



Application Safety Guide

Avalanche Rescue Transceivers



Important Contact Information

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Introduction

The Barryvox Application Safety Guide outlines some of the safety aspects of Barryvox transceivers. The document is based on the user and reference manuals of the Barryvox Pulse and Barryvox Element, the Barryvox Legal and Regulatory Guide as well as knowledge gained from many years of application in institutional civilian settings and in armed forces. This document does not replace but complements the user manuals, especially for professional users and institutional settings.

At Barryvox, we believe that the safety of potentially life-saving devices deserves special attention and therefore we look at transceiver safety in rigorous detail. In the Application Safety Guide, we therefore have listed even potential issues which occur very seldom, however, we believe that you should be aware of them, particularly if you are responsible for a larger transceiver fleet.

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1. The Elementary Concept to Ensure Reliable Transceiver Function

The elementary concept to ensure reliable transceiver function is based on 5 layers.

1.1 Check your Transceiver and Carrying System for Mechanical Damage

A damaged transceiver may have compromised water tightness, a switch contaminated with sticky food residue may not function properly and unintentionally turn off. Therefore, periodically check your transceiver for damage as outlined in the chapter “Frequent, self-responsible check”.

1.2 Each Time the Device is Turned ON, the Result of the Self- and Battery Test is Verified by the User

The self-test is the elementary level of testing.

Replace the batteries at the level indicated in the manual. Read the chapter “Batteries” for detailed information.

When replacing batteries, check the batteries and battery contacts to ensure they are absolutely clean, free of corrosion and any battery acid (zero tolerance for corrosion or leakage).

1.3 Group Check

The daily group check is a very important layer of the safety concept as it represents an independent verification of functionality by another device and person.

The group check can detect human and technical failures on a daily basis.

Please read the chapter “Group Check” in the reference manual for detailed procedures.

In a fleet of modern, triple antenna transceivers which are maintained based on this safety concept, it is acceptable to run only single group checks.

For modern, triple antenna transceivers, such as the Pulse and Element Barryvox, it is highly unlikely for a device which is unable to transmit or receive to show a positive self-test result.

In mixed transceiver fleets with older transceivers or with unknown maintenance level by the user, it is recommended to run double group checks each time a new group gets together and every week later.

1.4 Periodic Check by an official Barryvox Service Center or your own Barryvox Tester

Using the maintenance schedule as described in the chapter “Periodic check by a Barryvox service point”, each device should get rigorously tested by a dedicated test device, the Barryvox tester.

This test is more comprehensive and more precise than self- and group checks. For potentially life-saving equipment, a preventative maintenance and testing concept is crucial, as potential problems should be detected and the appropriate measures taken before the likelihood of a tragic failure increases.

1.5 Install the Available Firmware Updates

Firmware updates optimize the efficiency, ease of use and overall performance of the device. Often they add additional features for the benefit of the safety of the users, such as the Rescue-SEND function.

Therefore, it is recommended to get available firmware updates installed by an official Barryvox Service Center, your retailer or your own W-Link adapter / tester.

2. Batteries

Alkaline batteries of the type LR03/AAA (Element and Pulse Barryvox) or Lithium batteries LR91/AAA (Pulse Barryvox ONLY) can be used to power the transceiver. On the market a wide variety of batteries is available, in particular with regards to Alkaline batteries, there are significant performance differences between different brands and types and there is great variance between the best and the worst available cell on the market.

Using reliable batteries can significantly increase the application safety of a transceiver. For a reliable power supply, it needs 3 cells with clean contacts on both sides of the battery and the transceiver! Furthermore, the ability of the battery contact to physically establish a firm surface contact with the battery pole is crucial. As this is not a part of normative battery specifications, it is worth to pay attention that the metal **negative pole** of the cell is at least equal in length or longer than the battery casing.

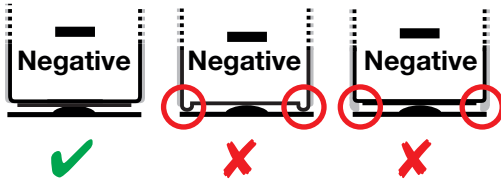


Illustration 1

Left: The metal contact of the negative pole stands out and allows a firm physical contact

Center: The metal contact of the negative pole is facing inwards, barely allowing a physical contact

Right: The battery casing / foil wrapping extends further out than the metal negative pole, strongly reducing the contact pressure

In the transceiver, the 3 batteries are used in a serial application. If one single battery fails or one single battery contact causes an interruption, the unit shows a power failure. Therefore, it is important to use 3 batteries of the same type, age and capacity and to replace all of them at once.

The contacts of the batteries have to be clean and free of any corrosion. If needed, they can be cleaned

as described in the respective chapter. In general: Store batteries in a cool and dry place. Any humidity can cause corrosion.

2.1 Indicated Remaining Battery Capacity Percentage

2.1.1 Alkaline

The indication of the remaining battery capacity at start-up of the unit shows different results at different temperatures, even with the same set of batteries. If the transceiver shows 40% at 25 degrees centigrade, it has to be expected that the same set of batteries barely has 20% of remaining capacity at minus 15 degrees centigrade. This is given by the fact that the ability of the battery to provide energy is temperature dependent. Even though the total battery capacity does not change over temperature, the ability of the cell to provide energy readily decreases the lower the temperature of the cell.

2.1.2 Lithium

The performance of the lithium battery and its ability to readily provide high currents down to very low temperatures is much less temperature dependent. This is especially the case when searching, as the device is most exposed to cold temperatures and most needs energy to be readily available.

Inserting Lithium Batteries (PULSE Barryvox ONLY)

When the device has detected the insertion of new lithium batteries, the battery capacity counter is reset to 100%. In order to indicate the remaining lithium battery capacity, the energy taken out of the cells is deducted. If you remove a battery while the device is in lithium mode, the remaining battery capacity value gets stored in the memory of the device. If you subsequently insert batteries again, the device has to prompt the user to verify and confirm if the newly inserted batteries are still the same (=device keeps deducting from the previously stored battery capacity value) or if the batteries are new (counter is reset to 100%).

It is recommended to leave lithium batteries in the battery compartment until they reach the threshold to be replaced.

2.2 Replacing Batteries

2.2.1 General

The lower the remaining battery capacity, the higher is the chance of a battery failure like sudden drop of battery voltage or reverse loading. When using alkaline batteries, the likelihood of leaking increases with decreasing battery capacity.

When replacing batteries, always check that the contacts on the battery and on the device are not corroded and do not show signs of residue or battery leakage. If there is any sign of acid on the new battery, DO NOT use this cell and immediately check all batteries of the same purchase.

After installing new batteries, always turn the device on and calibrate it [PULSE Barryvox] before you store it. In order to detect battery changes, the Pulse Barryvox applies a permanent battery monitoring function. Once the device is calibrated, the power consumption during storage is negligible, however, prior to device calibration, the drain is sufficient to have a relevant influence on battery life.

Batteries of a device, which show a sudden drop of battery power in SEND mode or do not show 99% when they are first inserted, should be immediately replaced. However, a major drop of remaining battery capacity may take place when the device is used for a prolonged duration in SEARCH mode, in particular in cold temperatures.

2.2.2 Alkaline

In normal operation, it is recommended to replace alkaline batteries at 40% (when measured at 20°C).

2.2.3 Lithium

In normal operation, it is recommended to replace lithium batteries at 30%.

2.2.4 Cleanliness of the Battery Caseing and Battery Compartment

Besides the cleanliness of the battery contacts, the outside of the battery casing and the inside of the battery compartment should be clean and free from sticky residues. Mechanical impact to a device, such as mechanical shock / fall might make the batteries move slightly up or down in the battery compartment. Only if the batteries can move freely, they will be immediately repositioned by the spring force of the battery contact, thus ensuring an uninterrupted electrical contact. Sticky residues may prevent a battery from gliding back into its proper position and therefore the electrical contact may be lost leading to a power failure.

3. Visual and Mechanical Integrity

3.1. Robustness and Shock-sensitive Parts

The Barryvox contains shock-sensitive ferrite antennas. The antennas are the most shock sensitive part of the device and the transceiver should therefore be handled with utmost care. In case your transceiver has been mechanically mistreated, test it with the full test procedure on the Barryvox tester or send it in for a periodic check to a service center.

3.2 LCD Screens

The window of the LCD screen is the most sensitive part on the surface of the device. Regardless of the carrying position, the display should always face your body. While transporting the transceiver, leave it in its harness for additional mechanical protection or put it in a position where no sharp objects and mechanical pressure could damage the screen. When you hide a transceiver for an exercise, protect it well and always place it with the LCD screen facing downwards. Mechanically damaged LCD screens and screen windows are not covered by warranty. Be aware when using polarized sunglasses/goggles, certain sections of the screen, depending on the viewing angle, may appear darker. This is not a defect of the device.

3.3 Humidity and Water Tightness

ETS 300718 defines the required water proofness for an avalanche rescue device as follows: The device must be fully functional after one hour in 15 cm of water at room temperature.

To avoid problems such as corrosion and discharging of batteries, it is recommended to dry the unit as well as the carrying systems overnight (i.e. in a drying room or another dry and warm place), especially during very intensive use.

The straps should not be wrapped around the unit as this prevents the drying process.

If it is not possible to dry the transceiver and the carrying system (i.e. igloo, snow cave) keep your device as close as possible to your body as you would carry it during the day.

3.3.1 Condensation in Front of the LCD Screen

If you store the device in a humid environment, it is possible that the humidity inside the device can rise. If such a device is cooled down to low temperatures, the relative humidity inside the device will rise which can lead to condensation in front of the LCD screen. This is not a failure of the device! Simply store such a device in a dry place, do not wrap the webbing of the carrying system around the device and the LCD should become fog free.

3.4 Checking the Transceiver for Visual and Mechanical Integrity

When checking the device visually for mechanical integrity, focus in particular on the following points (following the testing criteria and order of testing as applied in the "Functional Test" and mentioned on the "Functional Test Report").

3.4.1 Main Switch

- The main switch must slide easily between OFF, SEND and SEARCH when the locking mechanism is unlocked.
- The locking mechanism of the main switch must lock positively in each position of the switch.
- Check if the locking mechanism prevents unintentional switching to the OFF position by pressing down the main unlock button at the top. In this position, the main switch must not slide to the OFF position. Only when pressing both unlock buttons simultaneously, it should be possible to slide the switch to the OFF position.



Photo 1
A contaminated main switch

Main switches which are contaminated as shown on photo 1, i.e. with residue of food, sticky liquids, garment fiber, sand or soil particles, etc. need to be cleaned.

3.4.1.1 Main Switch Cleaning Procedure

The proper function of the main switch may be compromised by contaminants such as any residue of food, sticky liquids such as tea with sugar, sun protection products, dirt etc. Unintended changes in position of the main switch, such as from SEND to OFF, are protected by the unlocking mechanism at the top side of the switch. If you recognize that the main switch does not slide smoothly or the two locking mechanism buttons do not fully and positively lock the main switch, you must send the device to an official Barryvox service centre or clean the switch based on the following procedure:

Place the device standing, upside down in a container with water. The water level must not exceed above the level as shown in photo 2. Leave the device for 5min in this position. Then, remove the device and operate the main switch several time in all 3 positions OFF – SEND – SEARCH including active use of the locking mechanism buttons. Flush any residue with water, wipe all the surfaces of the switch with a dry cloth, keep the device upside down and let it completely dry out for at least 24hrs. In case this cleaning procedure does not lead to success, the device needs to be sent to an official Barryvox service centre.

Do not use any chemicals or high pressure during the cleaning process.

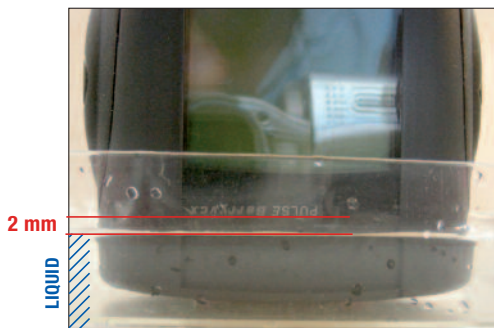


Photo 2
Main switch cleaning procedure

3.4.2 Display

The screen window should be free of cracks which critically reduce the ability to read the information on the screen. There is zero tolerance for broken or cracked screen windows – such devices must be checked by an official Barryvox service center and should not be used any longer.

3.4.3 Case and Side Buttons

The entire case must be free of cracks. The softer, rubber-like parts including the side buttons must not be perforated or visibly separated from the remaining case material.



Photo 3
Case damaged at the top right corner. Such devices must be checked by an official Barryvox service center and not be used any longer!

3.4.4 Battery Case Including Cover

The battery compartment must lock properly and must be clean and dry. Zero tolerance for partly or fully broken / damaged battery compartment locking mechanisms as shown on photo 4.

Such devices must be checked by an official Barryvox service center and not be used any longer!

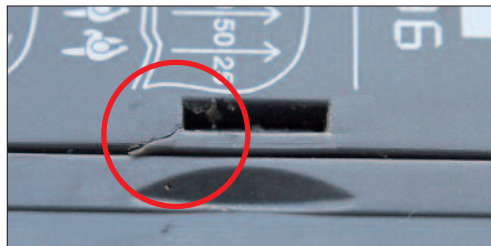


Photo 4
The locking gate of the battery compartment is damaged or fully broken.



Photo 5
If the battery compartment is damaged, the cover may not lock properly anymore.



Photo 6
The destruction is caused by users who have tried to open the battery case with an inappropriate tool and by pushing directly on the locking hook. Such damage is not covered by warranty.

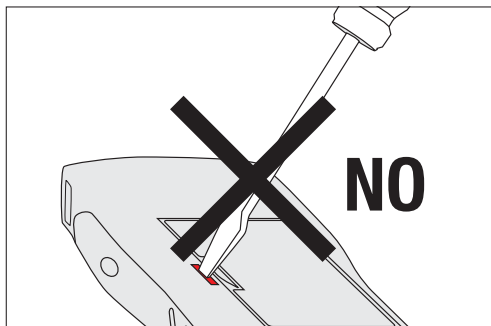


Illustration 1
Do not try to open the battery compartment or unlock the battery door by inserting any kind of tool here.

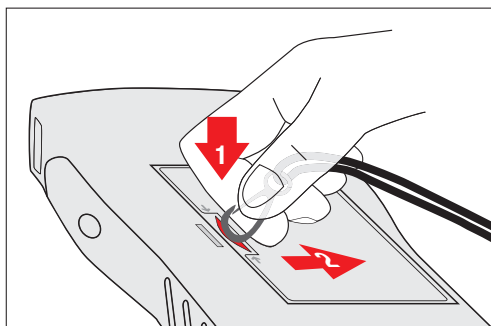


Illustration 2
Use the wrist strap hook as shown in illustration 2 to properly open the battery compartment.

3.4.5 Battery Contacts

A reliable contact between the battery contact in the battery compartment and the individual battery cell contact pole is crucial for the safety, good performance and reliability of the unit. Sufficient spring pressure and a clean contact surface are important to maintain this contact.

Testing of battery contacts is part of the visual and mechanical checks of the "Functional Test", listed in the testing procedure and functional test report as "Battery contacts".

3.4.5.1 Testing Battery Contacts for Mechanical Integrity and Spring Pressure

Do not bend battery contacts. If there is a bent/damaged contact or the spring force is low, the unit must be sent to a service center for replacing the battery contacts (see chapter "Battery Contact Replacement").

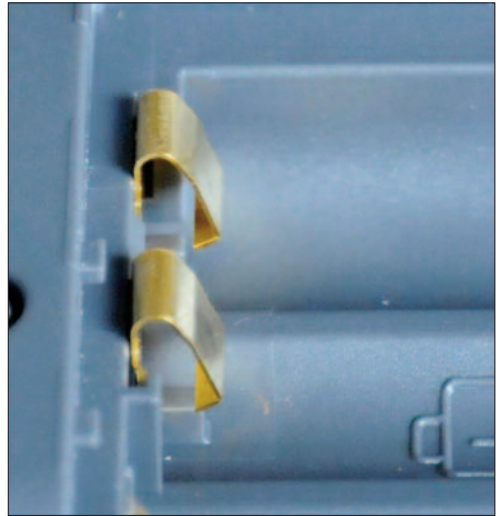


Photo 7
New battery contacts

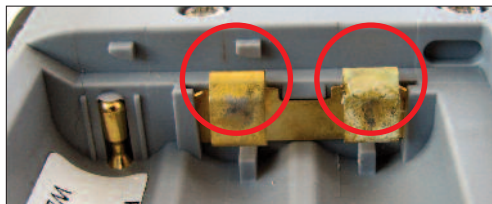
To verify if the spring force of the battery contacts is within tolerance, visually check the distance between the back wall of the battery contact and the lower end of the spring. The spring must not touch the back wall, otherwise there is no more flex. If the spring has collapsed (permanent deformation), which may happen when the device is exposed to a major fall, the spring force is too low and the battery contact needs to be replaced.

If the distance between the lower end of the spring and the back wall is much greater than normal or the spring is mechanically deformed, the battery contact has been mistreated and also needs to be replaced.

3.4.5.2 Cleanness and Corrosion

Battery contacts need to be clean and free of any corrosion.

If a battery contact is corroded, the unit must be sent to a service center for replacement of the battery contacts (see chapter "Battery Contact Replacement"). Corroded contacts lead to a high probability of eventual power supply problems. The series of three photos (Photos 8) show battery contacts with clear signs of leaked batteries which require the contacts to be replaced. Photo 15 shows a contaminated main battery connector. Unlike the spring battery contacts, the two main connector contacts are not replaceable, therefore the entire device must be replaced and not be used any longer.



Photos 8
Battery contacts with clear signs of leaked batteries.

Photo 9 shows a battery contact contaminated by residue from a source other than battery acid. In the extent as shown on this picture, the battery contact may be cleaned as described below. However, if the residue cannot be removed easily or is stubborn and persistent, the contact needs to be replaced at an official Barryvox service center.



Photo 9: A contaminated lower battery contact

Photos 10 and 11 show a battery contact with a very low, acceptable level of contamination. Such contacts do not need to be replaced at this time.

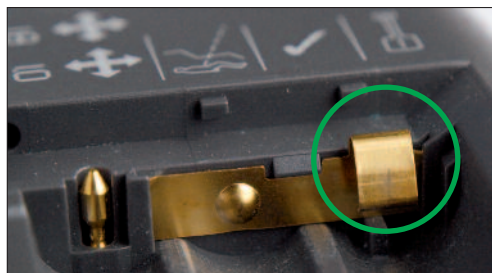


Photo 10: An acceptable lower battery contact

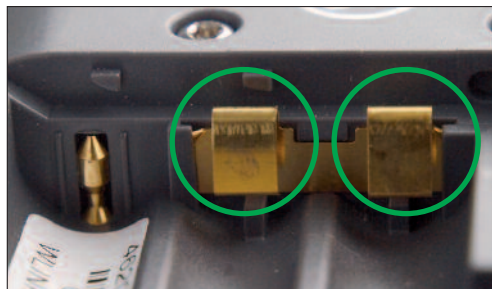


Photo 11: A acceptable upper battery contact

3.4.5.3 Battery Contact Cleaning Procedure

Only battery contacts which show no battery acid residue or mechanical damage may be cleaned. For leaked batteries, there is zero tolerance and the contacts must be replaced.

Battery contacts may be cleaned by the user. The procedure as described below needs to be carried out with care, in a clean, dry working environment with sufficient ambient light to clearly see the surface of the battery contact.

Use a slightly damp cloth. Do not use any chemicals or tools to scrape the surface. Only use as much liquid that there is no water flowing into the case. Gently clean the battery contact by rubbing from top to bottom as shown on photo 12. Do not rub up and down as the cloth may hook onto the contact during the upward motion which leads to outward bending of the contact and potentially destroy it. Only apply as much pressure that the spring force flexes the contact back into the original decompressed position. Only clean one contact at the time.



Photo 12: A battery contact is getting cleaned.

In particular after cleaning, check that the battery contacts are still properly locked in position.



Photo 13: Battery contact not properly locked in position

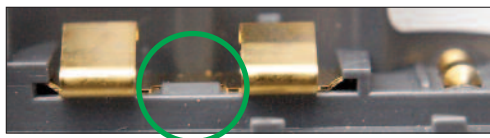


Photo 14
The contact is laterally properly inserted in the guiding rails and on the top locked by the locking knob.

3.4.5.4 Leaking Batteries

The acid of leaking batteries is very destructive to battery contacts and can easily cause corrosion. Even if the currently installed batteries do not show signs of leakage but leaked battery acid is visible on the contacts (see series of four photos 8), they need to be replaced as previously used batteries may have caused the damage (see chapter "Battery Contact Replacement"). In case the acid has also damaged one or both main connectors to the circuit board as shown on photo 15, the entire device must be replaced as it might stop working properly at any time in the future without prior warning. Therefore, there is a strict ZERO TOLERANCE policy concerning devices with any signs of battery leakage.



Photo 15: A contaminated main battery connector

Alkaline:

The chance to have a leaking battery depends on the quality, the age and the discharge level. The older the battery and the lower the remaining capacity, the higher the chance of leaking.

Always remove the batteries during longer periods of non-use (i.e. during summer) in order to minimize the chance of leaking battery problems.

Lithium:

Lithium cells almost never leak, therefore the batteries can be discharged to a lower level (-> chapter "Lithium")

3.4.5.5 Battery Contact Replacement

Send your device to an official Barryvox Service Center where it will be tested and the battery contacts as well as other parts replaced, if required.

4. Operation and Alert Messages

4.1 Turning the Device to SEND

4.1.1 Mechanical Locking Position

The device turns ON/to SEND electrically before the switch has mechanically locked into the SEND position. It is therefore important to make sure that the switch has positively mechanically locked to the SEND position.

4.1.2 Turning the Device from OFF to SEND

When sliding the main switch from OFF to SEND, the unlock button at the top must be pressed as described in the reference manual. To prevent damage of the main switch, it will slide from OFF to SEND if sufficient force is applied without pressing the unlock mechanism. However, this option is only to prevent damage to the device in case there is unintentional mechanical pressure on the switch, for example during transport in a backpack. The device should not be turned on regularly without pressing the unlocking bottom as this damages the switch over time.

4.2 Alert Messages

The strategy of Barryvox is to transparently and immediately inform the user about problems which temporarily or permanently degrade the performance of their transceiver.

Please read the chapter “Troubleshooting” in the reference manual. Be aware that most alert messages are triggered by external interference which has the potential to lower the performance of the device, such as when it is carried in SEND mode in close proximity to a metal object or electronic device. It is important to be able to distinguish alert messages which have been triggered by an external interference and alert messages which indicate a permanent problem with the device. If the device shows an alert message, try to find out if external interference could have triggered it. In the chapter “Interference” you can find many of the potential causes for interference. In order to find out if the indicated alert is based on a persisting technical problem of the transceiver or simply triggered by external interference, apply the following procedure:

- 1:** Turn the device off, wait until it has shut down
- 2:** Turn it back on in an environment free of interference, i.e. by holding the device with your extended arm away from your body and any metal parts or other electronic devices
- 3:** If the result of the self-test is positive, the alert message was triggered by an external interference and no further action is required except avoiding the interference
- 4:** If the self-test produces again an alert message, the transceiver has a persistent problem and you need to take action as defined in the chapter “Troubleshooting” in the reference manual

5. Interference Problems

5.1 Introduction

Any electronic device has to be compliant to different norms and standards, depending on country regulations. Within these norms interference problems are split up into two parts and are specified as radiated emission and immunity. This perception leads to the following interpretation: A beacon can be disturbed e.g. by a mobile phone due to (unwanted) radiated spurious signals (→ radiated emission) or by a high (wanted) communication signal (→ immunity) and vice versa. However, the user has to be aware of interference starting from both the beacon and the other equipment in question. The tolerances and measuring setups are defined in such standards.

In addition, as the beacon works with a magnetic field on 457kHz any conductive part (e.g. case of another electronic unit, mobile phone etc) close to the antennas (within 20cm) can put them out of tune and therefore degrade the performance e.g. range and sensitivity.

Please also consult the “Barryvox Legal and Regulatory Guide” (www.barryvox.com) concerning legal compliance, legal standards and interference issues.

5.2 Performance Versus Tolerance of Interference

On one hand, the range of a transceiver should be as large as possible, while on the other hand this increases the sensitivity for interference.

5.3 How to Detect Distance and Direction Indications Triggered by Interference

Interference from electronic devices affect a large frequency range, including the 457kHz operational frequency of avalanche transceivers. For the searching transceiver, the 457kHz part of an interfering signal is interpreted the same as a weak signal from a buried subject in large distance and therefore the transceiver will show a distance and direction indication. However, by listening to the analog sound (Pulse Barryvox), it will immediately become clear that the regular Beep – Beep – Beep sound pattern is missing. This allows the rescuer to immediately

and reliably distinguish between “false positives” triggered by external interference and the real signal of a buried subject. Please read the chapters “Profile” and “Analog Mode” in the *Pulse Barryvox Reference Manual* to make sure your device is configured appropriately to give you analog sounds.

5.4 Recommendations Concerning Potentially Interfering Equipment

General Rules

Clothing

Avoid wearing clothes with magnetic buttons or larger metallic and/or conductive parts (e.g. nets of electrically heated gloves)!

Storage

Do not store the transceiver close to strong magnetic fields as they can magnetize the antennas with a long term effect.

Magnets

Permanent magnets compromise the antennas of the device with a long term effect. Already short exposure to close proximity of a magnet can lead to a long lasting magnetization effect. Therefore avoid by principle to store or otherwise expose the device to magnetic influence. Be aware that i.e. all loudspeakers contain a strong permanent magnet and therefore should be kept 20cm away from a transceiver during operation and storage. In SEARCH mode, the Pulse Barryvox uses its internal compass to accelerate direction indication. The compass is highly sensitive to magnets and therefore 50cm safety distance need to be respected.

SEND Mode

In transmit mode a minimum distance of 20cm has to be respected between the avalanche rescue transceivers and any metal object or electronic device. Although the distance where serious interference of transmit mode has to be expected is for many objects and devices considerably shorter (<3cm), the likely displacement of a carrying system, clothing and potentially interfering objects due to the mechanical impact to the person taken by an avalanche has to be taken into account and therefore the recommended distance has to leave some safety margin.

SEARCH Mode

Searching Rescuers

In search mode, a minimum distance of 50cm has to be respected between the beacon and the listed objects below which can be used with a transceiver.

Non-Searching Rescuers and Other Equipment On-Site

- Cellular phones, satellite phones, Personal Locator Beacon PLB. As long as the search is in progress, it is recommended to turn off cellular phones, satellite phones and PLBs.
- devices providing a backup transmit function in case of a secondary avalanche
- head lamp

5.5 Definitive List of Equipment Which Can Be Used With a Transceiver

List of objects and equipment (conclusive), which can be used with a transceiver respecting the rules as mentioned above. This conclusive list includes rescue or operationally critical equipment and equipment which is an integral part of mountain excursions. For equipment which is critical for rescue or operationally, but require more restrictive rules than the 20cm safety distance in transmit and 50cm in receive mode, the exceptions are specifically mentioned.

General Equipment:

- metallic frames of backcountry backpacks
- camping and cooking equipment, metallic vacuum bottles
- non engine driven snow sport equipment (skis, snowboards, snowshoes)
- climbing gear (carabineers, ice axes, crampons, etc.)
- electric head lamps excluding headlamps with switching power voltage regulators; as a general tendency, the greater the maximum brightness of the lamp the more interference has to be expected. When dimming the light to save power, the switching power regulator tends to make greatest interference. If you experience interference, try to use the lamp on the brightest setting or turn the lamp off if the conditions allow it
- snow study kits incl. metallic snow saw

- improvised repair equipment and tools like pocket knives and pocket multi-purpose repair tools
- writing tools
- wrist watch without radio functions on the wrist; large, multi-functional watches with large screens should not be worn on the same hand like the searching transceiver is held.
- Any kind of food, candy or cigarette box wrapped with metal foil

Search, Rescue and Survival Equipment:

- flotation devices (incl. remote release device), Avalung, Avalanche Ball
- avalanche rescue transceivers
- devices providing a backup transmit function in case of a secondary avalanche
- RECCO search devices (3m distance while searching with the transceiver, do not point directly to another rescuer)
- RECCO reflectors (reflectors may be placed at any distance without any risk of interference)
- avalanche probes and shovels (metallic and carbon probes may not be placed on the snow surface during fine search)
- high performance lights and generators for night searches in organized rescue (strong interference may occur and affect a larger zone around the equipment. Interference should be checked with an analog receiver on the highest sensitivity setting and appropriate measures taken accordingly)

INTERFERENCE PROBLEMS

Vehicles:

- snow mobiles, snow grooming machines, cars, snowploughs, snow blowers (The search from such vehicles can be severely disturbed by interference from the running engine, metal plates and the vehicle electronics. In transmit mode, reduction of range is possible depending on proximity of the transmitter to metal parts of the vehicle. Search accuracy might be compromised in close proximity of the vehicle.)
- helicopters (the search from a helicopter is only efficient with specialized transceivers)

Medical Equipment:

- pacemakers and ICDs (Users of pacemakers/ICDs are advised to carry the device on their right side (adjust the length of the carrying straps. Consult the manufacturer's instructions of the pacemaker with regards to the interference impact.)
- portable heart rate monitors (needs to be switched off during search or in 50cm distance to the receiver)
- first aid equipment incl. metallic splints
- toboggan, immobilization equipment, stretchers

Communication Equipment:

- analog VHF and UHF radios up to 5W transmit power (interference may occur during transmit of the searching rescuer)
- digital VHF and UHF radio up to 5W transmit power (interference may occur during communication [incl. synchronization with the network], communication of text messages and data), devices need to be turned off during search for all searching rescuers. As long as the search is in progress, it is highly recommended to turn off all digital radios.
- cellular phones, satellite phones, PLB (personal locator beacon) (interference may occur during communication (incl. synchronization with the network), communication of text messages and data), devices need to be turned off during search for all searching rescuers. As long as the search is in progress, it is recommended to turn off cellular phones, satellite phones and PLBs.

Orientation Equipment:

- electronic and mechanical altimeters
- electronic and mechanical compasses
- handheld GPS receivers (except devices with radio transmit functions)

Equipment of Armed Forces and Law Enforcing Agencies:

- guns and pistols, ammunition (weapons incl. optics, but excluding electronic systems; if the weapon is carried diagonally on the front side of the body, the transceiver must be carried sideways)
- body armor systems (carry transceiver sideways)

Non Rescue, Mountain or Operationally Relevant Equipment (= All Equipment Not Listed Above):

The variety of electronic equipment (entertainment, video, photo, remote controls, etc) that rescuers have been trying to use in combination with their avalanche rescue transceiver has grown in the past years. Whereas some of the equipment might not cause an interference problem in combination with a particular transceiver, it does with others and vice versa. It is therefore impossible to make a recommendation for each individual device and transceiver. Several reports from failed or severely disturbed and delayed rescue action in the last years have shown that electronic equipment can have a very unpredictable and severe influence on avalanche rescue transceivers.

Therefore, while a search is in progress on the avalanche, all equipment not listed above is recommended to be turned off and remain off on the entire avalanche for the short duration of the search compared to the entire duration of rescue.

Permanent Installations and Infrastructure

High voltage power lines, terrestrial power and telecommunication cables as well as radio towers may as well dramatically reduce the performance of an avalanche rescue transceiver. Often, the digital search mode completely fails and it is necessary to carry out an analog search by applying signal search strips with a very limited width.

6. Maintenance

6.1 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”

6.2 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.

6.3 Washing the Carrying Systems

As the carrying systems is worn on the innermost layer of clothing, it is recommended to wash it periodically. In order to avoid damage to the carrying system and the washing machine, put the carrying systems in a mash bag or similar protection. Only wash them with low temperature (30°C), a mild, liquid detergent and do not use fabric softener. Do NOT tumble dry the carrying systems, instead hang them so that the webbing dries out quickly. Pay attention to the washing instruction symbols engraved on the carrying system.

7. Test and Maintenance Equipment for Organisations

7.1 Barryvox Fleet Management Solutions for Institutional Users

For a comprehensive overview, please consult the “Barryvox fleet management solutions for institutional users Guide” at www.barryvox.com.

7.2 Barryvox Tester

The Barryvox tester is a highly sensitive technical measurement device and requires an environment free of interferences, particularly around 457 kHz. Consult the help menu of the Barryvox Service Software for specific information.

7.2.1 Calibration of the Barryvox Tester

The tester continuously verifies its precision by comparative measurement with its golden reference device. After 3 years, the tester and golden device must be sent to the manufacturer for calibration. After 3 years without calibration, all test reports will state that the test equipment is over its calibration data and the test result is therefore invalid.

To return your tester and golden device, for calibration, please contact your local Mammut Sales Organization first for further information.

During calibration, the golden device is usually updated to the most recent Barryvox firmware version. This requires that your service software and the firmware of your entire Barryvox fleet get as well updated to the most recent version. In case you are not ready for a complete fleet update, please specify when you send the tester for calibration, on which firmware version your fleet should be running.

Every version of the service software can only handle one specific device firmware version. This concerns the firmware version of the golden device as well as the Pulse and Element Barryvoxes.

7.2.2 Interpretation of the Test Results

A positive (PASS) result means that the device has fulfilled all the criteria mentioned on the test report at the moment of testing. The result is a nowcast and not a forecast of the functions of the device. The device is not or only with limitation capable of detecting non-permanent problems. Whereas it is close to impossible to generate a wrong positive test result due to an external, interfering influence, it is very easy to generate a wrong negative test result by external interference.

7.2.3 Differences in the Test Results From Your Tester to Test Device of a Barryvox Service Centre

The test device used in an official service center is technically equal to your test device. Differences in a test results may still occur. Usually, they occur when one or several measured values are very close to the allowed limit and one test devices still count it as “passed”, whereas the other already counts it as “failed”. In such a case, the result of the Barryvox service center test device counts and the official test report which gets shipped to you with the device has to be taken as proof of a proper, positive test.

