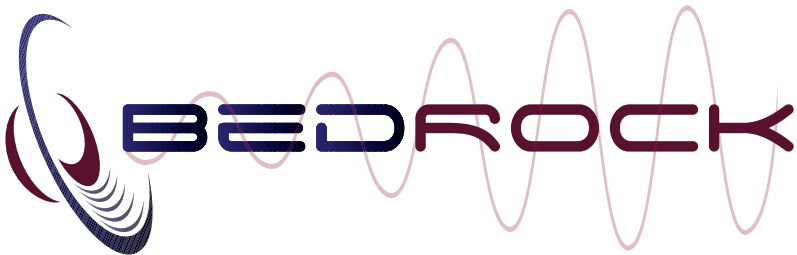CE

Bedrock BTB65 TalkBox

Operating manual

Bedrock BTB65 operating manual

Contact information and support

The Bedrock product line, including the Bedrock BTB65 TalkBox, is designed and manufactured by Embedded Acoustics B.V. in the Netherlands.

The manufacturer can be contacted at the following address:

> Embedded Acoustics BV
> Ampèreweg 18
> 2627 BG DELFT
> The Netherlands
> www.embeddedacoustics.com
> www.bedrock-audio.com
> Phone: +31 88 8770700
> Fax: +31 88 8770799
> Email: support@bedrock-audio.com

Further documents and data files related to the TalkBox are released online :

> www.bedrock-audio.com/support

NOTE: All screenshots and product pictures shown in this manual correspond to the BTB65 TalkBox with hardware platform 2.1 running firmware version 3.2.0 or higher. If you are using a different device model or a different firmware version, the screenshots may not fully correspond to what is being displayed on your device's screen.

Document version 2.1, release date January 2018. Applies to models: BTB65

Contents

1. Introduction

Congratulations on purchasing your Bedrock BTB65 TalkBox. The BTB65 TalkBox is a versatile and reliable signal source for acoustic measurements, including STIPA and full STI speech intelligibility measurements.

Using the BTB65 Talkbox is quite easy, thanks to its intuitive touch-screen interface. Most users will get the hang of doing measurements with the TalkBox without spending too much time with this manual. Nonetheless, we strongly recommend that you do read this manual before using your TalkBox for the first time, in order to get acquainted with the various features of the device, as well as the procedures for calibration and maintenance. With a little care, you can expect years and years of reliable and trouble-free operation from the BTB65.

Touchscreen

Line in
Data port

Line out

Laser pointer
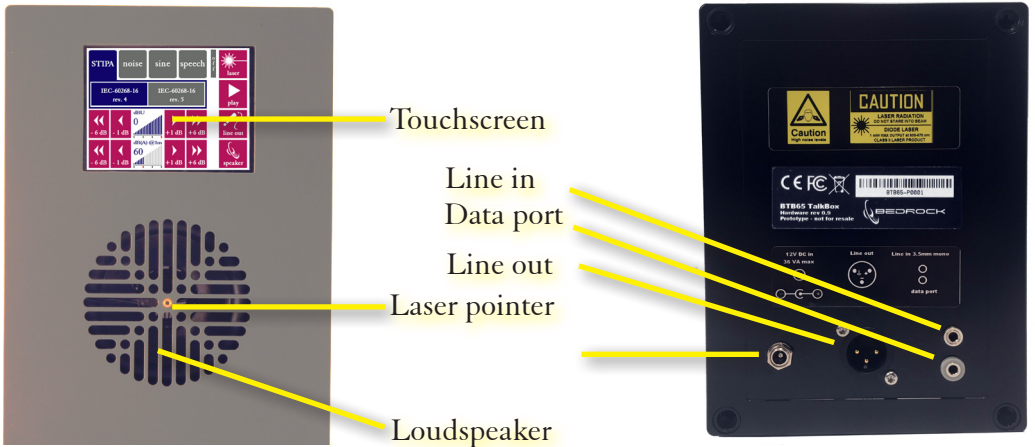
Loudspeaker

2. General use and safety precautions

2.1. Protecting your device

Your Bedrock BTB65 contains a high-sensitivity wideband loudspeaker that was calibrated at the factory for accurate control over the reproduced sound pressure levels and frequency transfer function. To make sure that the performance of your TalkBox remains undegraded over the years, we recommend taking the following precautions:

- Protect the TalkBox from dropping, shock and vibration. If you use a tripod to mount the device during measurements, we recommend that you use a sturdy model with a sufficiently wide base.
- Do not expose the device or its power supply to rain, moisture or liquids of any kind. Take special care to prevent liquids to permeate into the device through the connectors or along the display bezel.
- Do not operate at ambient temperatures above 35°C/95F.
- Do not use close to flames or open fire.
- Do not use in environments where flammable or explosive materials may also be used.
- Do not keep the device powered on while unattended for prolonged periods of time.
- Use the power supply only with the international adapter suitable for your region.
- During transportation and storage, keep the device in a suitable casing or container – preferably its original case. The device needs to be protected from shocks and vibration (due to transportation or falling), excessive temperatures, liquids and moisture, and any other external conditions that could do damage to the device. Care should be taken that other objects cannot come into direct contact with the display during transportation.

2.2. Protecting yourself and others

Whenever using the Bedrock BTB65, take precautions to keep yourself and others safe. In particular, take note of the following warnings related to electrical hazards, eye safety and hearing protection:

The included power supply comes with adapters for use worldwide, and operates on a wide AC voltage range of 100 – 250V. Do not use the power supply if the casing appears cracked or broken, or if it has been exposed to fluids or moisture. Contact with components inside the power supply while this is plugged in may result in serious injury or death.

CAUTION

LASER RADIATION
DO NOT STARE INTO BEAM

DIODE LASER
1 mW MAX OUTPUT at 635-670 nm
CLASS II LASER PRODUCT

The Bedrock BTB65 features a class II laser pointer to assist in placement of microphones. Never look directly into the laser, and make sure that others cannot accidentally look directly into the laser either. Do not use around children or animals. Do not disassemble or remove the laser from its enclosure.

Caution
High noise levels

The Bedrock BTB65 is capable of producing high sound levels at close range. Do not hold the ear up to the loudspeaker grille, and observe a distance of at least 0.6m (2ft) between your ears and the loudspeaker when operating.

3. How to use the TalkBox

The TalkBox is a calibrated test signal source for acoustic measuring purposes. When using the TalkBox for generating test signals, the following tasks have been taken care of:

- Precise generation pre-determined test signals
- Equalization of these test signals
- Calibration of the absolute output level
- Playback through an acoustic and/or electric output

The TalkBox simultaneously plays back test signals via a balanced XLR output jack (on the back of the device) and via its loudspeaker. The acoustic and electric output channels can be independently muted, and the output level is also controlled independently.

3.1. Splash screen while booting

When the TalkBox is connected to power, it boots up immediately. The following "splash screen" is displayed:

Press on the blue bar at the bottom of the screen to skip directly into the main menu. Press the button "calibration menu" if you need to adjust the level calibration of the TalkBox or to change any of the hardware settings. See section 3.3 for a description of these settings.

3.2. Main screen

As soon as you press the blue bar, or if you wait for a few seconds, the main screen of the user interface will be shown. The way the interface is designed you are able to observe all the relevant controls and settings at a glance.
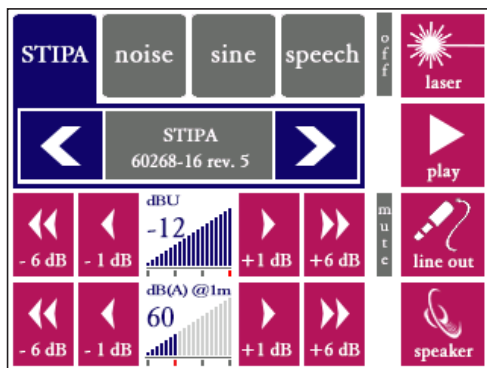
Select any of the tabs on the top-left bar to access any of the four categories of test signals: Speech intelligibility (STIPA), Noise, Sine or Speech. Then choose the test signal which you need for your measurements. Consult chapter 4 of this manual for further explanations on the different types of test signals.

While the top-left section of the screen is dedicated to selecting a signal, the bottom-left part of the screen controls the output signal levels. Two individual gauges show the current output levels of the electric and acoustic output channels:

- The top gauge shows the electric output level on the XLR output (line out), calibrated in dBU. The level can be adjusted to any level between -30 dBU and -12 dBU.
- The bottom gauge shows the acoustic output level, defined as the A-weighted sound pressure level at a distance of 1.00m relative to the reference plane (the surface of the loudspeaker grille). In other words, this is the dBA-level measured at 1.00 m straight in front of the TalkBox, when used under anechoic conditions. This level can be adjusted to values between 54 dB(A) and 72 dB(A)

Separate buttons are available for adjusting the level in increments of either 1 dB or 6 dB.

To the right of the level gauges (and adjustment buttons), you will find separate mute buttons for the line out and loudspeaker (with pictograms of a line jack and a loudspeaker). Mute/unmute each of the channels with these buttons. If muted, a grey indicator ("mute") will appear next to the button.

This leaves only the two buttons unexplained, both found at the top right of the screen.

- The button marked "laser" toggles the laser pointer on/off. The laser pointer is useful when positioning a microphone in front of the TalkBox, for accurate on-axis alignment. We recommend turning it off when it is not needed.
- The start/stop button does precisely what one would expect: it starts and stops test signal playback, simultaneously on both the electric and acoustic output channel.

3.3. Calibration menu

The calibration menu can only be accessed while the device is booting (see section 3.1). Any changes made in this menu take effect immediately, but the device needs to be restarted before the main screen can be accessed again.
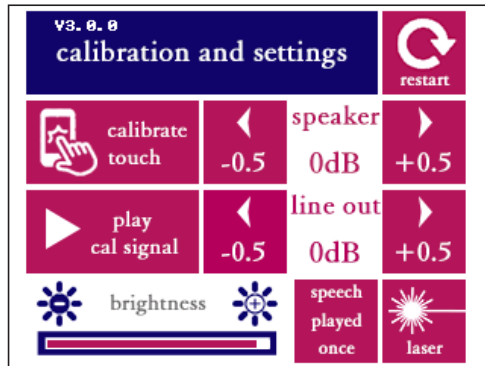
Press the "restart" button at the top right of the screen to restart the device once you are done making adjustments.

The calibration menu can be used for the following purposes:

- **Adjusting the electric and acoustic input/output levels in 0.5 dB increments.** The output levels are accurately calibrated before any TalkBox leaves the factory, and no particular attention to level calibration is normally required from the user. However, should there still be a need for minor adjustments, these can be done here. Note that a test signal playback button is provided within this menu, so that the effect of any calibration adjustments can be observed straightaway while making the adjustments.
- **Touch screen calibration.** Press this button if the touch screen digitizer appears inaccurate (the touch points appear not to be detected in exactly the right place). Be very careful with this option and use it only if needed (which should be rarely, if ever).

⚠ Improper use of the calibration routine will render the device inoperable. It will need to be returned to the factory by repairs (not covered under warranty). Always use a stylus when calibrating the touch screen. Do not press "confirm" unless you are certain that you touched the correct marks in the calibration pattern.

- **Display brightness.** Adjust the brightness by means of the slider or the + and - buttons.
- **Looping of speech files.** Press the button once to toggle between looped and unlooped play back of speech signals. This only applies to speech; all other signals (with the exception of the sweep) always provide continuous playback.

3.5. External power supply

The Bedrock BTB65 TalkBox operates off its external 12 V DC power supply. It does not have an internal battery; the device shuts off immediately when the power supply is disconnected. In most use scenarios, the TalkBox is used near a lectern or paging microphone, in which case a mains outlet (100-250 V AC) will be available nearby. If this is not the case, alternative ways to power the TalkBox will be more convenient. In particular, car battery adapters and external battery packs may come in handy.

Since 12V external batteries and car adapters are ubiquitous and inexpensive, we recommend sourcing any battery pack that meets your requirements in terms of size, weight and capacity. The pin-out of the DC jack is printed on the type label (on the back of the device). Feel free to contact us for recommendations on recent products that work well with the Bedrock BTB65: support@bedrock-audio.com

Note that the BTB65 draws peak currents up to 3A. The external power supply must be able to accommodate such high current peaks, or the output signal is likely to be distorted.

3.6. Line-in jack

The BTB65 TalkBox has a 3.5mm line-in jack, which can be used for playback of audio from external sources.

Note that signals from the line in jack are not equalized; the spectral characteristics and level of the signal are not controlled. The line in jack is only intended to use the TalkBox as a convenient playback device (powered loudspeaker) to listen to external recordings. Do not perform measurements based on external signal sources, unless you have ways to control (calibrate) the signal level and frequency transfer function externally.

4. Speech intelligibility measurements

A comprehensive explanation of the STI method and STIPA is beyond the scope of this device manual; there are several online and offline resources that provide guidance and information on doing STI measurements, such as our own white paper on this topic. This manual assumes that the general principles behind Speech Transmission Index testing are known, as well as the basics of designing and executing STI measuring campaigns. This manual explains how to use the TalkBox in this context.

First and foremost: note that you will need an STI analyzer (such as the Bedrock SM50 or the Bedrock SM90) for any of the measurements described in this chapter.

4.1 Setting up the TalkBox for STI measurements

In most cases, STI measurements are set up to comply with specific regulations or application standards, such as NFPA-72 Annex D, NEN-2575, DIN-60849/DIN-VDE-0833-4, or BS-5839-8. Consult the applicable standards for guidelines on the exact setup as required.

In general, the setup procedure is as follows:

- **Place the talkbox in the appropriate environment;** most commonly this is at a control panel, lectern or any other position close to a microphone. **Note that the TalkBox replaces the human talker that is normally part of the speech transmission chain.** Place the TalkBox exactly where the talker's head would be. Use a tripod or other mounting materials if neccessary. The TalkBox is fitted with an adapter for standard camera tripods at the bottom.
- **Align the microphone and TalkBox;** make sure that the TalkBox is radiating into the microphone as a human talker would. In some cases, the human talker would *not* talk directly into the microphone, e.g. if the microphone is mounted away from the talker, such as at the corner of a lectern. Make sure that the orientation of the TalkBox matches what a human would do. The laser pointer indicates the reference direction; use this to place microphones on-axis with the TalkBox.
- **Adjust to the right TalkBox-microphone distance.** The loudspeaker grille is the reference plane of the TalkBox. Measure all difference relative to this plane.
- **Set the signal level to match the intended vocal effort.** Application standards usually require the sound pressure level to match a certain "nominal" level at 1 meter distance (e.g. 65 dB(A) for NFPA-72, and 60 dB(A) for many other standards. For "relaxed" speech, a setting of 54 dB(A) is common, whereas 66 dB(A) and 72 dB(A) are commonly adopted values when loud speech is expected.
- **Now play the signal.** It is often convenient to keep the signal playing continuously, while working with the STI analyzer to collect data at various measuring locations.

NOTE: IEC-60268-16 recommends a 3 dB adjustment when matching the level of a STI-PA signal to the level of recorded speech. This adjustment is needed to account for the pauses that occur naturally in speech, while the STIPA signal is fully continuous. This correction is already applied by your TalkBox, according to the procedure described in Appendix J of IEC-60268-16 rev. 4. Simply set the TalkBox at the playback level cited in your application standard.

4.2 STIPA measurements

The TalkBox has two variants of the STIPA signal: the STIPA signal according to IEC-60268-16 rev. 4 (2011) and IEC-60268-16 rev. 5. Revision 5 is expected to be published late 2017 or 2018. The difference between the signals is a change in the long-term spectrum of the signal that has been implement in IEC-60268-16 rev. 5 (currently still in draft). The energy in the two lower octaves (125 Hz and 250 Hz) has been reduced, obtaining a better overall agreement with recent literature on human vocal effort.

The question which signal to use depends on the purposes of the measurement; in those cases where rev. 5 of the STI-standard is explicitly required, the rev. 5 STIPA signal must be used. When measuring to requirements and/or standards drafted before 2018, the rev. 4 signal is the most suitable choice. In all other cases, both signals are most likely acceptable. In the majority of practical situations, the difference in measured STI-value is small to negligible.

Note that the TalkBox is compatible with any STIPA analyzer that complies with IEC-60268-16 rev.4 or higher. We recommend a minimum duration of 18s for each individual STIPA test.

4.3. Full STI measurements

The Speech Transmission Index is originally based on a Modulation Transfer Function matrix (MTF) comprising 7 octave bands and 14 modulation frequencies (98 values in total). STIPA is a simplified version, featuring only 2 modulation frequencies per octave band. This has been shown sufficiently accurate for Public Address systems, and most other applications for that matter, but "Full STI" measurements may still be needed to get accurate results in highly complex environments (for example, environments that feature discrete echoes).

The original Full STI method, which has not been available as part of commercially available measuring instruments since the 1990s, dealt with each of the 98 octave-band/modulation-frequency combinations individually. This meant that a single measurement took up to 15 minutes to complete. A novel approach, now implemented in the Bedrock SM50 and SM90, uses a STIPA-like approach to reduce the measurement time to approx. 1 minute.

This novel Full STI approach, as implemented on the BTB65 TalkBox, is similar to STIPA in the sense that it also simultaneously considers two modulation frequencies per octave band. However, each measurement consists of 7 different stages, corresponding to 7 different segments of test signal. A rotation scheme is adopted that applies different modulation frequencies in each band during different phases of the measurement, ending up with a completely filled MTF matrix at the end of the measurement cycle.

The Full STI signal is played back continuously, in the same way as STIPA. The task of synchronizing to the different phases of the signal is performed by the STI analyzer.

Note that the Full STI signal currently works with all Bedrock STI analyzers, but not necessarily with third-party analyzers. Although the Full STI implementation fully complies with IEC-60268-16, the underlying technology is proprietary; vendors of third-party analyzers will need to license the technology before implementing it. Before using the Full STI signal with third-party products, ensure that these are fully compatible and certified by Embedded Acoustics BV.

Also note that the Full STI signal is copyrighted and watermarked. With the purchase of the Bedrock BTB65, a non-transferable perpetual licence is acquired to use the Full STI signal on all projects and for all STI-measuring needs that the TalkBox owner may have, both personally and professionally, also for all those employed by the owner of the TalkBox. However, this license explicitly excludes the rights to sublicense, to distribute, or to embed the signal in third-party equipment.

5. Noise, sine waves and sweeps

5.1 Noise

The BTB65 TalkBox offers two kinds of noise: pink noise and white noise. Pink noise has a flat spectrum on a logarithmic scale (equal energy per octave band), whereas white noise has a flat spectrum on a linear scale (equal energy per FFT bin). Given the logarithmic characteristics of frequency resolution of the human ear, this means that white noise perceptually emphasizes the higher frequencies.

The noise signals can be useful (among many other applications) in the following scenarios:

- Quickly assessing the frequency transfer function of a system. On a real-time analyzer, the pink noise signal will show a flat spectrum (equal in each 1/1 or 1/3 octave band). Any deviation from the flat spectrum reflects frequency-dependent behavior of the transmission channel between the TalkBox and the analyzer
- Measuring the reverberation time (RT60) by means of the interrupted noise method. The TalkBox can be used as a noise source, although especially in larger rooms a secondary high-power loudspeaker will be needed to achieve a sufficiently high sound pressure level. Upon switching of the noise source, the decay curve can be estimated.
- The TalkBox can be used as a source of interfering noise (simulating background noise) in speech intelligibility studies.

5.2 Sine waves

Sine waves (pure tones) are available for each of the ISO-standardized octave frequencies from 125 Hz to 8 kHz. These can be used for measuring pure-tone response, dynamic range and distortion.

5.3 Sweep

Under the "sine" signal tab, the last signal ("sweep") is a 14 second logarithmic sweep, covering the whole audible frequency rang from 20 Hz to 20 kHz. Note that the TalkBox is not able to produce the lowest and highest frequencies within the sweep's range, but these will be present in the line out signal. This sweep can be used for measuring the frequency transfer of loudspeakers and rooms, through convolution with the inverse sweep. Third-party software tools need to be used for the convolution process.

6. Speech recordings

The Talkbox currently features six languages: US English, UK English, French, German, Spanish and Dutch. For each language, speech has been recorded for a male as well as a female talker. Translations of the same two messages are available for each talker:

English
"Attention. Within a few moments, a test of the sound system will begin. You may hear test signals being played, such as tones and noise. No action on your part is required. Thank you for understanding."
"Attention. End of sound system test. Thank you for your cooperation"

German
"Achtung: In wenigen Augenblicken wird die Lautsprecheranlage getestet. Dabei hören Sie möglicherweise Testsignale, zum Beispiel Tonsignale und ein Rauschen. Sie müssen dann nichts unternehmen. Vielen Dank für Ihr Verständnis."
"Achtung: Der Test ist beendet. Vielen Dank für Ihre Mitwirkung."

French
« Attention. Le système de sonorisation et d'information sera testé dans quelques instants. Il se peut que vous entendiez des signaux de test, tels que des signaux de tonalité et des bruits légers. Il n'est pas nécessaire d'y prêter attention. Merci de votre compréhension »
« Attention. Fin du test. Merci de votre collaboration. »

Spanish
"Atención. En unos instantes se procederá a probar el sistema de megafonía. Es posible que escuche señales de prueba, como señales de tono y ruidos de fondo. No es necesario tomar ninguna medida. Gracias por su comprensión"
"Atención. Final de la prueba. Gracias por su colaboración."

Dutch
"Attentie. Binnen enkele ogenblikken wordt het omroepsysteem getest. Mogelijk hoort u hierbij testsignalen, zoals toonsignalen en ruis. U hoeft hierop geen actie te ondernemen. Dank u voor uw begrip"
"Attentie. Einde van de test. Dank u voor uw medewerking."

These sentences may be used to announce the beginning and end of test sessions, but also to determine the speech level.

Note that there is an option in the calibration menu to toggle between looped speech playback and one-time only playback of each recording.

7. Calibration and accuracy

The frequency transfer function and sensitivity is measured individually for each TalkBox at the factory. Before the start of the calibration process, a 15-hour "burn in" cycle is carried out to improve the stability of the loudspeaker. Based on these measurements, the signals played back by the TalkBox are amplified and equalized to accurately match the intended level and spectrum.

7.1. Factory re-calibration

Note that excessive shocks and vibration may alter the characteristics of the TalkBox. Always check your TalkBox if you suspect that it has been dropped or manhandled. When in doubt, return to the factory for a check-up and recalibration. We recommend that each TalkBox is checked and factory-calibrated at least once every 24 months.

7.2. Level calibration

The TalkBox is designed and calibrated to accurately match the chosen signal level at 1 meter distance with a deviation of no more than +/- 0.5 dB. Note that this is the level under anechoic conditions; in a real-life environment, reverberation is likely to contribute somewhat to the overall level at 1 meter distance.

The distance is measured relative to the reference plane (loudspeaker grille). Although we follow the convention in specifying the level at 1 meter distance, calibration measurements for the TalkBox actually take place at 0.25m distance, under the assumption of spherical radiation. The default level of 60 dB at 1.00 meter corresponds with 72 dB(A) at 0.25m.

7.3. Spectral calibration

The requirement in terms of the frequency transfer function is that no individual 1/3 octave band in the range from 80 Hz to 16 kHz may deviate more than 1 dB from the target level for that band. This is only achievable through an equalization process that counteracts the natural frequency-dependent characteristics of the loudspeaker. The "inverse filter" to compensate for the loudspeaker transfer differs between individual devices, and has to be measured independently.

The frequency characteristics as well as the characteristics of the inverse filter for each individual TalkBox are printed on the calibration certificate that is supplied with the TalkBox.

8. Cleaning and maintenance

No further maintenance is needed beyond normal superficial cleaning. We recommend that you clean the instrument with a soft cloth. LCD display cleaner can be used to clean the touch screen, provided that the following precautions are taken:

- Do not spray cleaner directly onto the display or into the loudspeaker grille
- Only use cleaning liquids specifically intended for LCD screens

Do not remove the hologram seal at the bottom of the device; this voids your warranty.

Never open the device. Note that any changes on the interior of the box (including the placement of the internal acoustic foam) may have an impact on the frequency transfer of the device. If you suspect that your TalkBox needs repairs or maintenance, contact us at: support@bedrock-audio.com.

9. Product warranty

The device is covered by a full-service, worldwide pick-up & return warranty until 24 months after the date of purchase. Please direct all warranty claims to:

> Embedded Acoustics BV
> Ampèreweg 18
> 2627 BG DELFT
> THE NETHERLANDS
> warranty@bedrock-audio.com

Please email us and wait for our response (typically within a business day) before shipping your hardware back. We may ask you to fill out an RMA form, and we will supply you with a reference number for your warranty claim. If you can provide a complete statement of the problems you are experiencing, this will help us solve your hardware issues as soon as possible. Always provide the ID number of your device (found on the bar code label on the back of the device), your name and address, and your date of purchase. If you did not purchase directly from the Bedrock webshop, also include dated proof of your purchase.

In general, our warranty programme covers all defects except for those resulting from accidents, misuse (including improper electrical connections) and improper maintenance. The following is explicitly excluded from product warranty:

- Any damage resulting from dropping, falling or excess vibration
- Any damage done by liquids, including damage resulting from excessive use of screen cleaning liquids
- Any damage resulting from incorrect electric connections to the device through external connectors
- Any damage done by power surges or overvoltage on the USB power supply and/or audio connector
- Any mechanical damages to the display caused by mechanical forces applied to the screen surface, such as scratches.
- Normal wear and tear

The following voids warranty:

- Repair attempts by an unauthorized party
- Removal of product stickers, tamper proof seals, bar codes or serial numbers
- Attempts to install firmware from any other source than the manufacturer, or firmware intended for a different device model.

Malfunctions that are found to result from any of the above conditions are not covered by warranty. Repairs will take place only at the expense of the owner. If claimed under warranty, an examination fee may be charged and transportation costs will be charged to the owner.

Please do not attempt to open your Bedrock BTB65 yourself, as there are no user-serviceable parts inside. If you do see a legitimate need to open the device yourself, please contact us at warranty@bedrock-audio.com first, so we can discuss preserving your warranty rights. Please be aware that the product is protected by tamper-proof seals.

A worldwide pick-up&return service is included in the warranty. This means that we will have the defective unit picked up at your location at no charge, provided that it is presented in its original equipment case, packed in a cardboard box with suitable cushioning material.

10. Firmware updates

The firmware can be updated through the data port on the back of the device.

⚠ Only use the original USB data cable provided for this purpose with your talkbox. Use of other cables may permanently damage your talkbox and voids your warranty.

The firmware update procedure is as follow:

- Download the latest BTB65 update package from www.bedrock-audio.com/support
- Connect the BTB65 to your PC or Mac via the supplied USB data cable
- The Bedrock BTB65 now presents itself as a mass storage device
- Copy the update package to the folder names updates
- Power cycle the BTB65. The update package will now automatically install itself. Not that this may take several hours. Do not interrupt the power supply while the update is installing.

⚠ When connected via USB, the system files of the talkbox are present within the file system of the mass storage device as hidden files. On most operating systems, you will not be able to access these files. However, if your computer is set up to display hidden files, you will be able to manually alter or remove system files, permanently making the talkbox inoperable. This is not covered under warranty. Make sure that your computer cannot access hidden files before you connect your BTB65.

11. Technical specifications

Functionality	Playback of acoustic test signals via balanced XLR line-out and loudspeaker. Supported signals: STIPA, Full STI, sine waves (125 Hz - 8 kHz), log sweep, pink noise, white noise, speech (male/female, 6 languages: US English, UK English, French, German, Spanish, Dutch).
Standards compliance	IEC 60268-16 rev. 4 and rev. 5
Specs acoustic output	Output range (SPL @ 1 m): 54 dB(A) - 72 dB(A) Adjustable in 1 dB increments Frequency transfer flat within +/- dB from 80 Hz to 16 kHz within 1/3 octave band resolution.
Specs electric output	Output range: -30 dBU to -12 dBU Adjustable in 1 dB increments
Display	Resistive LCD touch screen 320x240 pixels, 65k colors Luminance typ. 250 Cd/m2 Durability: 100k finger slides, 1M taps
Environmental	Temperature: 5 -35ºC (41-95F) Relative humidity: 0% - 95% (non-condensing)
Electromagnetic compatibility	Complies with EN 61326-1:2006 - EN 61326-1:2006 FCC part 15 compliant (class A device)
Mechanical specs	Size approx. 180 x 130 x 115 mm Weight 800g Rear-mounted tripod adapter Loudspeaker diameter 58 mm
Bundled items	Ruggedized waterproof carrying case, TalkBox, power supply, int. power supply adapters (US, EU, UK, AU), calibration certificate

12. Troubleshooting

Problem	Possible cause	Solution
Display shows error messages (green or red text).	Error on display processor or in communication between DSP and display processor	If the problem persists, contact support.
Audio sounds distorted	Operating on line in jack	No calibration/EQ on line in jack. Please ensure that the signal level is within range.
	Mild intermodulation distortion	This is normal and does not affect STIPA or frequency transfer measurements
	Loose parts/wires Loudspeaker malfunction	Send to factory for check-up
No audio after pressing Play	Output muted	Check status of mute button
Speech playback is not looped (plays only once)	Looping is an optional setting in the calibration menu	Enter the calibration menu when the system boots to toggle between looped/unlooped audio playback
Display is not bright enough	Brightness turned to low	Adjust through calibration menu