

IMPORTANT: The ELEMENT Barryvox® is designed for snow and mountain sports outside of controlled, groomed slopes within ski area boundaries as well as controlled, maintained trails. All snow and winter sport activities are inherently dangerous.

Knowledge and experience are essential to reduce the risk of injury or even death. Do not enter avalanche terrain without an experienced guide or equivalent training. Apply common sense at all times. Never pursue these activities alone.



Reference Manual

ELEMENT Barryvox®

Version 1.0 2013



ELEMENT *Barryvox*®

MAMMUT



REGISTRATION AND SERVICE

Register your ELEMENT Barryvox® today!

By registering your device, you will gain exclusive access to the Barryvox Community. We will remind you when to have your device serviced and provide you with technical tips, the latest insights on avalanche theory, as well as information about the availability of software updates. If you register now, several services will be free of charge!

Register your ELEMENT Barryvox® at:

www.mammut.ch/barryvox

Service Centers Information and prices for maintenance and repair are available at:
www.mammut.ch/barryvox (-> Service)

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Phone: +41 (0)62 769 83 88
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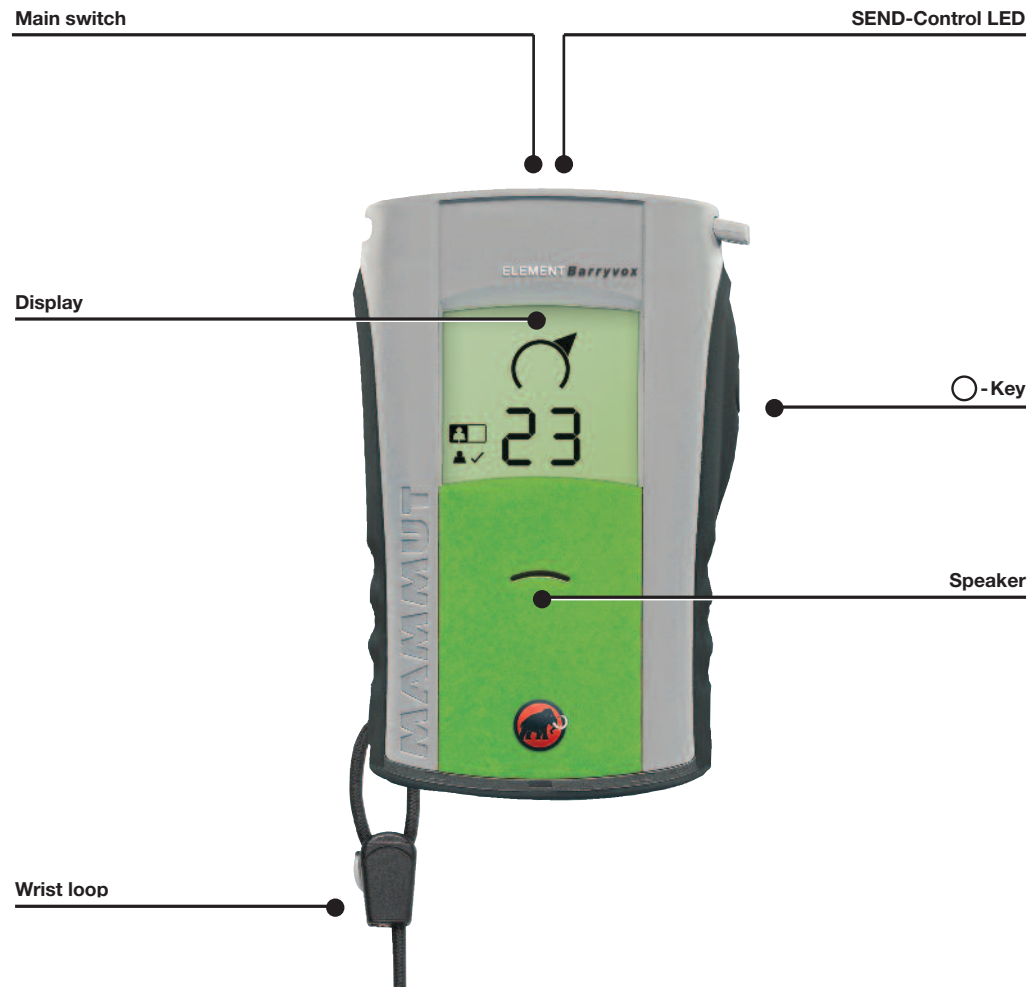
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For years, Mammut has been heavily involved in «Avalanche Risk Management» [a.r.m.] with the objective to increase the safety of all winter sports enthusiasts by providing better equipment, know-how transfer, and focused training.



Avalanche Training Centers

Within the "Avalanche Training Centers", provided by Mammut in several regions, you have the opportunity to practice realistic search and excavation situations for free. In addition to comprehensive information on the assessment of avalanche danger, permanently installed, snow-covered transmitters can be activated randomly and searched for.

Mammut and Snowpulse Airbag Systems:
The additional use of a Mammut or Snowpulse Airbag increases the chance to stay on the surface and therefore considerably reduces the risk of a complete burial.



Rescue Equipment

With the ELEMENT Barryvox, probes, shovels and the airbag systems, Mammut offers a comprehensive choice of avalanche rescue and survival devices.

Additional information on [a.r.m.] or Mammut products can be found at: www.mammut.ch



[Photo: Rainer Eder]

WELCOME

Introduction

Digital 3-antenna device focusing on the essentials. The Barryvox® ELEMENT stands out thanks to its ease-of-use and clear instructions. Its one-button operation and clearly laid out display make the device very user friendly. Guaranteeing fast and precise location. Signal analysis, listing of people and a marking function are additional details to quickly and reliably tackle even complex situations involving multiple buried people. The extremely robust housing offers good resistance to impact or breakage. For further information concerning maintenance Mammut Barryvox transceivers, please consult www.mammut.ch/barryvox.

Congratulations on the purchase of your new ELEMENT Barryvox®

This reference manual explains the functionality and use of the ELEMENT Barryvox®.

A transceiver does not protect you against avalanches!

As a winter outdoor enthusiast, you must consider all possible avalanche prevention measures and plan your trips carefully. Companion rescue – the worst case – must be practiced frequently. Under the stress of an accident, this is the only way you will be able to locate and dig out a companion quickly and efficiently. Despite practice and all the technological advancements, by far not all of the completely buried avalanche victims are rescued! An avalanche burial is always life threatening.

Important information on these topics can be found in the chapters on companion rescue and avalanche theory.

ELEMENT Barryvox® – Made in Switzerland
Our heritage is compelling. Mammut and Barryvox follow the time-honored tradition of world-class precision products made in Switzerland. From its design to its engineering and production, this device is completely Swiss-made.

This device is compatible with all avalanche transceivers that comply with the EN 300718 standard and operate on a frequency of 457 kHz.

The following documents for the Barryvox transceivers are available at www.mammut.ch/BarryvoxManual:

Barryvox Legal and Regulatory Guide

Contains information concerning the normative and legal use of the device, warranty and repair, as well as the region and country specific differences in the application of the W-Link data transmission.

Barryvox Emergency Plan

Stick the emergency plan on the back of the battery compartment lid. It shows the elementary steps for a successful companion rescue.

Barryvox User manual

The user manual is a practical companion in the field.

Barryvox Reference Manual

The reference manual is a comprehensive resource of information for your Barryvox. It includes the complete system overview, information on maintenance and troubleshooting, but as well on rescue organization, excavation and avalanche prevention.

Barryvox Application Safety Guide

In addition to the reference handbook the Application Safety Guide contains comprehensive instructions on the safe use and maintenance of your transceiver as well as possible sources of interference. Special considerations are included for efficient fleet management.
(www.mammut.ch/BarryvoxManual)

Front view

Welcome

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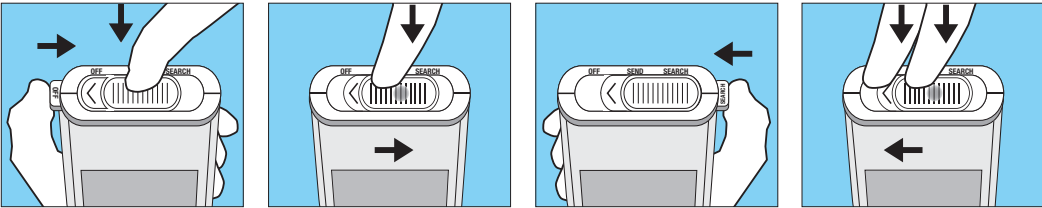
7. **Introduction to Avalanche Theory** 46

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1. Operation

1.1 Main Switch OFF / SEND / SEARCH

The main switch is located on the top side of the device. It can be moved by pressing down on the button. By applying lateral pressure to the switch, it can be set to SEND at any time. In the left switch position, the transceiver is OFF, in the center position, it is in SEND mode, and in the right position, the SEARCH mode is activated. To get into the OFF position, an additional safety button must be pressed down, as well.



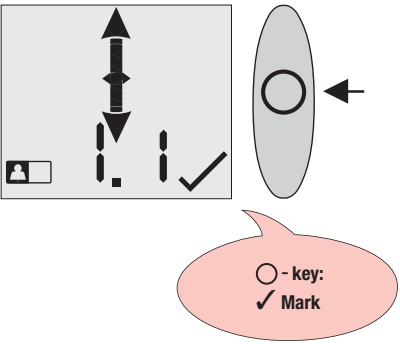
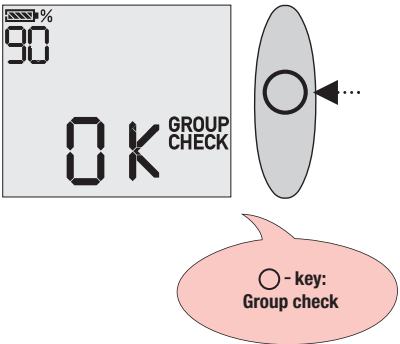
OFF -> SEND SEND -> SEARCH SEARCH -> SEND SEND -> OFF

Always make sure that the switch locks into position mechanically to avoid an undesired change of mode.

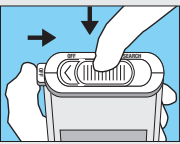
1.2 Use of Keys

The ELEMENT Barryvox® clearly excels through its ease of use. The device is operated using the two lateral keys. The current function of the key is always shown at the right of the display.


Examples:




SEND MODE



OFF -> SEND
Chapter «Main Switch»




Chapter «Battery Level Indicator» und «Turning Device ON»

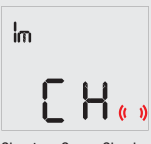


Chapter «Send Mode»

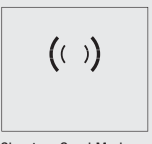
GROUP CHECK




Chapter «Battery Level Indicator» und «Turning Device ON»



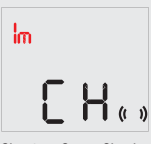
Chapter «Group Check»



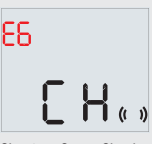
Chapter «Send Mode»



Chapter «Group Check»




Chapter «Group Check»

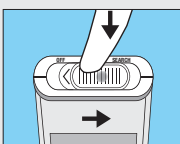


Chapter «Group Check»


SEND -> SEARCH



Chapter «Send Mode»




SEND -> SEARCH
Chapter «Main Switch»

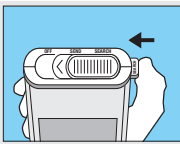


Chapter «Search»


SEARCH -> SEND




Chapter «Search»



SEARCH -> SEND
Chapter «Main Switch»




5 Sec. Count-Down




Chapter «Send Mode»


SIGNALSUCHE



Chapter «Signal Search»




Chapter «Signal Search»




Chapter «Auto Revert to Send»

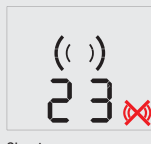
COARSE SEARCH



Chapter «Search»

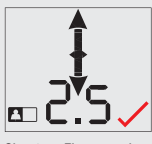


Chapter «Search»




Chapter «Auto Revert to Send»

FINE SEARCH

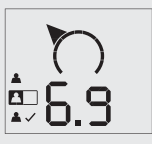


Chapter «Fine search»




Chapter «Auto Revert to Send»


MULTIPLE BURIALS



Chapter «Search for Multiple Buried Subjects»




Chapter «Limitations» and «Search for Multiple Buried Subjects»

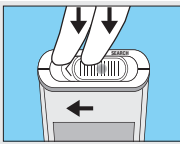


Chapter «Limitations»


SWITCH OFF AND ADDITIONAL INFORMATION




Chapter «Send Mode»



SEND -> OFF
Chapter «Main Switch»



Chapter «Periodic Checks» und «W-Link»



Chapter «Periodic Checks» und «W-Link»

2. Setup

2.1 Initial Setup

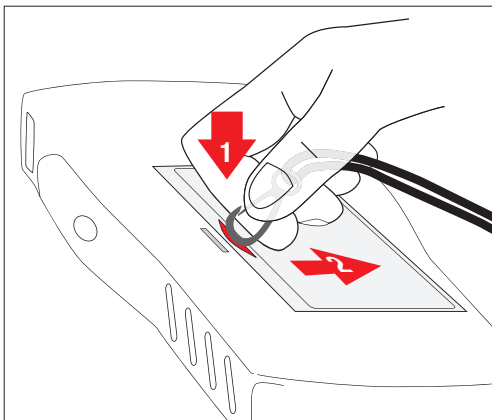
Before you use the device for the first time, remove the protective foil on the front side and stick the emergency plan on the back of the battery compartment lid.

2.2 Insert / Replace Batteries

Only use **alkaline** (LR03/AAA) batteries of the same type. Always insert 3 new batteries of the same type. In case these batteries need to be removed, the same 3 batteries or 3 new batteries need to be reinserted. **Never use rechargeable batteries** and always replace all the batteries at the same time.

Make sure the lid is properly closed and that the device and the batteries stay dry. Periodically inspect the battery compartment. Clean or dry it, if needed, since moisture can cause corrosion. Avoid touching the contacts with your hands.

A reliable power supply is crucial for the safe operation. Please refer to the detailed instructions in the Application Safety Guide.
(www.mammut.ch/BarryvoxManual)



2.2.1 Important Points When Using Alkaline Batteries Type LR03/AAA

When storing or not using the transceiver for an extended period of time (i.e. in the summer), remove the batteries and leave the battery compartment open. The warranty becomes void if batteries have leaked! When reinserting the batteries, use the same 3 batteries or 3 new batteries.



2.3 Adjusting the carrying system

Adjust the carrying system to fit your body.
(Chapter «Carrying positions»).

2.4 Handling the Barryvox

As all transceivers, the Barryvox contains shock-sensitive ferrite antennas. Therefore, you should handle it with utmost care!

Store the device and the carrying system in a dry spot that is protected from extreme cold or heat and direct sunshine.

It is recommended that you have the functionality tested at regular intervals (see chapter «Periodic Checks»).

2.5 Interferences

As a matter of principle, avoid having other electronic devices (e.g. mobile phones, radios, headlamps), metal objects (pocket knives, magnetic buttons), or other transceivers close to (20 cm in SEND; 50 cm in SEARCH) your running avalanche transceiver. **Users of pacemakers are advised to carry the device in a pant pocket, the zipper must remain closed for the duration of the trip (without vital data detection).** Consult the manufacturer's instructions with regard to the impact on pacemakers.

For professional and institutional use, it is highly recommended to consult the Barryvox Application Safety Guide (www.mammut.ch/BarryvoxManual).

When searching, hold the device at a minimum of 50cm away from these objects and turn off any electronic devices, if possible.

Be aware that electronic devices used by other rescuers may disturb the search. This is equally valid for mobile phones, therefore it is highly recommended to switch off phones which are not absolutely required.

The Application Safety Guide of the Barryvox contains an exhaustive list of allowed equipment as well as a detailed list of possible limitations.
(www.mammut.ch/BarryvoxManual)

2.6 Carrying Positions

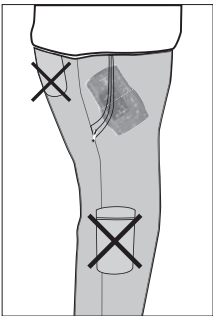
Regardless of the carrying position, the display should always face your body!

2.6.1 Carrying System
(Recommended Carrying Position)

The carrying system has to be put on your innermost layer of clothing prior to beginning the trip (see illustration) and has to be worn on your body for the duration of the trip. **The transceiver shall always remain covered by one layer of clothing.** The device itself is inserted into the carrying system according to the illustration. It should always remain anchored to the base plate of the carrying system using the red hook on the wrist loop.



2.6.2 Carrying the Transceiver in a Pocket



If you carry the Barryvox in a pant pocket, the zipper must remain closed for the duration of the trip. Always use a secured pocket (see illustration). If possible, attach the wrist loop to your pants or secure it around your belt.



2.7 Turning the Device On

When the main switch is moved from the OFF to the SEND or SEARCH positions, the transceiver is turned on. To slide the main switch from OFF to SEND or SEARCH, unlock the main switch by pressing down the button at the top. While starting, the device conducts a self-test. The microprocessor, the antennas and the display are checked. If the self-test is completed successfully, the display will show «OK».

The remaining battery level is displayed as a percentage. If the self-test fails, an error message is displayed for 20 seconds along with an acoustic warning. The meanings of the different error messages are described in the chapter «Troubleshooting».

Test your Barryvox at home prior to your trip. Turn the transceiver on and monitor the self-test and the battery level. This gives you the opportunity to replace low batteries and have an eventual defect repaired beforehand.

2.8 Battery Level Indicator

The following table gives you average values for the battery levels. The remaining battery level can only be displayed correctly if batteries are used according to the chapter «Insert / Replace Batteries». Low temperatures, age, and brand can have a negative impact on the battery life and the accuracy of the battery level indication.

100%:	Normative Requirement (=minimum requirement) min 200hrs SEND at 10°C followed by 1hr SEARCH at -10°C Typical values for the ELEMENT Barryvox® with alkaline batteries: 250hrs SEND at 10°C Measured with Duracell ULTRA (initial set of batteries)
less than 20% or 0%	The batteries must be replaced as soon as possible! Emergency reserve at 20%: Max. 20hrs in SEND mode and max. 1 hr in SEARCH mode left.

The transceiver sounds a warning if the battery level is below 20% or unknown at startup.

2.9 Group Check

Single Group Check

Before a party takes off, the transceivers of all party members must be checked. To conduct this test, the function group check is activated on a single transceiver within the party. Activate the group check by switching the device from OFF to SEND and pressing either of the keys within the first 5 seconds. After a few seconds, the device will automatically activate the group check. Make sure all the other transceivers of the party are in SEND mode.

The test is successful if you can clearly hear beep sounds from each participant's transceiver within the range indicated on the display. The members of the party must be spread out appropriately to avoid mutual interference. The indicated test distance must not be shortened, as otherwise the group check becomes very unreliable.

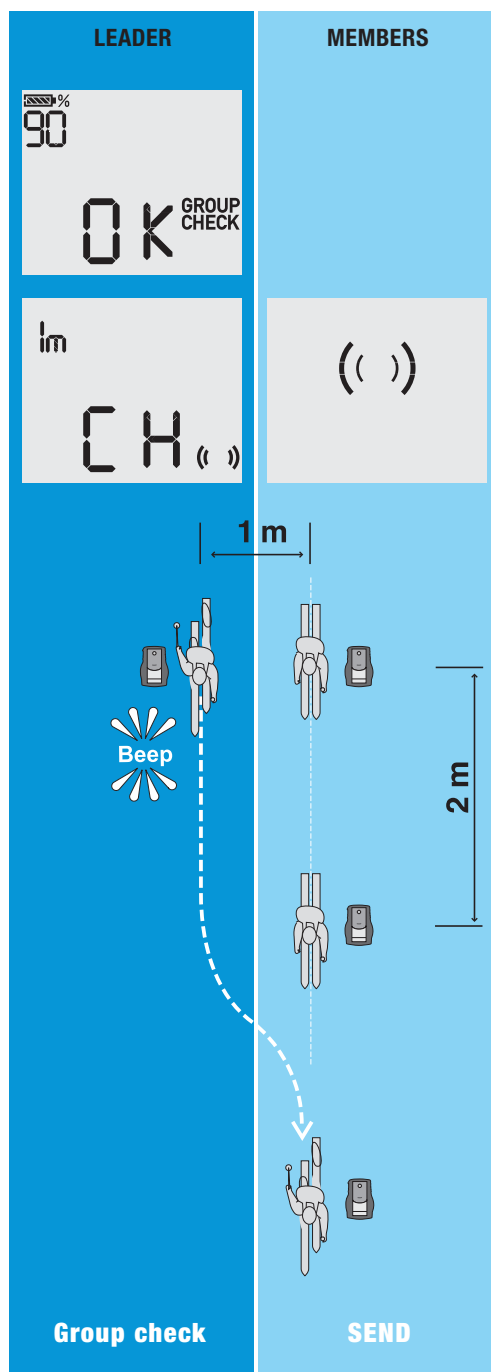
If no tone is heard within the indicated range, the device may not be used.

How to solve the problem:

1. Check if the device is switched to SEND.
2. Replace the batteries.
3. Have the device checked by the manufacturer. (chapter «Maintenance and Repair»)

After 5 minutes in group check, the transceiver automatically switches to the SEND mode. The user is warned ahead of time by an acoustic alarm. This automatic switching can be prevented by pressing any button within 20 seconds. After the group check, the transceiver must be switched to the SEND mode by pressing the lateral key.

If your ELEMENT Barryvox® detects that the transmit frequency of the tested device is not within the normative regulations, an «E6» warning message will be shown. In this case, repeat the test with 5 m distance between the participants to identify the defective transmitter. Such devices must be checked/repared by the manufacturer.

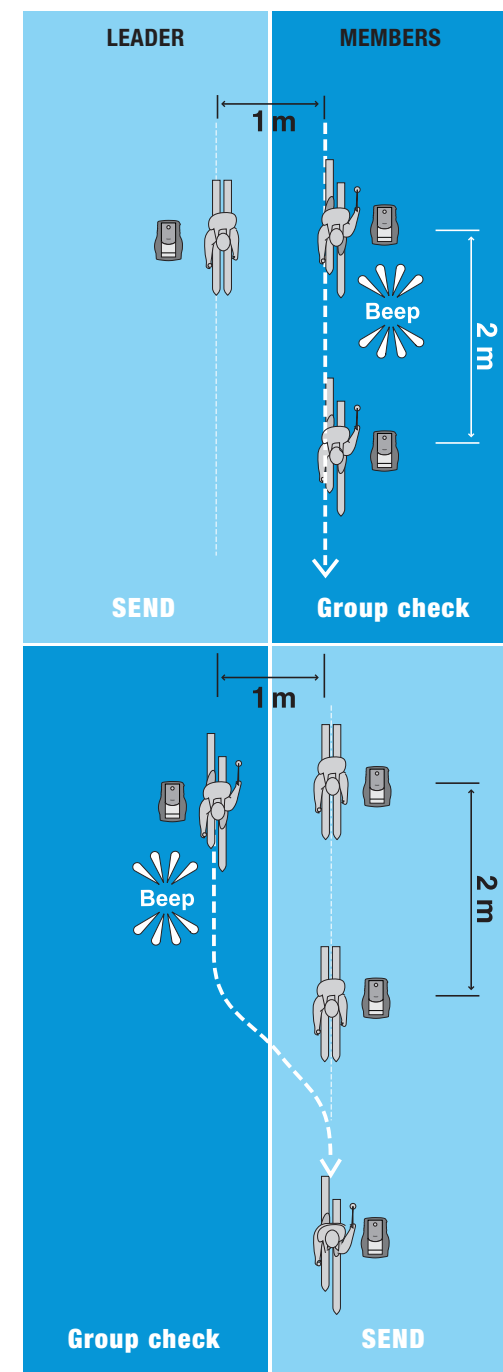


Double Group Check

We recommend to perform a double group check ones a week and in general when a new group gets together.

The double group check individually tests the SEND and SEARCH function of all devices.

The members of the party activate the group check on their transceivers or set them to a low receive volume. The leader switches his or her transceiver to the SEND mode and ensures that all party members can receive. Subsequently, the party members switch their transceivers to SEND, and the leader activates the group check or sets the transceiver to a low receive volume. The SEND mode of all transceivers is checked, and ultimately the leader switches his or her transceiver to SEND.



3. SEND Mode

The SEND mode is the normal operating mode outdoors or in all other situations in which there is a risk of avalanches.

Each time the SEND mode has been activated, this is confirmed by a triple beep sound.

Each individual signal element is tested. If the test is successful, this is confirmed by a blink of the red SEND-Control LED.

The LCD display is automatically deactivated in the SEND mode, but can be activated any time by pressing either of the keys.



4. SEARCH Mode

Although the avalanche transceiver is easy to use, its effective use requires proper training. We recommend that you practice transceiver searches regularly.

Electronic devices and metal objects can interfere with the search or make it impossible.

See chapter «Interferences».

Be aware that electronic devices used by other rescuers may disturb the search. This is equally valid for mobile phones, therefore it is highly recommended to switch off phones which are not absolutely required.

At the beginning and during the search, pay close attention that the rescuer's transceivers are not transmitting and do not switch to SEND unintentionally.

It does not make sense to remove the backpack and mount the shovel and probe already at the border of the avalanche. Keep the backpack with all the equipment on you! The assembled shovel and probe is only a hindrance during signal and course search. Only remove your pack to assemble probe and shovel ones you have successfully concluded the fine search.

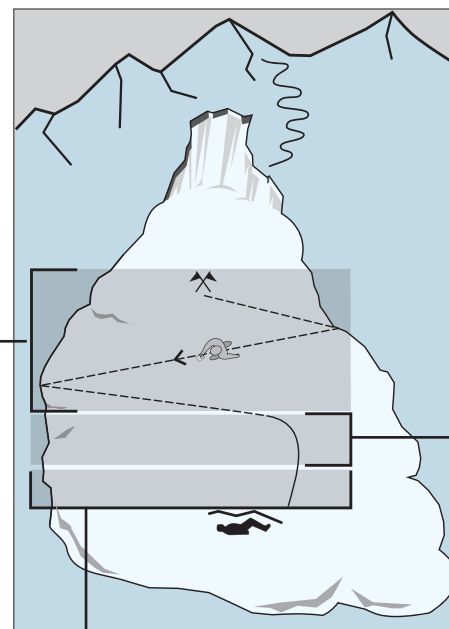
4.1 Search Phases

In an avalanche search, the following phases are distinguished:

- Signal search
 - Coarse search
 - Fine search
 - Pinpointing
- } using transceiver
- } using probe

Signal search:

Search area to the point where the first signal can be detected.



Coarse search:

Search area starting from the reception of the first signal until the immediate vicinity of the buried subject. In this phase the signal search pattern is abandoned in order to follow the signals leading to the buried subject.

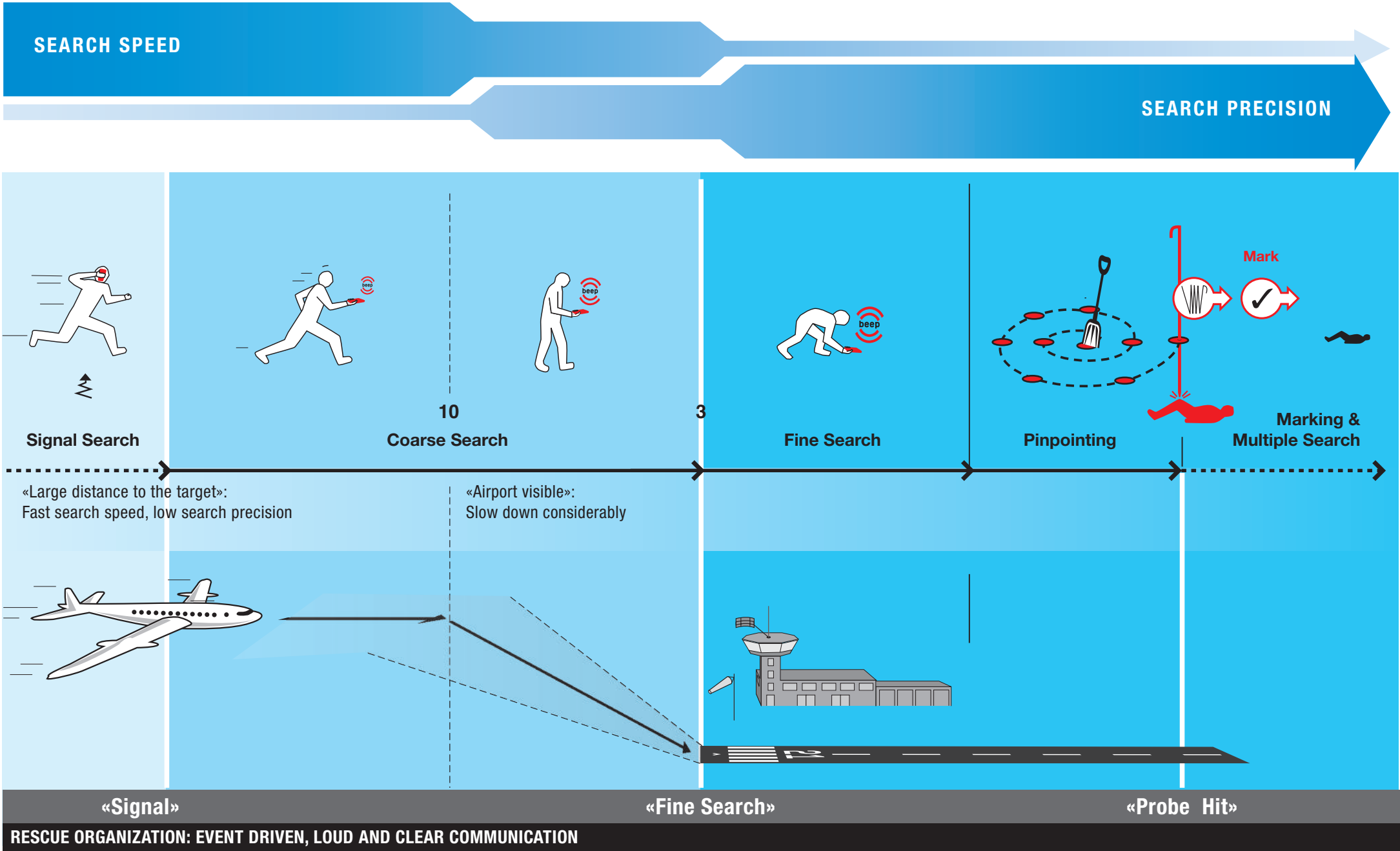
Fine search:

Search area in the immediate vicinity of the buried subject.

Pinpointing:

First use of the probe until probe hit.

The transceiver search is comparable to the landing of an airplane!



4.1.1 Signal Search

From the start of the search until you hear the first tone, you are in signal search. The avalanche surface is searched systematically until you pick up a signal. During the acoustic signal search, the rescuer has the visual focus on the surface of the debris in order to be able to see body parts or objects protruding the snow surface.

The ELEMENT Barryvox® uses the symbol \otimes as a generic instruction to apply one of the following search patterns for new signals!

Optimization of Range

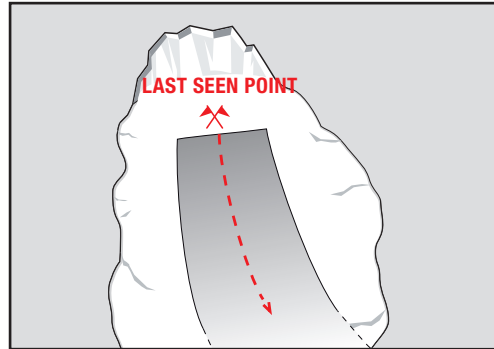


To optimize the range, rotate the transceiver slowly around all axes. Hold the device with the loudspeaker facing your ear sideways of your head.

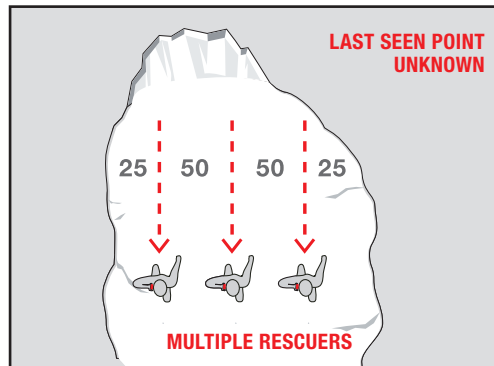
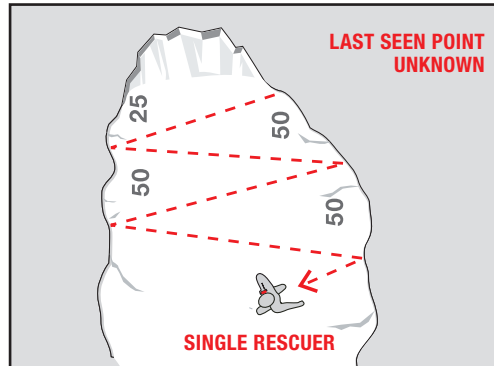
If your Barryvox® detects that the signal search strip width needs to be reduced due to a device transmitting far apart from the normative regulation, the reduced search strip width will be indicated.

Regardless of the operating mode, the following search strategies apply:

Search strategy if the last seen point is known. The signal search strip extends downhill from the last seen point in the direction of the slide.



Search strategy if the last seen point is unknown.



4.2 Auto-Revert to SEND

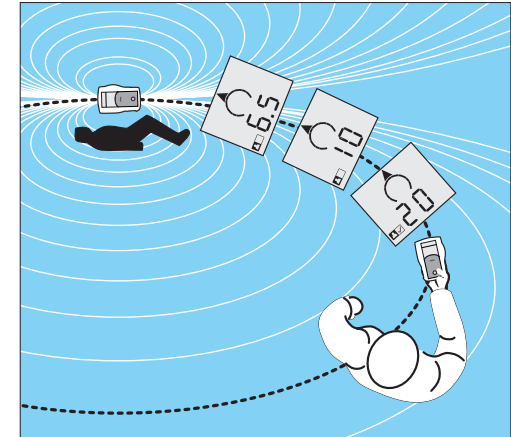
Auto-revert to SEND automatically switches the transceiver from the SEARCH mode to the SEND mode if no user interaction occurs during 8 minutes.

Prior to reverting, the device will sound an audible alarm. Reverting can be avoided if either of the keys is pressed within 30 seconds of the alarm.

In case rescuers are buried in a second avalanche, this function allows them to be located using transceivers.

Elementary understanding of transceiver search

The 457kHz transmitter of the transceiver has a special, kidney shaped transmit distribution, which is visualized with field lines in the illustration below. The searching transceiver leads the rescuer along the field lines and therefore usually not in a straight line to the buried subject.



Search Along the Field Line: Flux line search

4.3 Search Mode

As soon as the device is switched to SEARCH, it is operating in search mode.

4.3.1 Search for a Single Buried Subject Using the Search Mode

Coarse Search

If the distance to the buried subject is less than approx. 60 meters, the distance and direction are displayed.

Interpretation of the Distance Indication

The distance indication shows the longest possible distance to the buried subject in meters. The buried subject may be much closer, but never ever further apart from the rescuer.

The distance can never be determined exactly. It is important whether the numbers are increasing or decreasing. The closer you are to the transmitting device, the more precise the indicated distance is.

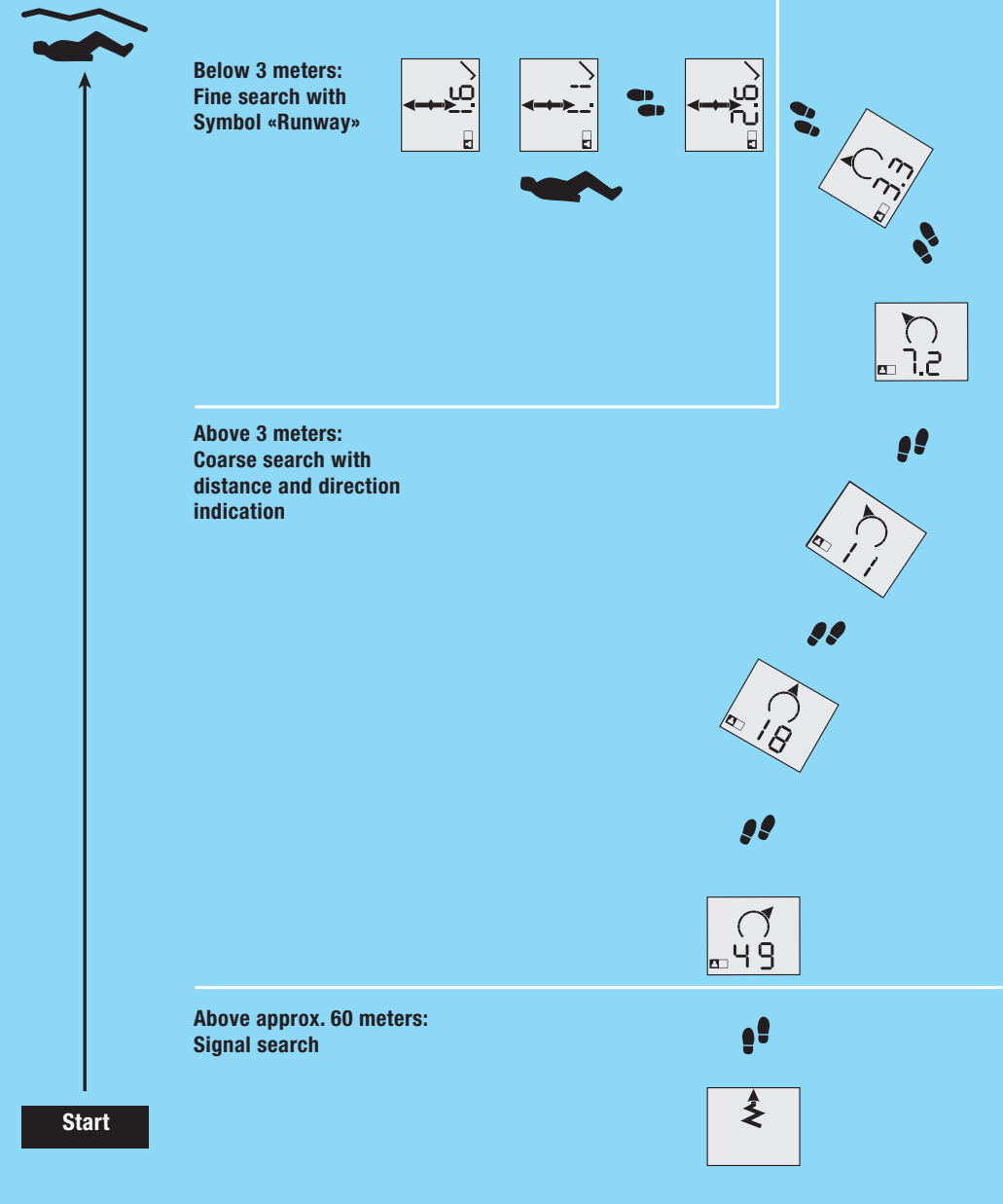
Practical Search Instructions

Hold the transceiver horizontally in front of you and proceed in the direction indicated by the arrow. If the distance increases, you are moving away from the victim. Continue the search in the opposite direction. The transceiver will lead you to the buried subject quickly and reliably.

Do not move backwards, otherwise the direction indication will be incorrect.

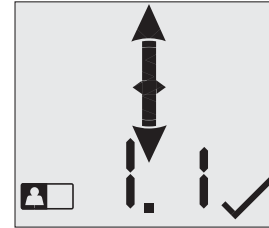
Start the search at a high speed and reduce your speed as you close in on the buried subject. Operate the transceiver in a quiet and concentrated manner - avoid rapid movements. This way, you will reach the objective in the quickest and easiest manner!

User interface in the search mode

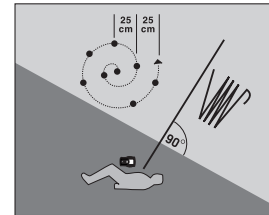


Fine search

During fine search hold the transceiver directly above the snow surface! Proceed in a straight line until you reach the point of the smallest distance reading and use the shovel to mark this spot as a visual reference for the probing spiral.



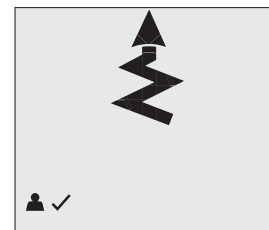
Use the avalanche probe to complete locating the buried subject (See chapter «Companion Rescue»).



A located subject should only be marked using the ✓-Mark function after his or her location has been verified using a probe pole! Do not place the Barryvox on the snow surface again for this purpose!



After marking a subject's location, the Barryvox searches for other possible burials. The transceiver leads you directly to the next buried subject or the signal search symbol is displayed and advising you to search the rest of the avalanche (See chapter «Signal Search»).



Deep Burials



Marking a buried subject in more than 3 meters depth is not possible. For further information, please see chapter «No Probe Hit».

4.3.2 Search for Multiple Buried Subjects Using the Search Mode


In search mode, the transceiver attempts to analyze all the detectable signals and to determine the number of buried subjects. This is possible, because all the signals from one transmitter display characteristics, which are distinguishable from the signals from other transmitters. The more unique the signal characteristics are, the more accurately the signals can be distinguished and located (pattern recognition). By automatically associating the signals with their respective sources, multiple burial situations can be solved without applying specific search tactics. Transceivers which additionally transmit W-Link information can be detected particularly fast and reliable.

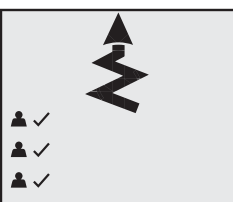
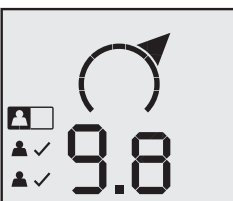
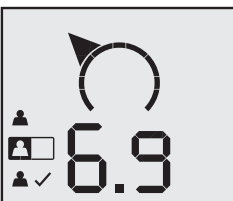
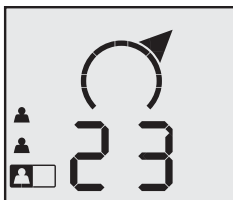
List of Buried Subjects

The buried subjects whose transmit patterns can be identified are inserted in the list of buried subjects based on their signal strength. The closest buried subject on the avalanche is shown at the bottom, the furthest at the top of the list.

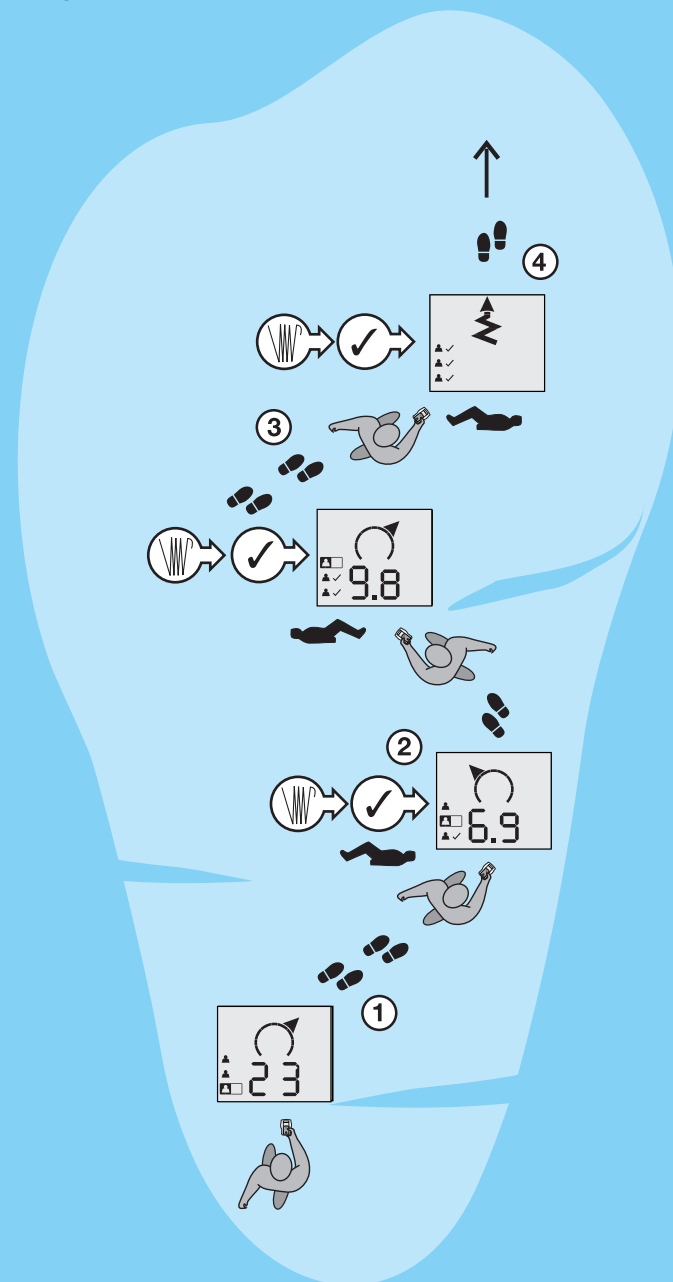
The list of buried subjects can show no more than 3 buried subjects at the time. In case the amount of recognized buried subjects is greater, arrow symbols indicate that the list contains further down or further up in the list additional entries. Usually, the device guides you so that the list is processed from bottom to top. The lower, already hidden part of the list of buried subjects (symbol ) contains therefore the buried subjects which have already been marked as found, and the upper, not yet visible part of the list (symbol ) contains the buried subjects which are not found yet and still ahead of you on the avalanche. Independently of the position of a buried subject in the list, the device will always try to guide you as quickly as possible until all recognized buried subjects are found.

Procedure

1. The device favors the closest subject first. Locate the various buried subjects using the transceiver and probe pole (Chapter «Search for a Single Buried Subject using the Search Mode»).
2. As soon as you mark an individual subject, the transceiver takes you to the nearest, unmarked buried subject.
3. Continue this procedure until all subjects are located and marked.
4. The rescuer now searches for additional buried subjects while the display shows the symbol for the signal search phase  to indicate that the rest of the avalanche surface must be searched (Chapter «Signal Search»).

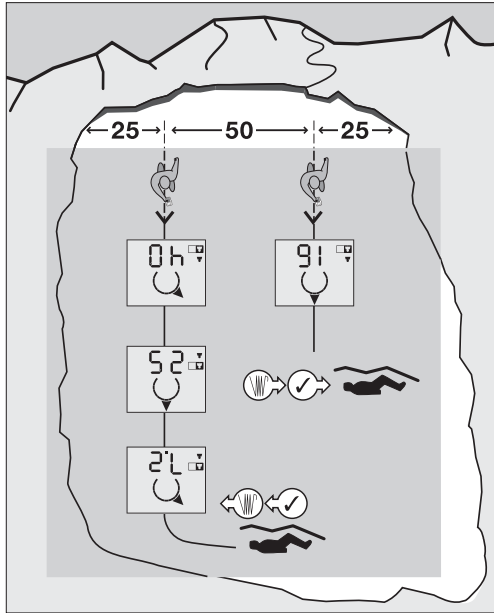


Procedure for multiple burials

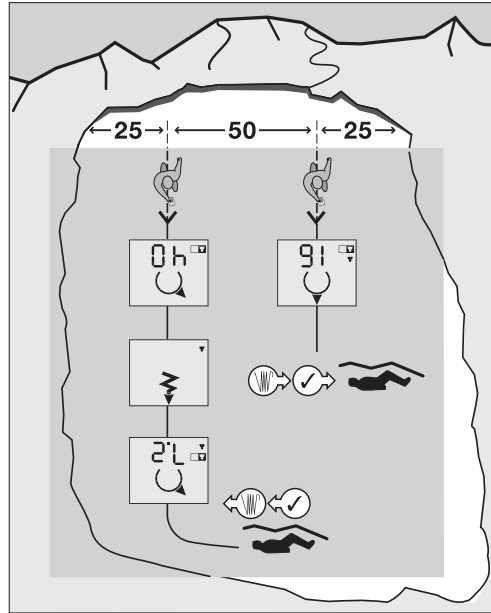


Search With Multiple Rescuers

When the search is conducted with multiple rescuers searching at the same time, it should be avoided that several rescuers search for the same buried subject.



Situation 1: Two rescuers receive two buried subjects. One rescuer continues the search for the buried subject closest to him, the other rescuer should directly search for the second buried subject, without having to mark the first one. The search is therefore continued on the current signal search pattern until the transceiver obviously leads to a different buried subject.



Situation 2: The two rescuers only receive one buried subject. One rescuer continues the search for the buried subject closest to him, the other rescuer should search the remaining of the avalanche for more buried subjects. The search is therefore continued on the current signal search pattern until the transceiver obviously leads to a different buried subject.

4.3.3 Limitations

The larger the number of buried subjects, the more difficult and time-consuming the exact analysis of the situation gets, because of overlapping signals. The more signals there are, the longer the signal overlaps can last. The capability to automatically detect and isolate signals from multiple buried subjects is therefore limited.

+Symbol

The +symbol indicates that signals are received from additional buried subjects that cannot be isolated and entered in the list of buried subjects yet. Turn off the transceivers of the buried subjects already found as soon as possible to simplify the isolation of the remaining signals.



Search Suspension / "Stand still!"

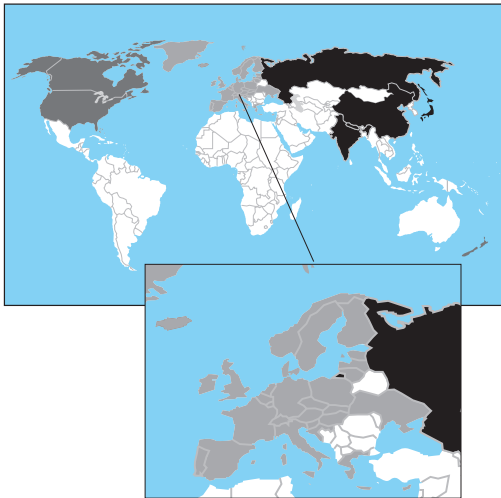
During the search for multiple subjects, signals may overlap making it impossible to analyze the signal of a single buried subject. If the signal overlap lasts several seconds, the rescuer has to interrupt the process temporarily to avoid deviating from the optimal search path. The Barryvox® will indicate the necessity to suspend (max. 15 seconds) the search by displaying the word «Stop». Stand still, and do not move until the word «Stop» disappears, at which time you can continue to search.



5. Additional Information

5.1 W-Link

The ELEMENT Barryvox® uses a W-Link radio transmission. Different countries have varying frequency regulations. The following world map shows the frequencies used in the individual countries. **Note that specific frequencies may not be used in certain countries. The frequency is factory set depending on the country of sale. The manufacturer declines all liability in the case of after-sale frequency modifications.** Please consult as well the Barryvox Legal and Regulatory Guide.



Frequency setting:

EU = Region A / W-Link Frequency 868 MHz
[= light grey] EU- and EFTA-Member countries

NA = Region B / W-Link Frequency 915 MHz
[= dark grey] USA, Canada and New Zealand

no = W-Link not allowed [= black]
Japan, Russia, India, China

unknown [= white]

How to verify the W-Link setting of your ELEMENT Barryvox®

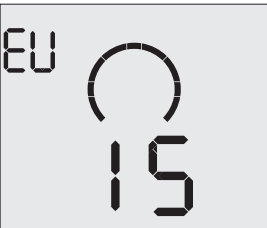
Press the key on the side during shut-down to see the W-Link region of your device. In the «Cockpit Send / Search / Group Check» you find a step-by-step setup guide

5.2 Maintenance and Repair

Barryvox transceivers, which do not function correctly, despite full and properly inserted batteries (e.g. problem listed under troubleshooting, no signal during the group check, mechanical defects) must be sent to a service center listed at the beginning of this manual.

5.3 Maintenance

Press the key on the side during shut-down to see in which year the next periodic check is required.



5.4 Frequent, self-responsible check

Always check the result of the self- and battery test (chapter “Turning the Device On” and “Battery Level Indicator”) and pay attention to alert messages (chapter “Troubleshooting”). Regularly carry out the group checks as indicated in chapter “Group Check”. Furthermore, we recommend that you take self-responsibility by frequently checking your device for mechanical damage of the casing, proper function of the main switch, battery compartment cover as well as cleanness of the battery contacts. In case you detect problems, it is mandatory to have the device checked by one of the service centers listed under “Registration and Service”



5.5 Periodic check by a Barryvox Service Point

To check the proper function of the device, is highly recommended to send the device every 3 years, or when reaching 3000 hours of operation, to a Barryvox service center or have it checked by a Barryvox service point (service charge will apply). The functional test is much more comprehensive and precise than the self and group check. As part of this service the electronics and the mechanical components such as the case, the main switch and the lateral key, the battery contacts, the battery compartment and cover as well as the wrist strap will be checked. In case the check shows abnormal wear and tear due to incorrect or long, very intense use, the service center may recommend you to purchase an exchange device.

We recommend that you have your device checked during the summer months so that your Barryvox is tested and ready to use at the start of the next winter season. In the “Maintenance” tab in the start menu, you can see when the next check is due.

For further information concerning maintenance and testing of Barryvox transceivers, please consult the Barryvox Application Safety Guide. (www.mammut.ch/BarryvoxManual)

5.5 Troubleshooting

Error message / failure description	Solution
Transceiver doesn't turn on / No self-test at startup	<ol style="list-style-type: none">1. Check and replace batteries.2. If this doesn't help, the device must be repaired.
E1: Batteries are empty!  E2: Batteries are weak! 	The batteries must be replaced as soon as possible. Refer to the instruction in the chapters «Batteries, Handling and Maintenance».
E3: Alert 457 SEND! SEND LED doesn't blink	<ol style="list-style-type: none">1. Make sure that no metal objects or electronic devices are close to the transmitter.2. Check and replace batteries.3. Turn the transceiver off and turn it back on after it has properly shut down.4. If this doesn't help, the device must be repaired.
E4: Alert 457 SEARCH!	<ol style="list-style-type: none">1. Make sure that no metal objects or electronic devices are close to the transmitter.2. Turn the transceiver off for approx. 1 minute and turn it back on.3. If this doesn't help, the device must be repaired.
E6: Group test	When testing another device, an error message appeared. Refer to the instructions in the chapter «Single Group Check».

5.6 Warranty

There is a 5-year warranty on the Barryvox transceiver (excluding the batteries, the carrying system, and the wrist loop) from the date of purchase shown on the purchase receipt. In case of a warranty claim, all parts that can be shown to have material or production defects will be replaced free of charge. Damage that can be traced to incorrect handling or normal wear and tear is excluded. The warranty is voided if the buyer or any non-authorized third party opens the device. This is also the case for devices that have been used with spare parts or accessories, which are not original and are not recommended by the manufacturer. A fee will be charged for the diagnostic test of a transceiver not needing any repair. Warranty repairs do not extend the duration of the warranty. There is a six-month warranty on spare parts. Warranty repairs will only be conducted if the device is sent in along with the receipt. The owner will be charged for the shipping. No other warranty shall exist. Any liability for any kind of loss or damage including but not limited to any direct, indirect or consequential damage is explicitly excluded.

5.7 Technical Data

Transmitter frequency	457 kHz (International standard)
W-Link frequency	Region A: 869.8 MHz Region B: 916 – 926 MHz Frequency setting see chapter «W-Link»
Power supply	3 x IEC – LR03 1.5 V Alkaline (AAA)
Initial set of batteries	Duracell Ultra Alkaline
Battery life	min. 200 h
Maximum range	Normally 60 m in standard mode
Search strip width	50 m in Search Mode The search strip width has been calculated based on the method Good
Operating temperature range	–20° to +45° C
Dimensions (L x W x H)	113 x 75 x 27 mm
Weight	210 g (incl. batteries)
Type/Modell ELEMENT Barryvox®	A10010-10000 (W-Link 868 MHz) A10012-10000 (W-Link 915 MHz) A10013-10000 (W-Link off).

5.8 Approval / Conformity

All information concerning approval and conformity is available in the Barryvox Legal and Regulatory Guide.

All information provided without liability. Status July 2013. Technical data and specifications are subject to change without notice in future transceivers.

6. Companion Rescue

Companion rescue means that buried subjects are located and excavated by members of their party immediately after the avalanche slide. Avalanche rescue is a race against time! While most buried subjects can be rescued within the first 8 minutes, the chances of survival decrease rapidly afterwards. Companion rescue, therefore, provides the greatest chances of survival for a buried subject.

6.1 If an Avalanche Occurs

As a Victim:

- Escape to the side
- Discard skis, snowboards, and poles
→ anchor effect
- Try to stay on top
- Close your mouth; place your hands in front of your face
→ clear airway when the avalanche stops

Separate instructions apply for the use of specialized safety equipment, such as the highly efficient flotation devices.

As a Witness:

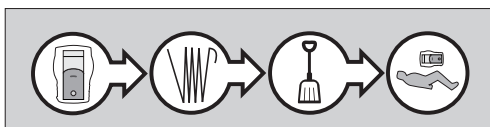
- Memorize the last seen point as well as the direction of the avalanche
→ primary search strip
(See chapter «Signal Search»).

6.2 Personal Rescue Equipment

Carrying the proper personal safety equipment is critical for effective companion rescue. A transceiver, a shovel, and a probe pole are necessary to localize and excavate a buried subject quickly and efficiently. Mammut offers a variety of suitable probe poles and shovels.

The use of a flotation device (airbag system) significantly reduces the risk to be completely buried and therefore leads to considerably higher survival chances.

Carrying a radio or a mobile phone to call for help is highly recommended.



The use of the transceiver precedes the use of the probe pole and the use of the probe pole precedes the use of the shovel.

6.3 Emergency Plan

The emergency plan shows the elementary steps for a successful companion rescue. Depending on the situation at hand, the procedure must be adapted.



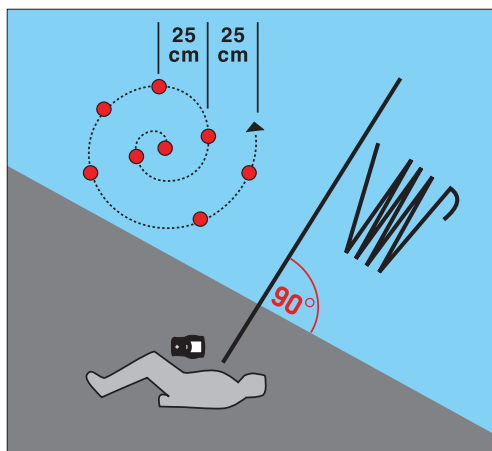
6.4 Triage Criteria and Vital Data

6.4.1 Triage

With limited resources (few rescuers) it is not possible to locate and dig out all the buried subjects at the same time. The question arises in which order the buried subjects shall be rescued. **Subjects with higher chances of survival should be located and dug out first.** Besides simple terrain factors, e.g. drop over a cliff, in seracs or crevasses, collision with trees etc., the burial depth is an important triage criteria.

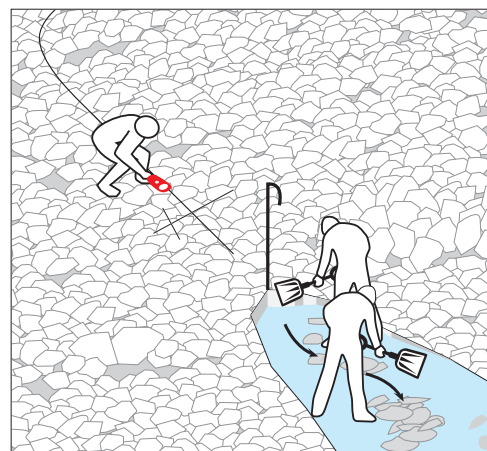
6.5 Pinpointing with Transceiver and Probe Pole

Pinpointing the location of a buried subject is not possible with a transceiver alone. The burial depth and the orientation of the subject can be determined easily and quickly with a probe pole. Use the shovel to mark the point with the lowest distance reading or loudest tone as a visual reference for the probing spiral. Always probe at a right angle to the snow surface. If the buried subject is hit with the probe pole, the pole is left in the snow. It serves as a guide while excavating the buried subject. The burial depth is also a triage criterion. In situations with limited resources deep burials are located later.



6.5.1 Multiple Rescuers in the Fine- and Pinpoint Search

If several rescuers are present while you are in the fine or pinpoint search phase, place a probe 1 meter below the expected burial location. Now, you have the required space to conclude the fine and pinpoint search while the remaining rescuers already start with the excavation of the buried subject. When you have confirmed the find with a probe hit, remove the pilot probe so that the V-shaped snow conveyor belt can be extended.



6.5.2 No Probe Hit

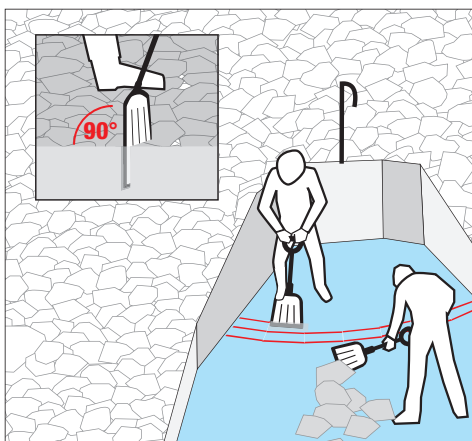
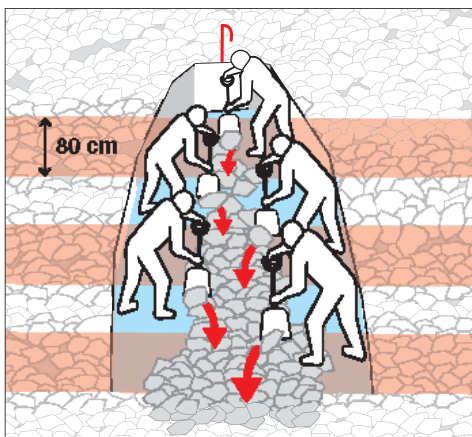
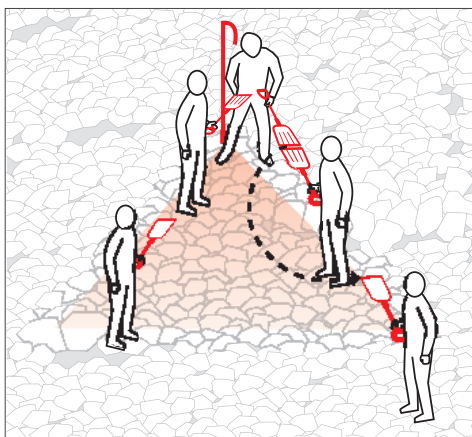
If the buried subject cannot be found by the probe, place the probe approx. 1 meter above the point with the lowest distance indication. While digging, enough space is now made available to allow a further fine and pinpoint search within the excavation site.

6.6 Rescue – Excavating the Buried Subject

Size the area to be dug out generously. Pay attention to the presence of an air pocket and avoid trampling on top of the buried subject. Access the buried subject laterally. Digging must be practiced as well. It takes by far the most time.

The V-Shaped Snow Conveyor Belt

- Position diggers in a «V» formation
- The first two rescuers are in a distance of one shovel length from each other, all additional rescuers are in a distance of two shovel length from each other.
- Length of «V»:
 - Flat terrain: 2x burial depth
 - Steep terrain: 1x burial depth
- Amount of rescuers: 1 per 80 cm length of «V»
- Rescuer in the tip of the «V» directly digs following the probe to the buried subject
- Diggers rotate frequently (approx. every 4 min) clockwise on command of the rescue at the tip of the «V»
- Cut out blocks of snow with the shovel by stepping on the shovel blade which is held perpendicular to the surface. Apply a half-moon shaped cutting pattern. Position yourself facing the open end of the «V», cut the first half-moon without pulling back on the shovel shaft. When cutting the second and subsequent half-moons, pull the shovel shaft gently backwards after you have cut the block so that it pops out. To cut the next half-moon, step backwards toward the probe, like this, you do not step on the pre-cut blocks.



6.7 First Aid

Patient assessment, ABCs, and Basic Life Support

- A** Airway?
Clear the airway (snow?)
- B** Breathing?
Perform rescue breathing as necessary
- C** Circulation
Perform CPR as necessary

Basic Life Support

- Depending on ABCs, continue rescue breaths or CPR on patient.
- **For a patient in an avalanche accident, special attention need to be paid to the immediate clearance of the airway and rescue breaths.**
- Prevent further heat loss.
- If patient is responsive and can control his/her airway, administer warm fluids
- Handle patient very gently.
- Evacuate by helicopter whenever possible.

6.8 Notification

It is not possible to provide a complete list of all mountain and helicopter rescue services in this manual.

Please inform yourself prior to your trip about the local rescue services and their phone numbers and radio frequencies.

Message:

- Who** – is calling?
- What** – happened?
- Where** – is the accident site?
- When** – did it happen?
- How many** – casualties (nature of injuries) / how many rescuers?
- Weather** – at the accident site?

Alpine Distress Signal

If you cannot call for help using a radio or phone, you should try to communicate the emergency using the alpine distress signal.

We need help 6x/minute
Help is on the way 3x/minute

In visual contact with a helicopter:



Help!



No help needed!

7. Introduction to Avalanche Theory

We would like to provide you with some basics on this complex topic and recommend thorough initial and ongoing advanced avalanche training.

The Slab Avalanche: The Set Trap

Most winter outdoor travelers trigger their own avalanches. The snowpack is fragile. Slab avalanches resemble set traps: If we trigger it, the trap snaps. Remember that a small slab of 100m³ weighs about 25 tons!

7.1 Hazard identification

Very critical weather situations

The avalanche danger increases rapidly after storms with new snow, wind, and cold temperatures. Slopes with wind-drifted snow are especially dangerous! Snow can also be moved by wind during nice weather. The first nice day after a snow event is particularly dangerous. Most accidents occur when a cold front with strong winds and snow moves in after days of blue skies and cold temperatures! In this situation, new snow amounts of 10 – 20 cm can constitute a critical situation that can last several days.

Rapid and strong warming (downslope wind, rain) can also cause an increase in avalanche danger, which decreases again with falling temperatures. If the snowpack is uneven and weak, the danger is hard to perceive. This is often the case with shallow snow packs in the beginning of winter or during periods of little precipitation. In spring, the danger usually increases as the day progresses: from low in the morning following a clear night to considerable in the afternoon.

7.2 Risk Assessment

Critical amounts of new snow

With the following amounts of new snowfall within 1 – 3 days, the danger level is at least CONSIDERABLE:

- 10–20 cm with adverse conditions
- 20–30 cm with average conditions
- 30–50 cm with favorable conditions

Adverse conditions

- Strong wind (> 50 km/h)
- Low temperatures (< -8° C)
- Slope seldom traveled

Favorable conditions

- Light wind
- Temperatures little below 0° C
- Slope traveled frequently

Humans as Trigger of the Trap

The steeper and more shaded the slope is, the greater the likelihood of releasing a slab avalanche. The likelihood increases with large groups without spacing, frequent turns, and especially with falls or jumps over cornices or other shock loading. Remote triggering is possible starting with the danger level CONSIDERABLE, i.e. the person triggering the avalanche can be standing dozens of meters outside of the fracture zone. This is fatal at the bottom of a slope, because the entire slope above can be released!

Note: Light forest (trees far enough apart to ski or ride through) will not protect you from slab avalanches. Even rock outcroppings will not prevent the release of slab avalanches.

7.3 Precautions

7.3.1 Standard Safety Precautions

The following standard safety precautions should always be taken regardless of the danger level:

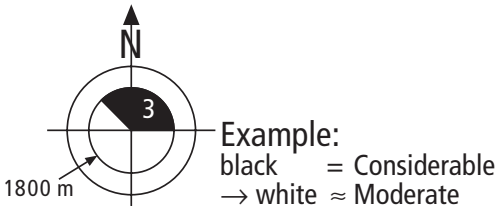
- Avalanche transceiver on SEND, along with a probe pole and shovel
- Avoid fresh wind-deposited snow
- Consider daily fluctuations in temperature, especially in the spring
- Constantly assess the conditions throughout the trip

Pay attention to **avalanche hazard even during the summer**, in particular after recent snowfall. Apply the safety precautions if required.

7.3.2 Minimize Stress on the Snowpack

Adequate spacing is an effective method to minimize stress on the snowpack. Ascending, the spacing should be approximately 10 meters; descending approximately 30 – 50 meters, due to the additional stress. Danger zones should be traveled one person at a time. Minimize the stress on the snowpack by making long turns. Avoid jumping!

7.3.3 Renunciation in the Terrain
(Basic Reduction Method, W. Munter)



Danger Level	Skiable/ridable slope angle
2-Moderate	less than 40 degrees
3-Considerable	less than 35 degrees
4-High	less than 30 degrees






- Untracked steep slopes (> 30 degrees):
→ spacing of at least 10 m.
- Outside of the forecasted aspect or altitude ranges:
→ the danger level is generally one level lower.
- At the edge of the forecasted aspect or altitude ranges:
→ Do not approach the limits

7.4 Avalanche Forecast Centers

It is impossible to publish a list of all the avalanche forecast centers in this user manual.

Current information about all avalanche forecast centers can be found ie. At www.avalanche.org (worldwide) and www.avalanches.org (Europe).

7.5 International Avalanche Danger Scale

Danger Level	Snowpack	Typical Indications	Tours
1 LOW 	Snowpack generally well bonded.	None.	Generally favorable conditions.
2 MODERATE 	On some steep slopes snowpack only moderately bonded.	Difficult to recognize. No alarm signals.	Generally favorable conditions. Careful choice of route on steep slopes of aspect and altitude as given in the avalanche forecast.
3 CONSIDERABLE 	On many steep slopes medium to poor snowpack. bonding only.	«Whumphing» noises. Some spontaneous avalanches. Remote triggering at the foot of slopes.	Partly unfavorable conditions. Experience in assessing avalanche risk required. Wherever possible avoid steep slopes of aspect and altitude as given in the avalanche forecast.
4 HIGH 	Poor bonding of snowpack on most steep slopes.	Spontaneous avalanches. Remote triggering.	Unfavorable conditions. Tours only in moderately steep terrain < 30°. Be aware of avalanche runout zones.
5 EXTREME 	Generally poor bonding of snowpack, mostly unstable.	Spontaneous avalanches and remote triggering on a large scale.	Very unfavorable conditions. Refrain from tours.

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