

Survival Chances of Complete Burials

- Avalanche rescue is a race against time!
- First 10min: good survival chances, afterwards rapid decrease

Companion Rescue

- Rescue by group members immediately after avalanche has occurred
- Companion rescue = highest chance of survival

Immediate Action in Case of an Avalanche

When caught: (if possible)

- Try to escape to the side
- Release gear (skis, poles, etc.) → avoid anchoring effect
- Fight to stay on top
- Close mouth, keep arms in front of the face
→ unobstructed airway when avalanche stops
- Airbags, additional safety devices
→ Read and follow manufacturers instructions!

When observing:

- Remember last seen area and direction of the flow
→ Determine primary search area

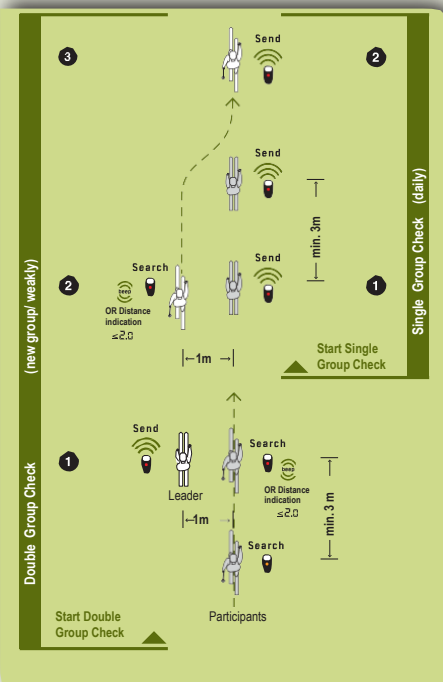
Group Check

- Double Group Check (Check: SEND + SEARCH): Recommended when a new group forms and at least once a week.
- Single Group Check (Check: SEND only): At the start of each touring or out of bounds skiing day, after search exercises, etc.
- Test distance must not be less than 1 m; distance between participants min. 3 m.
- Test successful: Clearly audible beep sound, positive confirmation indication >2.0: Check batteries, report distance indication ≤ 2.0
- No signal/absence of positive confirmation/ distance air device if necessary.

“Search”:

- Devices with group test function: “Group check”.
- Other devices: “Search”.
- Analog devices: Volume level corresponding to a range of 1 m.

Consider checking the results of the self-test and battery test as well as the availability of emergency and rescue equipment as part of the group check.



Rescue Equipment

Personal rescue equipment

Only the combination of an avalanche transceiver (3 antennas + mark function), probe (min. 240 cm), and shovel (metal) allows quick and efficient search and excavation.

EMERGENCY PLAN

CALL FOR HELP 1414 / 144 (VS) / 112 (Uses all networks)

1. Assign a leader - Obtain an overview
Avoid slopes with similar characteristics!
2. Before search, verify that people who are not performing a transceiver search have their transceiver OFF.
3. Switch off communication and other electronic devices and take off heated gloves for the duration of the search!
4. Use skis or snowboard (skins?) snowshoes, snowmobile etc. as long as practical. Remove snow sports equipment when entering the fine search area. Keep your backpack and gear with you at all times.
5. At least one rescuer immediately starts transceiver SEARCH, while looking and listening at the same time
6. Assemble probe and shovel only when the fine search is concluded
7. Transceiver search finished: all transceivers to SEND
8. Excavate
9. First Aid

Adjustments depending on the situation and the ratio of rescuers to buried subjects.

Avalanche Rescue Transceiver: Handling and Interference

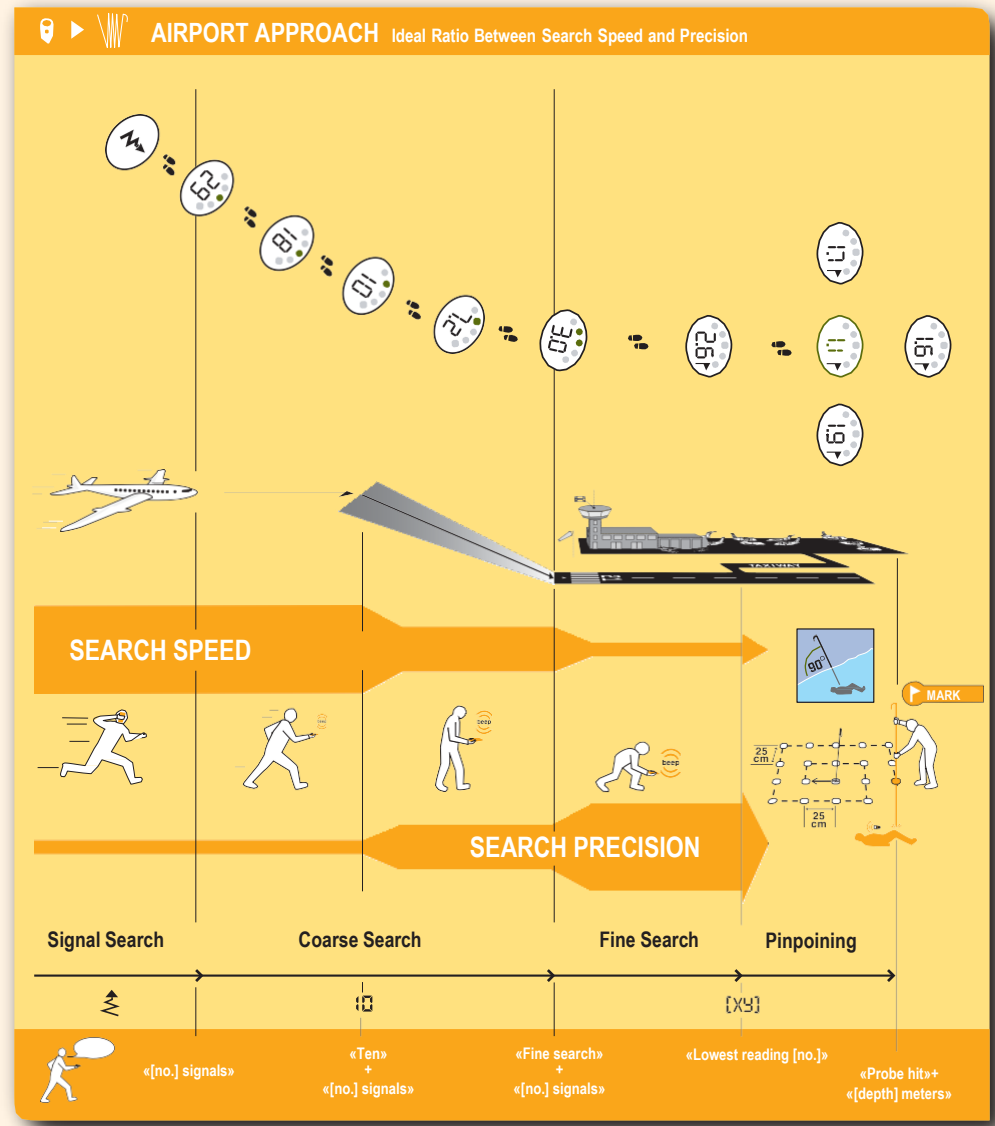
- Handle the avalanche transceiver with great care!
- Perform battery and device self-tests.
- SEND: No electronic devices (e.g., cell phones, radios, headlamps), metal parts (e.g., pocket knives, magnetic buttons) in the immediate vicinity (at least 20 cm).
- SEARCH: During the search, stay at least 50 cm away from such objects, switch off electronic devices if possible, and switch off cell phones completely (including flight mode)!

Emergency Call:

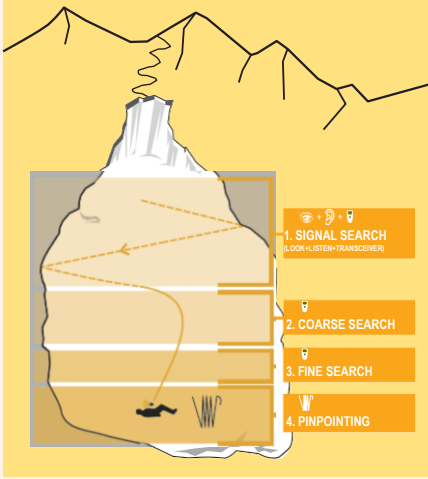
Communication equipment for emergency call and all other active electronics: 10 m away from the nearest searching rescuer

Carrying Method

- The avalanche transceiver is worn throughout the entire tour on the innermost layer of clothing using a carrying system.
- The avalanche transceiver must always be covered by a layer of clothing.
- The avalanche transceiver must always be worn with the display facing the body.
- There are two possible carrying methods:
- **Carrying system:** The device must always be covered by at least one layer of clothing. If this is not possible, carry the avalanche transceiver in a secure pants pocket.
- **“Secure pants pocket”:** no sewn-on pockets, pocket must always be closed with a zipper, attach wrist strap (hook, belt).



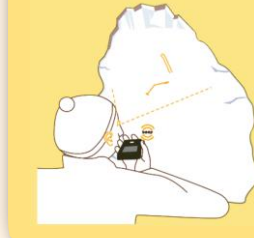
SEARCH PHASES



1. Signal Search

- Start of search until reception of the first audible signal or distance indication on the screen.
- High search speed
- Search strip width: apply information on the back of the avalanche transceiver and on the screen!

SIGNAL SEARCH



Last seen point known



Search in direction of the flow

Last seen point unknown



One rescuer

Multiple rescuers

2. Coarse Search

- Search from initial reception to the immediate vicinity of the buried subject.
- Hold the avalanche transceiver centered, horizontally in front.
- Walk in the direction indicated by the arrow; no jerky movements!
- Increasing distance: turn the search direction 180°
- Distance indication 10: Slow down and precisely follow distance indication!

3. Fine Search (approx. ≤ 3.0)

- Search area in immediate proximity of the buried subject.
- Hold device at knee height
- Do not change the orientation of the device.
- Place visual marker (pole, hat) at the point of the smallest distance indication → starting point for the probing spiral.

4. Pinpointing

- Precise location is not possible with an avalanche transceiver.
- Lowest distance value = maximum burial depth
- Spiral probing pattern aligned in rectangular coordinate grid.
- Probe perpendicular to the snow surface.
- Upper hand: probing, applying the force; Lower hand: guiding the probe
- Probe hit: leave the probe in place as a guide to the buried person while digging

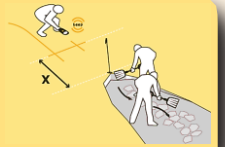
Where to dig if probe hit is not possible

Insert probe 1m uphill of the point of the smallest distance indication. Start digging, repeat fine search after every meter of digging, reposition probe if required, continue until probe hit is possible. Apply probing spiral, dig along the probe.

Multiple rescuers in the fine and pinpointing

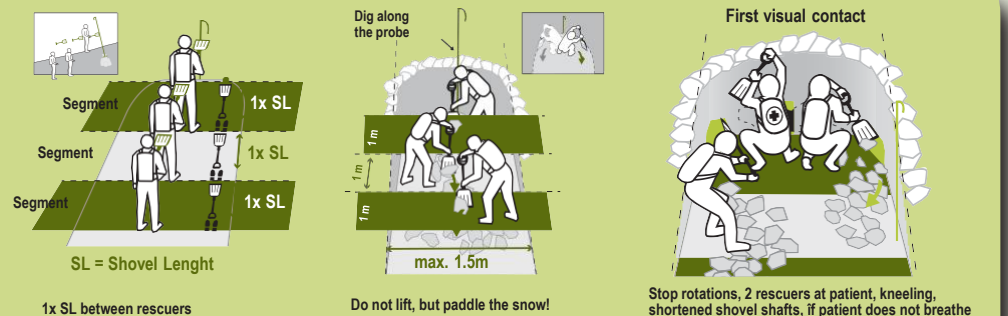
One person finishes the search with the transceiver and probe, while the other rescuers are already digging below the probable location of the buried subject.

Burial depth:
- Normal → x ~ 1 m
- Deep → x = 1.5 - 2 m



Snow Conveyor Belt

- Probe hit: Leave the probe as a guide to the buried subject.
- Length of the snow conveyor belt:
 - Flat deposit: $2 \times$ burial depth
 - Deposit $\geq 20^\circ$: $1 \times$ burial depth
- Optimal number of rescuers: 1 rescuer for every meter of length of the snow conveyor belt.
- Rescuers rotate regularly clockwise at the command of the rescuer in the tip of the conveyor belt (approx. every 2-4 min.)
- If there is no more snow in the segment, immediately continue digging deeper.
- Cut blocks if the snow is hard.



Stop rotations, 2 rescuers at patient, kneeling, shortened shovel shafts, if patient does not breathe normally, immediately give 5 rescue breaths. If required, start 30:2 CPR (follow AvaLife protocol).

Search Strategy for Multiple Burials

Mental Map of the Avalanche Situation

The mental map includes all the available information (eyes, ears, avalanche transceiver) and is used to determine the search and rescue strategy (e.g., where/how many rescuers/shovelers are needed).

Information from the avalanche transceiver: list of buried subjects, map, overview/special/scan mode, analog sound check, etc.

Distance Indication

The number of buried subjects must be interpreted in conjunction with the distance indication on the screen. Distance on the screen = maximum possible distance between the rescuer and the buried subject.

Sound Check (if analog sound is available)

Counting the number of different sound patterns gives the number of buried subjects. The distance indication shows the distance to the closest buried subject not marked as found yet. The additional analog beep sound patterns are from buried subjects within max. $\sim 50\%$ of the displayed distance. Sound Check = Two questions to quickly and reliably determine of 1 to 3+ buried subjects:

- Could this be only one buried subject? No → at least 2
- Could there be only two buried subjects? No → at least 3!

Example: 3 sound patterns and distance indication 10: One buried person is max. 10 m away, the other 2 buried subjects are approx. 10 to 15 m away (→ distance shown on the screen $\sim 50\%$)

Procedure for Multiple Burials

- Signal separation & marking: Modern avalanche transceivers can resolve many situations with multiple burials based on digital signal separation and the marking function.
- Immediately free head and chest of the buried subjects already found, unless burial depth ≥ 1.5 m in shortage of resources. Continue search. Switch off the avalanche transceivers of those already excavated as quickly as possible!
- If problems arise:
 - Further buried subject are not displayed
 - Marking function fails (or is not available)
 - Search becomes inefficient and is no longer effective → Apply the following alternative search systems:

Alternative Search Systems

If available, switch transceiver to alternative/analog search mode.

Three-Circle Method

Apply 3 circular search strips in fixed radii of 3, 6, and 9 m around the already located buried subject (=center of the circle). Search for distance minima on the circles.

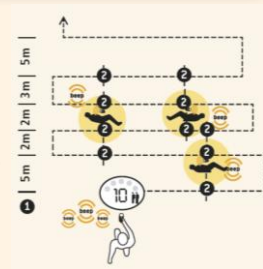
From here, the other buried persons are located using a classic cross-search method. Return to the point where the circle was left. Continue the search until all 3 circles have been searched.



Micro Search Strips (MSS)

Parallel search strips. Search strip width 2-5 m: 1 The more buried subject there are and the closer they are to each other, the tighter the grid (→ generic search theory). The search strip ends at the side as soon as the distance indication is >10 .

Starting point: return in the direction you came from until the distance indication reads 10. From this point on, ignore the direction indications on the transceiver. Apply the micro search strips perpendicular to the original search direction. Never turn the device.



2 At EVERY minimum of distance on the search pattern, check behind and ahead for decreasing distance indications and locate the buried subject by a cross search pattern. Return to where the micro search strip was left. Continue the search until the all distance indications on a micro search strip are >10 .

Optimization of Survival Chances for all Buried Subjects

Prioritize areas with greater likelihood of survival: No high falls, no forest, no seracs or crevasses, burial depth ≤ 1.5 m, vital signs.

Buried Subjects Without Transceivers

Probe the most likely burial spots with spot probing and the most likely burial areas with probe lines. Rescuers shoulder to shoulder, systematically, grid 60x60cm.