knowledge of the devices and theoretical knowledge

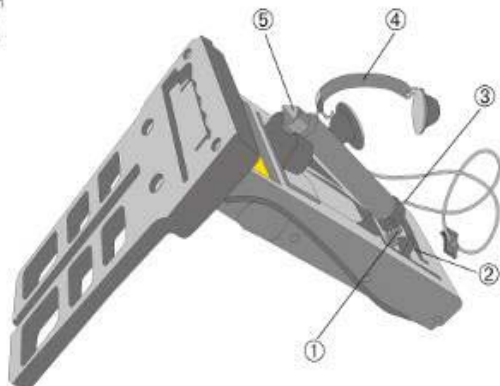
RECCO® R8 Detector

R8 detectors are still currently in use at some locations. Over the next few years, however, they will be gradually replaced by the R9.

- ▷ charging time: 2 hours (detector must remain connected up to the charger)
- ▷ operating time: 2 hours
- ▷ Ni-MH rechargeable battery.
- Caution: use only with the appropriate charger unit
- ▷ battery service life: 2 years

Fig. 5.11 RECCO® R8 Detector

- ① Main on/off switch
- ② Charger socket
- ③ Headphone socket
- ④ Headphones
- ⑤ Power controller

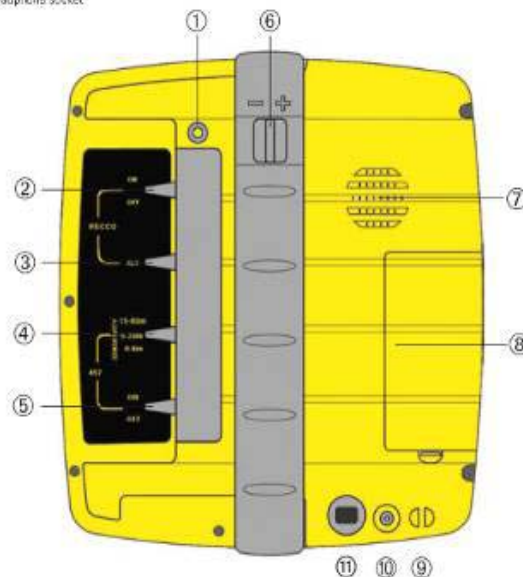


RECCO® R9 Detector

- ▷ charging time: 2 hours
- ▷ operating time: 2 to 3 hours
- ▷ Li-ion rechargeable battery.
- Caution: use only with the appropriate charger unit
- ▷ battery service life: 3 years

Fig. 5.12 RECCO® R9 Detector

- ① RECCO® blue LED power indicator: Continuous light = maximum power / Flashing light = reduced power
- ② Main on/off switch
- ③ RECCO® channel switch
- ④ Rescue beacon step switch (457 KHz) 3 steps
- ⑤ Rescue beacon main switch RB (457 KHz) analogue on – off
- ⑥ Volume control RECCO®, 3 levels
- ⑦ Loudspeaker
- ⑧ Rechargeable battery
- ⑨ Carrying loop
- ⑩ Charger socket
- ⑪ Headphone socket



5.6.4 Avalanche dog

If possible, a dog team should be included in the leading group for each avalanche rescue mission. If several dogs are deployed, then a lead dog handler must be determined. The Head of Operations Accident Site coordinates the search work of the dog teams with the lead dog handler.

5.6.5 Search with rescue beacon (RB) and RECCO® out of a helicopter

The decision in favour of this search method is made by the Head of Operations Accident Site in consultation with the helicopter crew.

Advantages:

- a big area can be searched quickly
- where there is a danger of avalanches, a search can be conducted from outside the danger zone
- only a few rescuers are required

Drawbacks:

- requires a trained crew for the search out of the helicopter
- a helicopter cannot be deployed in bad weather
- a large number of rescuers on the avalanche field make it impossible to deploy a helicopter

The technique and method to be employed is described in detail in the manuals (Flight Operation Manual, Training Manual and Standard Operation Procedures) of the helicopter operating company.

Using rescue beacons and/or RECCO®, the crew establishes the rough position of the buried victim from the airborne helicopter. An appropriate object is thrown down to mark the location point (e.g. a coloured ribbon with a weight). The rescuers present on the avalanche field then take over and establish the precise position.

5.6.6 Probing

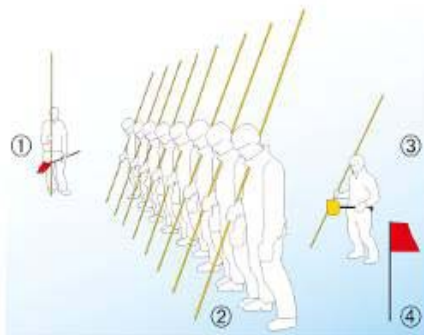
5.6.6.1 General information

Probing is generally only performed if the electronic resources and avalanche dogs have not produced positive results. The success of systematic probing depends to a very great extent on the management and discipline of the team.

Fig 127 Functions during probing

The head of the probing team should issue clear instructions from a sufficient distance in front of the team and make sure that these instructions are actually followed.

- ① head of probing team
- ② probing team
- ③ one to two people for digging with shovels and spare probes
- ④ red flags marking the area already searched



The following points should be borne in mind when probing:

- ▷ only hold probes with gloves (exception: in hot weather)
- ▷ always insert probes vertically
- ▷ check the screw connections between the individual sections of the probe from time to time and tighten them where necessary
- ▷ in the event of a presumed hit, leave the probe in the snow and continue the search with a spare probe; the digging team checks and digs down along the inserted probe
- ▷ the probing team should comprise 10 to 20 people
- ▷ the digging team (with shovels and spare probes) is approximately 5m behind the probing team
- ▷ mark the probed area (coarse, every 5m; fine, every 2m) and enter on the accident sketch
- ▷ when the team is replaced, leave the probes in position in the snow; the teams should walk along the edge of the avalanche

Probing systems

One of the following three probing systems is employed as a function of the particular situation:

- ▷ coarse probing
- ▷ fine probing
- ▷ rapid probing (probing with just a few rescuers)

5.6.6.4 Rapid probing (probing by just a few rescuers)

Rapid probing makes it possible to probe an area rapidly with just a few rescuers. Rapid probing is employed if a leading group has to carry out probing already following a vague alert by an avalanche dog (or another search system), or if an object is found. If a first round of rapid probing does not prove successful, a second round will be conducted, in a slightly staggered position or at right angles to the first round.

Hit probability: approx. 90%

Fig. 5.34 Rapid probing: grid

Per step (50cm) the probes are inserted twice (on the right and on the left) down to a depth of 2m (probe length 3m).



Fig. 5.35 Lining up

Those conducting the probing line up in a single row. They stretch out one arm and place their hand on the shoulder of the next person to ensure the correct spacing between individuals.

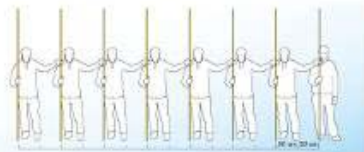


Fig. 5.36 Aligning the probes

The probe tip is placed on the surface of the snow 50cm in front of the tip of the right shoe, with the probe resting on the right shoulder. The head of the probing team issues instructions.



Procedure for rapid probing

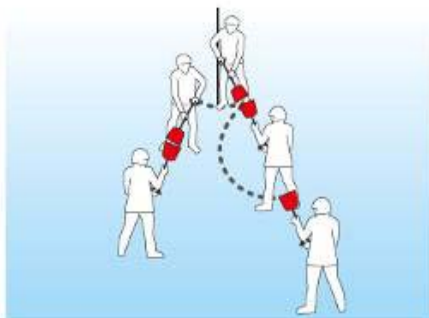
- ▷ The head of the probing team issues the instruction "Probe!"
- ▷ The rescuers take a step forward (50cm) without moving the probe tips and insert the probes vertically into the snow to a depth of 2m, on the right and left at a distance of 50cm. After the probe has been inserted for the second time, it is positioned ready for the next insertion and correctly aligned (probe tip 50cm in front of the tip of the right shoe, probe resting on the right shoulder).
- ▷ The head of the probing team issues the instruction "Probe!", and so on.

5.6.7 Digging

To dig out a buried victim, it is necessary to dig a big hole. To ensure that this can be done as quickly as possible, it is worthwhile adopting a systematic approach. The so-called "V-shaped conveyor method" (Genswein and Eide 2007) is a system of this type.

Fig. 5.37 V-shaped conveyor method: configuration

The rescuers line up in a V shape behind the probe with which the victim has been located. The distance between the individual rescuers is determined using the shovel. With shallow burial depths, the V should be approximately twice as long as the depth of the buried victim. The width of the V at its open end should always correspond to the depth of the buried victim.

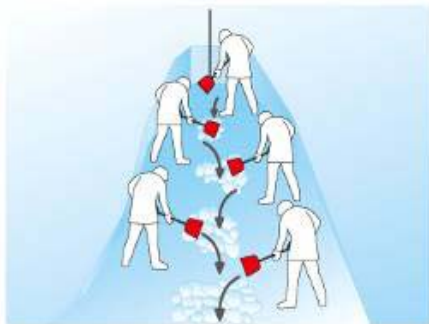


Important:

- Digging should always be done systematically.
- Good-quality, robust shovels should always be used for digging (ideally telescopic metal shovels with a hardened blade and a D-shaped handle).

Fig. 5.38 Digging

At the front, the snow is dug out over the length of the probe that is still in the snow. In the middle, the snow is passed back in the same way as on a conveyor belt. To ensure that the rescuers do not get tired so quickly, they should switch positions after 4 to 5 minutes when the rescuer at the tip of the V issues the command (rotating in the clockwise direction).



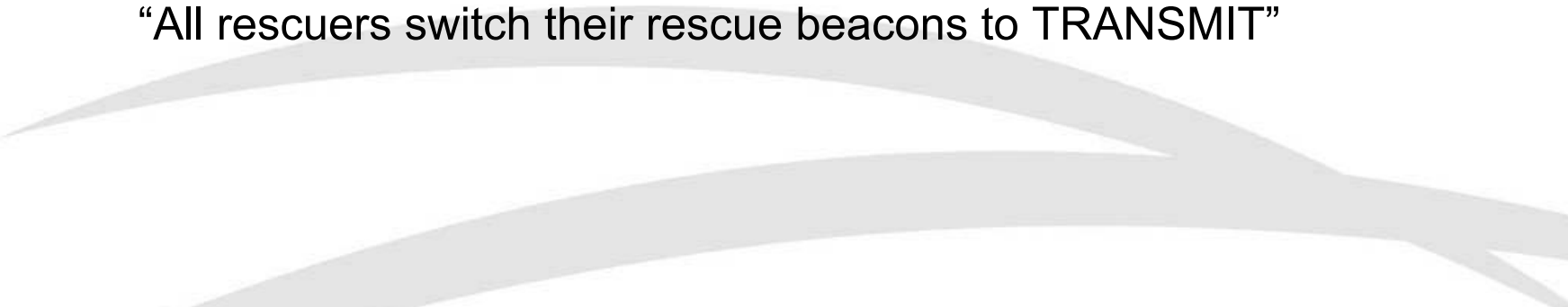
On sale in the public web shop

The Manual can be purchased via our website with either payment by credit card or delivery with an invoice; it costs CHF 90 plus shipping costs to Switzerland and abroad (public web shop):

<http://www.alpinerettung.ch>



Conclusion

1. It would be desirable to have a standardised test procedure for rescue beacons (possibly a job for ICAR)
 2. The easier an appliance is to operate, the more efficient the rescue operation will be
 3. Once the search with the rescue beacons has ended, the Head of Operations must issue the order:
“All rescuers switch their rescue beacons to TRANSMIT”
- 

Questions?



Thank you very much