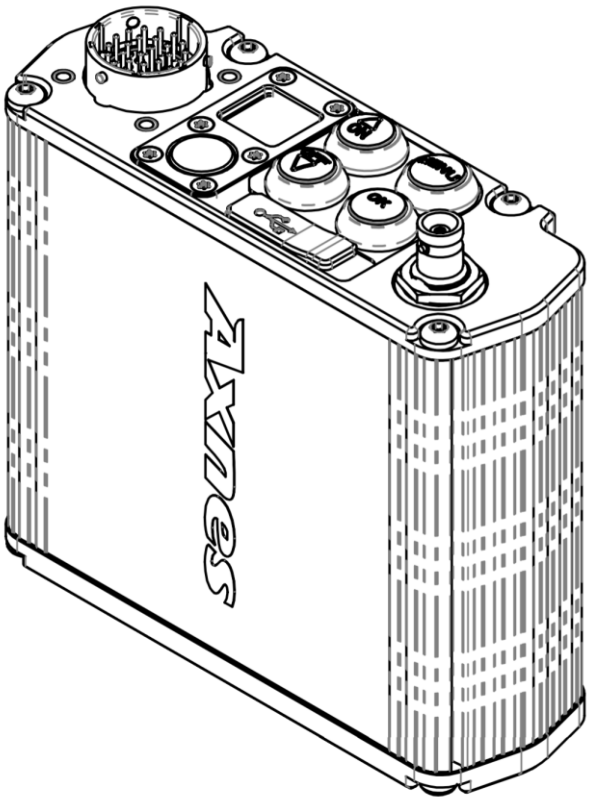
PNG BST30/35 Base Station

Operation Manual



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Revision history

Revision	Date	Description
Issue A	2020-02-12	First release of document
Issue B	2020-03-20	Minor editorial updates to menu inconsistency and change from line 1 and 2 to line 0 and 1 nomenclature
Issue C	2020-07-09	Updated with FCC reference

Table of contents

Section 1: PNG System

Axnes AS has delivered the Polycon system to the rotary wing Search and Rescue segment for decades. The system is widely adopted in this segment. The PNG system is based on the functionality in the previous system, but enhances the functionality and performance based on user feedback.

The PNG system incorporates the following main features:

- Wireless extension of aircraft intercom system with significant range and robustness.
- Full duplex operation.
- Uninterrupted communication.
- Support for keying of aircraft installed radios from the handheld.
- Support for multiple communication groups.
- Automatic microphone recognition on handhelds.
- Integrated Microphone for Patient/Casualty communication in the handheld.
- Versions of handhelds are IP68 waterproof down to a depth of 3 meters.
- Active noise reduction on microphone inputs giving excellent audio quality and VOX performance in high/extreme noise environments.
- Adaptive NIVOX (Axnes patented VOX), monitoring ambient noise environment and minimizing the effect of false triggers, and consequently noise flooding of intercom.
- GPS homing of handheld radios in the aircraft, on control panel and possible integration with map systems.
- AIS-SART compatible device location beacon in handheld.
- Support for mute and broadcast from aircraft side.
- Intercom operation in UHF band 397-470MHz.
- Handheld support for maritime VHF band for ship communication.
- Flexible intercom interface, supporting high and low impedance systems.
- All components available in NVG friendly versions.

Note: There are handhelds with different combinations of the following features: Waterproofing, GPS, AIS, VHF, Bluetooth and internal speaker.

The PNG system enables wireless communication inside and outside the aircraft. The system is very capable due to its robustness, range and noise reduction capabilities, as well as interception free communication between the entire crew.

The PNG system consists of one base station and one or more handheld rechargeable radios, chargers for the handhelds, as well as an optional control panel connected to the base station. The PNG Base Station and Control Panel are installed in the aircraft and supplied with power from the aircraft system.

The PNG handhelds implement functionality to suppress surrounding noise, and to secure optimal voice activation performance. They implement functionality to connect to the PNG Base Station in the helicopter (intercom mode), as well as functionality to communicate directly with other PNG handhelds, or handheld to other radios (direct mode).

The handheld radios are designed to be mechanically robust and the MP50 handheld radio is waterproof down to a depth of 3 meters to withstand extreme operating scenarios typically experienced in a SAR and multirole-configured aircraft.

Through the handheld internal microphone, the system enables communication with the survivor/ground rescue party without helmet removal.

Depending on the configuration and part number, the handhelds are equipped with a GPS receiver. The position of the handheld device may be polled by the PNG Base Station and presented on the PNG Control Panel in the aircraft.

The PNG Base Station is typically connected to the aircraft ICS and may support multiple connection points for audio and can deliver a PTT signal to other systems.

1.1 Radio

The PNG system operates a wireless link between the PNG Base Station and the handheld radios in the UHF band. Exact frequency configuration is done at production, based on customer input to available frequencies and bandwidth in the region they are to be operated in. The PNG system will normally be configured within a 10 MHz band in the frequency range 397 to 470 MHz The PNG Base Station will support the full 397 to 470 MHz range (depending on the antenna installation in the aircraft), while the handhelds support 10 MHz bands through the 397 to 470 MHz band, depending on the installed antenna. Antennas are available through the band.

The wireless link is a single frequency, duplex, interception free, digital radio link.

The handheld radios will operate at an output power of up to 400mW using a license specific frequency allocation.

The PNG system will not set any limit to the number of simultaneous receivers, but the number of simultaneous transmitters is limited by the available bandwidth and allocated timeslots. The PNG system allows up to three simultaneous transmitting handhelds.

The handheld radios support Maritime VHF mode, and channels can be configured in the 156-162MHz band.

1.2 BST3x

The PNG BST30 (non battery operated) and BST35 (battery operated) base stations are intended for carry on or ground support equipment and as such carrying limited aircraft qualifications. The system can be connected to the aircraft or vehicle through preinstalled provisions or through existing headset in/outs.

The BST30/35 PNG Base station is compatible with all existing PNG handsets such as MP30 and MP50 (requires rel 2.13 or newer handset software). The BST30/35 is a portable version of the PNG BST50 with a reduced set of interfaces and functionality. The BST 30/35 supports the following interfaces:

- 28VDC power in (designed MIL-STD-1275 compliant)
- 2xIntercom connection supporting Hi and low impedance systems
- 1xPTT out to intercom
- RS232/NMEA position data reported from connected PNG handsets
- 1xheadset connection
- 12VDC power out
- CAN bus interface (legacy)

- 1x BNC antenna port

The BST30/35 base station supports up to two voice groups, relaying through to the intercom on two separate intercom interfaces. One of the interfaces can support a PTT line supplied from the BST30/35 to the intercom. The PTT line can be driven by the BST30/35 triggered by wireless communication, or it can be set up to replicate PTT keying from the handsets (remote PTT keying).

The BST30/35 can relay position data from an GPS enabled PNG handset. The position data can be supplied from the base station to a mission system as NMEA data, allowing tracking of the wireless crew in moving maps, and target locking for search light and similar. Integration between moving maps and PNG system is supported by major map system suppliers, among others Euronav, Churchill, and Aerocomputer.

When the BST30/35 is connected to a wired intercom system, the lost intercom port can be replicated through the BST30/35 headset port, supporting both high and low impedance systems.

When installed in an aircraft or vehicle the antenna port can be connected to an external antenna for optimal range and coverage.

NOTE: The antenna port shall always be terminated when the base station is powered. Failure to terminate the antenna port may destroy the output amplifier.

1.3 Portable install

The BST30/35 is intended for a temporary/portable install and as such regarded as carry on/ground support equipment.

The BST30 requires external power supply through nominal 28VDC, while the BST35 can be supplied external power or operated from internal batteries allowing up to 10 hours operation.

Both versions can be equipped with a BNC antenna (different versions available from Axnes) or connected to an external antenna mounted on the aircraft/vehicle/vessel.

The base station can be operated connected to the platform’s intercom, or it can be operated stand alone. The Base station headset port can be operated independent of connection to wired intercom.

The base station can be installed in a bag, or in a pouch available from Axnes. Axnes will also have mounting brackets available.

1.4 Charging

The BST35 has integral batteries allowing up to 10 hours of continues operation. The charging of the batteries is possible through the USB type C port, and a USB type C power supply of minimum 45W are required (available from Axnes). The equipment can be operated while charging. It is also possible to charge batteries from the external 28VDC power. This option is configurable as some platforms typically will have restrictions for charging in some operational modes.

Charging time is expected to be around 3 hours, but depending on the surrounding temperature, charge time may increase or be disabled. Charging is disabled below 0°C and above 50°C. If temperature is below 10°C or above 40°C, the charge current is reduced, and additional charging time must be expected.

1.5 Headset

The BST30/35 allows for connection of a headset to the base station. This allow for replication of the lost intercom port or standalone operation. The headset interface is compatible with high and low impedance headsets, and the volume setting is controlled on the base station.

Connecting a headset will require an adapter cable (available from Axnes).

1.6 Identification of article

PNG Base Stations in **the BST30** series with part numbers in the **AXS-BS-D030XX*** series

PNG Base Stations in **the BST35** series with part numbers in the **AXS-BS-D035XX*** series

*Note: XX indicates any number of characters at the end of the part number string.

1.7 Document References

Ref #	Doc. Title	Doc number
[1]	PNG Installation and Interface Control Document	AX-PNG-ICD-2014

Section 2: Operation

The PNG system consists of one PNG Base Station and one or more handheld radios. To make all units in the PNG system interoperable, each unit must be configured with compatible parameters. Configuration of the PNG system will imply setting of radio frequencies, defining groups and setting scrambling or encryption parameters.

Multiple configurations may be stored on a device to support different operational modes.

The PNG system can be preconfigured from the vendor, or the configuration may be set by the operator's avionics department.

Ahead of flight all units in the PNG system will be set to compatible configuration. Different types of operation may use different configurations, due to radio frequencies, group definitions or other parameters. During operation and in flight the configuration on the PNG Base Station is normally not changed but may be required in some special conditions. Such conditions may be caused by radio interference, where alternative frequencies may be required, and an alternative configuration is selected.

The operational scenario may also require different handheld configurations to be loaded in different phases of the operation, e.g. to change group subscriptions during the mission. Switching between the handheld configurations is done by the handheld operator by a simple button push.

2.1 Groups

The PNG Base Station supports organizing the communication on the wireless link into groups. Groups are a set of audio channels on the wireless link, and a set of physical audio interfaces on the base station. The PNG system will support 2 groups depending on the available radio resources (channel bandwidth).

The PNG Base Station will by default have audio to and from the first group on physical audio interface 0 and the second group on physical interface 1.

The handhelds are configured to listen (receive) to one or more groups (allowing simultaneous listening to multiple groups). Transmit is configured to one primary group through PTT/VOX, but it is possible to configure transmit to a secondary group through configuration and use of the secondary PTT on the handheld.

When the PNG system is set up, one or more configurations are defined, see section 2.2 Configurations.

2.2 Configurations

Both the handhelds and the PNG Base Station use configurations to control the behavior of the devices. They can hold several configurations, with different operational parameters. A configuration contains a minimum of the following parameters:

- Logical name of the configuration
- Radio parameters (frequency, modulation, and channel bandwidth)
- Group subscriptions for receive
- Group subscriptions for transmit
- Configuration of remote PTT control (handheld activation of PTT from the PNG Base Station to the intercom)

The different pre-programmed configurations can be selected at start or during mission from the BST30/35 menu system. Typically, there will be several configurations when different radio channels shall be made available. There can also be different configurations for different mission types as e.g. SAR and EMS missions.

The different configurations are selected on the BST30/35 menu system with the menu navigation buttons and identified by the logical name. When selected, all relevant parameters are loaded.

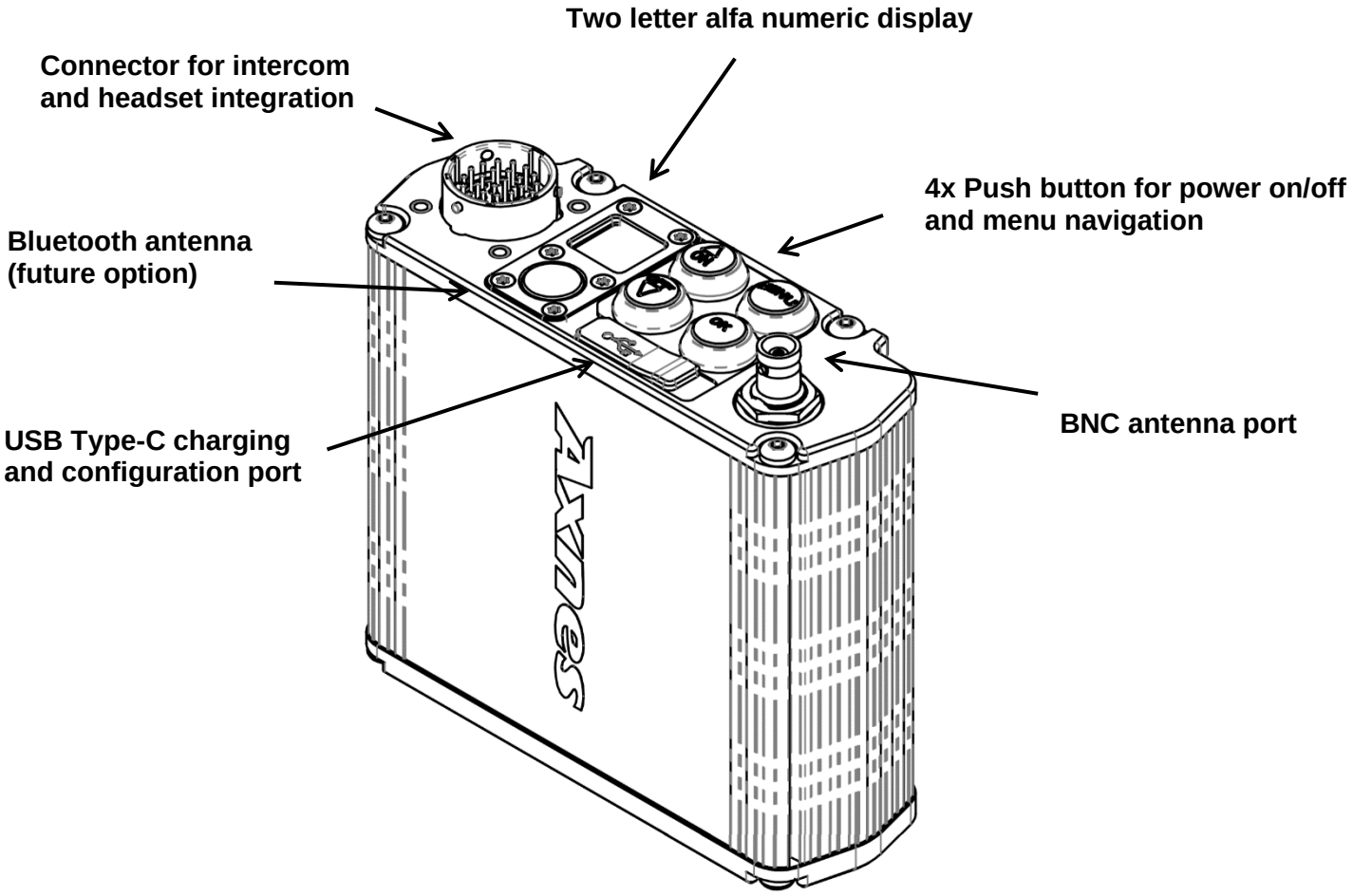
On the handheld, the configuration is selected with the up/down arrows and identified with a short two letter name and a long logical name (scrolling display).

Pre-programmed configurations can either be pre-ordered from the equipment vendor or changed by a qualified equipment operator with a PC based programming tool.

2.2.1 Encryption

With the PNG system all user data are encrypted according to the AES-256 encryption standard before they are transmitted over the air. When delivered from factory, the PNG Base Station uses a default encryption key called “AXNES DEFAULT”. Changing this encryption key requires the user to acquire an encryption key programming kit. Note that the PNG Base Station and all handhelds in a system must use the same encryption key in order to connect and communicate with each other.

2.3 General UI and outline



The BST 30/35 supports the following interfaces:

- Circular connector for:
  - 28VDC external power
  - Intercom connection
  - PTT out to intercom
  - RS232/NMEA position data
  - Headset connection
- BNC antenna port
- USB Type-C for charging and configuration

The PNG BST30/35 has a limited two letter display and 4 navigation buttons allowing limited configuration and status control.

NOTE: The antenna port shall always be terminated when the base station is powered. Failure to terminate the antenna port may destroy the output amplifier.

2.4 Power on/off

The PNG BST30 will by default automatically turn on when power is applied either to external power or USB power. The BST35 will be turned on when the on-button is pushed (battery mode), or power is supplied through USB or external power lines.

The system will conduct an initial in-built test, and any errors will be displayed.

After power-up, the system loads the last used configuration and is ready for use.

The system can be turned off by a push and hold of the power off button for 3 seconds. The system can be re-activated through a short push on the on button. At re-activation, the last used configuration is loaded.

It should be noted that default power on and charging behavior can be controlled through device configuration and the Axnes device configuration tool PolyConnect.

2.5 Noise cancelling

The BST30/35 implements active noise cancelling of the microphone signal from the headset port. Noise cancelling ensures very high performance of the VOX operation, and speech intelligibility, even in extremely noisy environments such as directly in front of a landing helicopter or similar. The noise cancelled signal is transmitted on the radio and used in the side tone. When using the headset port of the BST30/35 in windy environments, the microphone should always have a windsock mounted.

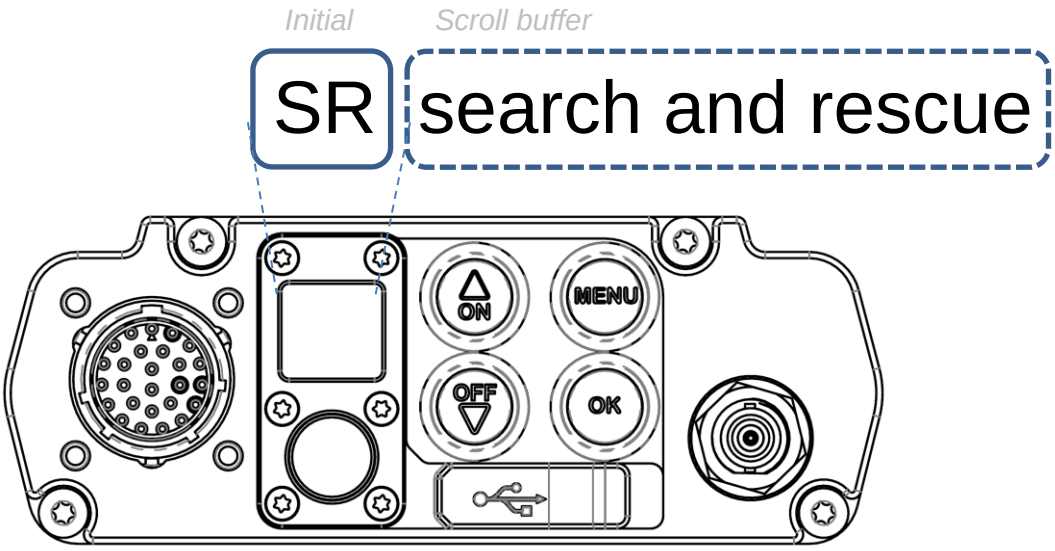
2.6 Microphone detect

The BST30/35 headset port implements active microphone detection when a headset is connected. The BST30/35 will identify the microphone type and set parameters for gain, impedance and bias accordingly. The active microphone detect can be disabled in the menu, and microphone type can be manually set. It is recommended to use active microphone detect.

When a headset is detected the arrow up/down button will have the function of volume control independent of the key lock status. When key lock is lifted the arrow up and down will be part of the menu navigation.

Without a headset detected the arrow up/down button will follow the key lock status and be part of the menu navigation.

The BST30/35 implements vocal audio feedback on some of the user operations if a headset is connected to the headset port. The vocal feedback helps with the navigation and alerts the operator of unintended operation of buttons and functions.

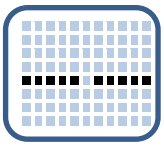


The display can show two letters at a time and implements scrolling of text to display longer strings. Most menu entries are therefore presented with a two-letter acronym, before the full menu name is scrolled.

2.7 Power on/off

The BST30/35 is turned on by pressing the volume up/ON button. The BST30/35 will start up in the last used configuration/mode. At power up, the configured name of the unit is displayed. If no specific name is configured, the BST30/35 displays the last four digits of the serial number.

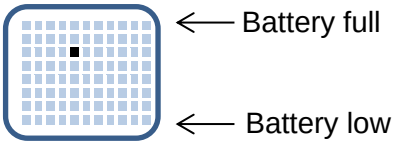
The BST30/35 is turned off by holding the volume down/OFF button for 3 seconds, until a double dash is displayed to indicate shutdown.



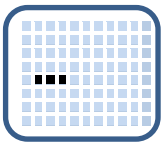
2.8 Display indications

Power on and active mode: When the BST30/35 is powered on and in radio on mode (default power up state configurable) the unit will display a standby mode. The standby mode is indicated by one blinking dot in the display, indicating that the base station transmits, and

handsets can connect to the base station. The vertical position of the dot indicates battery status for battery operated units.

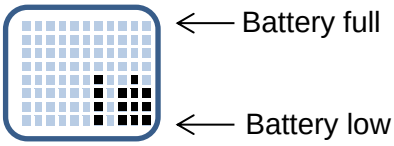


Power on and radio off mode: When the BST30/35 is powered on and in radio off mode (default power up state configurable) the unit will display a radio off mode. With the following symbol:



The radio on off mode can be toggled by pressing arrow up and arrow down simultaneous for 2 seconds.

Charging: When the BST30/35 is placed in a charger, the charge status is indicated with a battery symbol and a bar indicating the charge status. The battery is animated when charging and steady when charging is prevented (due to temperature) or battery full.



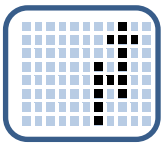
Connected to external power and not charging:

When external power is supplied through the 28V input and charging from this port is disabled, or

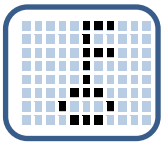
USB charger of 45W is connected and charging is disabled, or

a USB charger of insufficient power is connected,

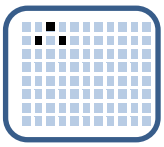
the following symbol is displayed (only BST35):



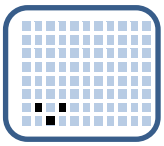
Keylock: When operating the menu key in in keylock mode the following symbol is displayed.



Transmit: When the BST30/35 is transmitting audio, the transmit status is indicated with a blinking arrow pointing upwards.



Receive: When the BST30/35 is receiving, a blinking arrow pointing downwards is displayed.



2.9 Adjusting headset volume

Depending on the headset/helmet connected to the BST30/35, the volume may be individually set to preferred volume by using the volume up/down buttons. When the BST30/35 is power off-on cycled, it will start up with a default volume setting.

2.10 VOX / PTT mode

The default headset mode can be set in the device configuration. If VOX is selected as default, when a headset is connected to the BST30/35, it will by default be set to VOX mode. It will remain in VOX mode until PTT mode is activated by pressing the PTT button on the cable harness.

When the BST30/35 is in PTT mode, the default mode can be reactivated by disconnecting and reconnecting the headset.

2.11 VOX sensitivity

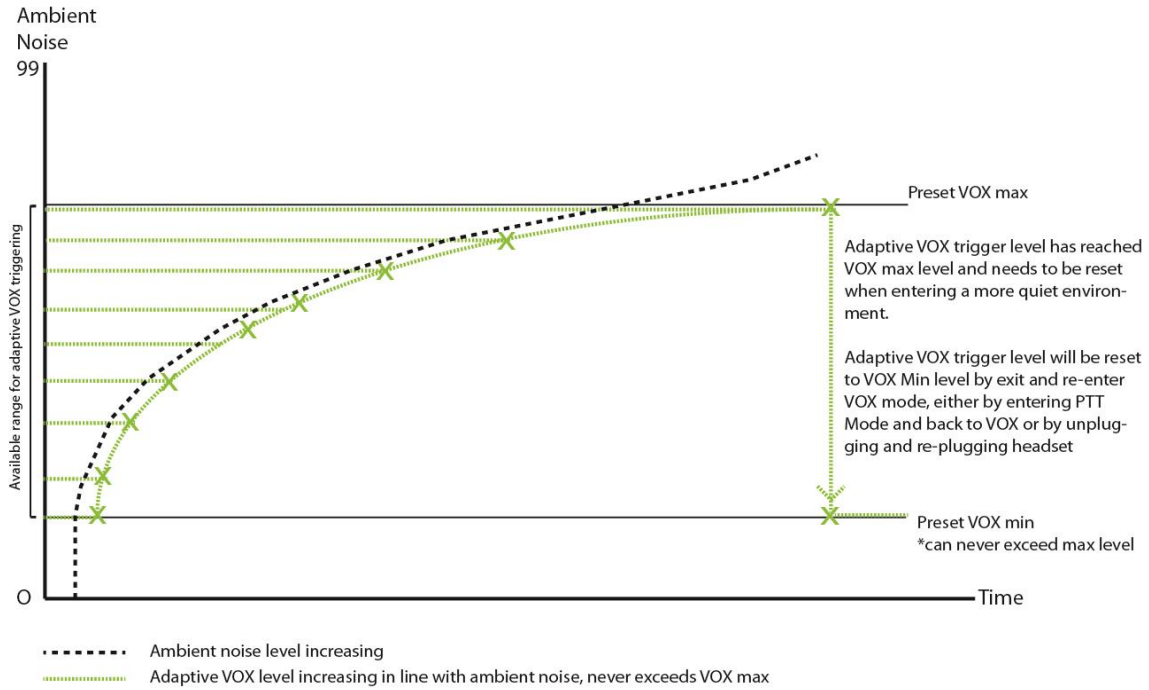


Figure 2-1 VOX trigger level functionality

The BST30/35 has automatic VOX sensitivity. When starting the BST30/35, the VOX trigger level starts at the VOX Min level (set in the menu). If the ambient noise level rises, the VOX trigger level may adaptively increase. The VOX trigger level will not adapt to lower ambient noise, and user intervention may be required. The maximum possible VOX trigger level is limited by the VOX Max level (set in the menu).

If the VOX trigger level is experienced too high by the user, it can be reset by either leaving VOX mode, entering the VOX Min menu or by disconnecting/connecting the headset (Note: By disconnecting the headset cable from the BST30/35, the water resistance is broken, thus should NOT be done in a humid environment).
All three actions will reset the VOX trigger level to the configured VOX Min level.

The VOX trigger level can be automatically adjusted to VOX Max level by entering the VOX Max menu.

NOTE 1: The VOX trigger level can be increased by exposing the microphone to a steady noise, e.g. by a careful steady blow into the microphone until the sidetone disappears. The trigger level will increase as indicated to the user by monitoring the side tone.

NOTE 2: To avoid excessive use of battery and radio capacity, it is important that the VOX level is set to an appropriate level to avoid inadvertent transmission.

2.11.1 Configuring the VOX Min and VOX Max level

To set the correct VOX Min level, the following procedure can be followed:

- Enter the VOX Min menu.
- Tune the VOX Min level so that the VOX is triggered when your normal operational voice level triggers a sidetone.

To set the correct VOX Max level, the following procedure can be followed:

- Enter the VOX Max menu.
- Tune the VOX Max level so that the VOX is not triggering a sidetone until you are shouting as loud as expected in the noisiest operational condition.
- After tuning the VOX Max level, enter the VOX Min level menu to reset the trigger.

Note 1: When tuning the VOX Min or Max level, the BST30/35 is transmitting according to selected configuration or chosen channel. It is therefore recommended to avoid VHF channel 16 when doing VOX testing/configuring.

Note 2: If setting the VOX Max to a level too low, the VOX will be triggered too often in a noisy environment. The active VOX sensitivity will be hitting the VOX Max level and thus never be able to go high enough.

Note 3: If setting the VOX Max to a level too high, a spike in the ambient noise level will raise the VOX trigger level too much and thus no shouting will be loud enough to trigger the VOX.

2.12 Key lock

The configuration and menu keys are protected with key lock to avoid inadvertent change of operational mode.

The keys are unlocked by pressing OK and MENU simultaneously.

Key lock is reactivated after 20 seconds of inactivity.

When key lock is active, the following status information is available by pressing:

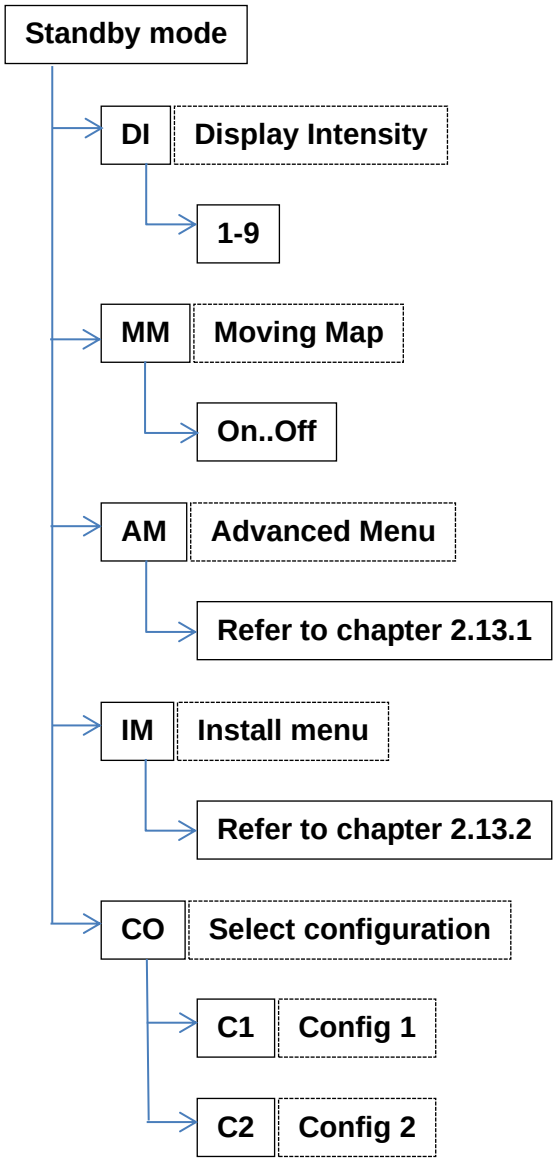
Arrow up and down without headset connected: Current selected configuration/channel

Arrow up and down with headset connected: Headset volume is adjusted

Unlocking the keys will open the menu at last used menu entry.

2.13 Menu

The first push on the MENU button will activate the last used menu entry. The configuration up or down buttons are used to navigate the menu tree. The OK button will select the active entry or setting, and configuration up or down will increase or reduce the value of the selected entry. The MENU button will step one level up in the menu hierarchy.
The menu hierarchy has two levels, one top-level which may be used during operation and one sub-level which may be used for more permanent configurations. The menu is illustrated below:

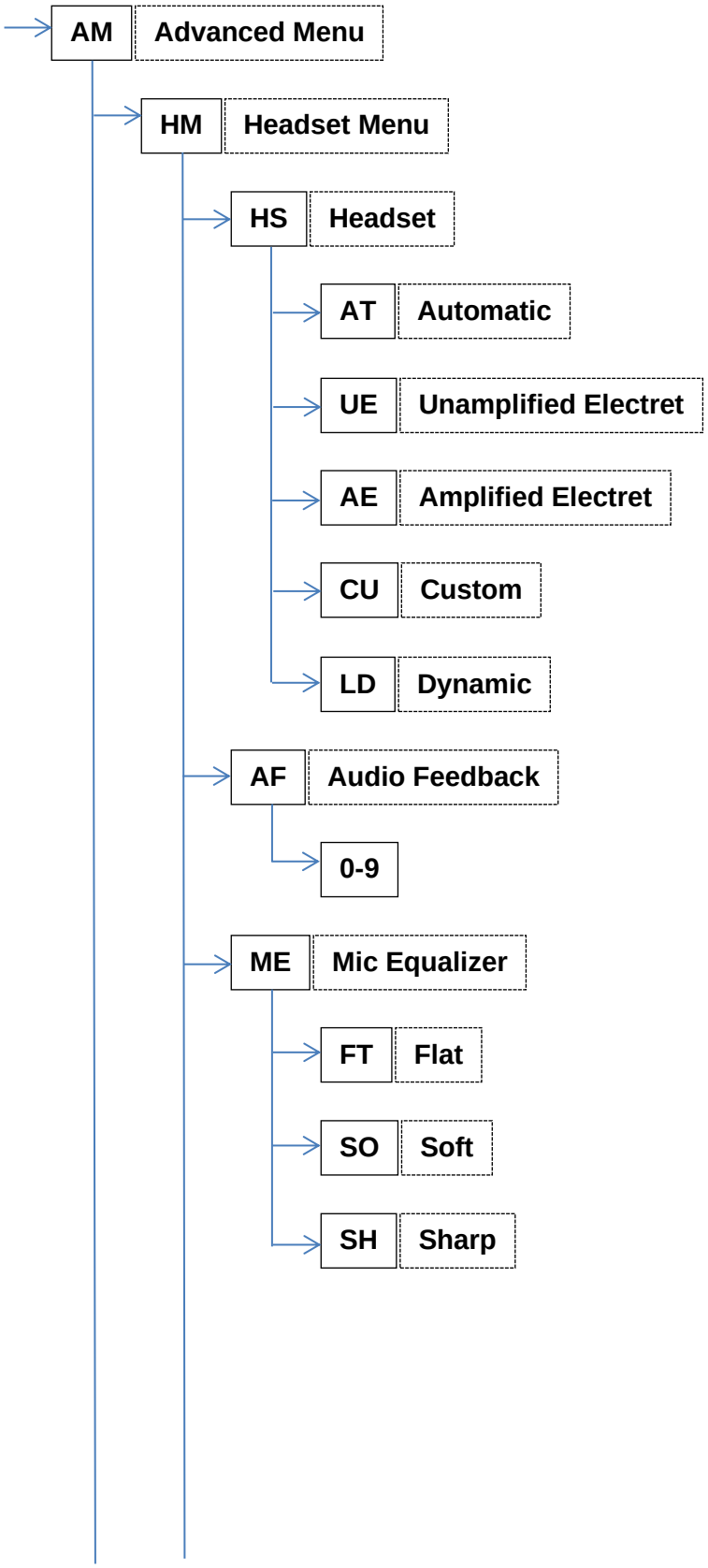


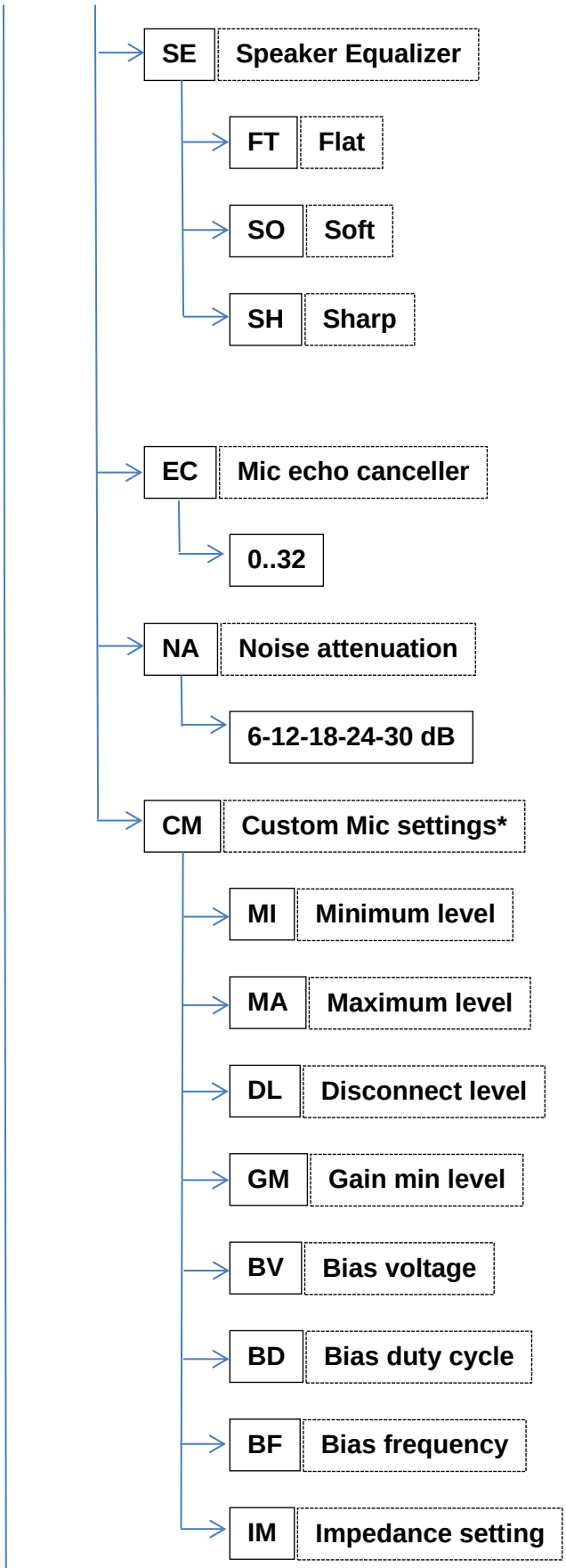
Display Intensity: Display illumination intensity can be regulated in steps between 1-9. The setting is persistent over a power off-on cycle. At start up the programmed default intensity is used, and then gradual adapting to the user selected intensity over a few seconds.

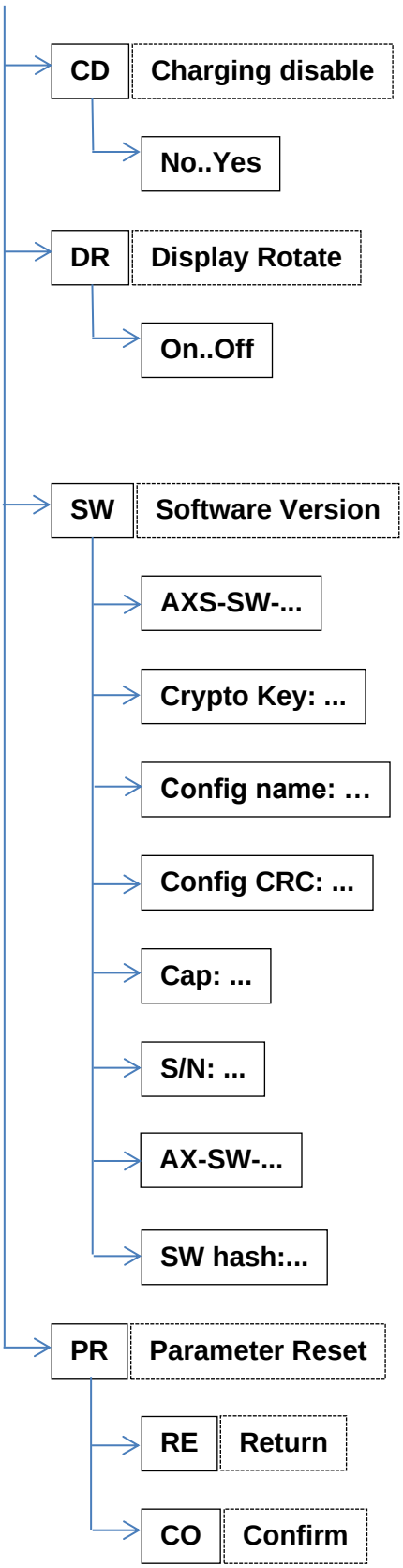
Moving Map: The polling of the handsets position data can be turned on and off. The handset position is reported as NMEA command on the NMEA port of the base station.

Select configuration: The predefined configurations set up by the supplier or through the PolyConnect tool can be selected and loaded.

2.13.1 Advanced menu




SE
Speaker Equalizer
FT
Flat
SO
Soft
SH
Sharp
EC
Mic echo canceller
0..32
NA
Noise attenuation
6-12-18-24-30 dB
CM
Custom Mic settings*
MI
Minimum level
MA
Maximum level
DL
Disconnect level
GM
Gain min level
BV
Bias voltage
BD
Bias duty cycle
BF
Bias frequency
IM
Impedance setting



*Note: Custom mic settings shall be adjusted at advice of Axnes representative.

Audio Feedback: The volume of the audio feedback can be set. Setting the volume to zero will disable audio feedback. The setting is persistent over a power off-on cycle.

Headset: By default, the BST30/35 will detect the connected microphone type. It is possible to override this and set the microphone type to be unamplified or amplified electret, custom or low impedance dynamic mic. The setting is persistent over a power off-on cycle.

Mic Equalizer: For best possible sound quality for those receiving your transmission, it is possible to adjust the treble of your transmission. It is possible to choose either flat, soft or sharp. When choosing the best treble setting, a headset connected directly to the intercom should be used for evaluation of your transmission. The preferred choice can differ when changing microphone or windsock. The setting is persistent over a power off-on cycle.

Speaker Equalizer: For best possible sound quality when receiving transmissions, it is possible to adjust the treble of the received transmission. It is possible to choose either flat, soft or sharp. When choosing the best treble setting, a transmission from either another BST30/35 or a headset connected directly to the intercom can be used. The setting is persistent over a power off-on cycle.

Microphone echo canceller: Some headsets are prone to vibrations from ear shell (loudspeaker) transferring down the microphone boom to the microphone causing echo/distortion/feedback. Microphone echo canceller will remove this unwanted earphone to microphone coupling. The phenomena are normally only present at very high-volume settings. The setting set activation point of the echo canceller relative to headset volume setting, e.g. setting 20 will activate echo canceller at volume setting 20 and higher. Setting 0 is echo canceller disabled, and default setting. The setting is persistent over a power off-on cycle.

Display Rotate: This menu is only present if the functionality is enabled in the active configuration. Select which orientation to read the display. Normal setting is to read display from the front of the device. The other direction is typically used for reading the display while the device is in the breast-pocket. The setting is persistent over a power off-on cycle.

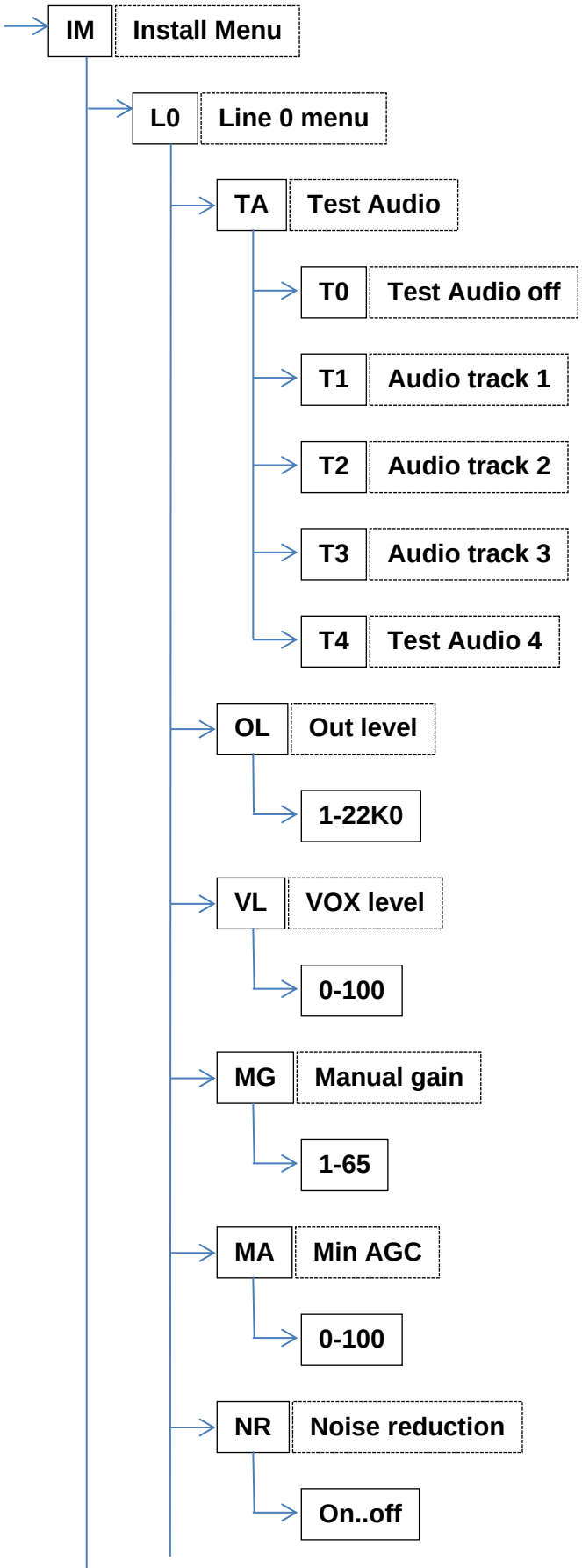
Software Version: Select what to show with the configuration up and down buttons. The following information can be displayed:

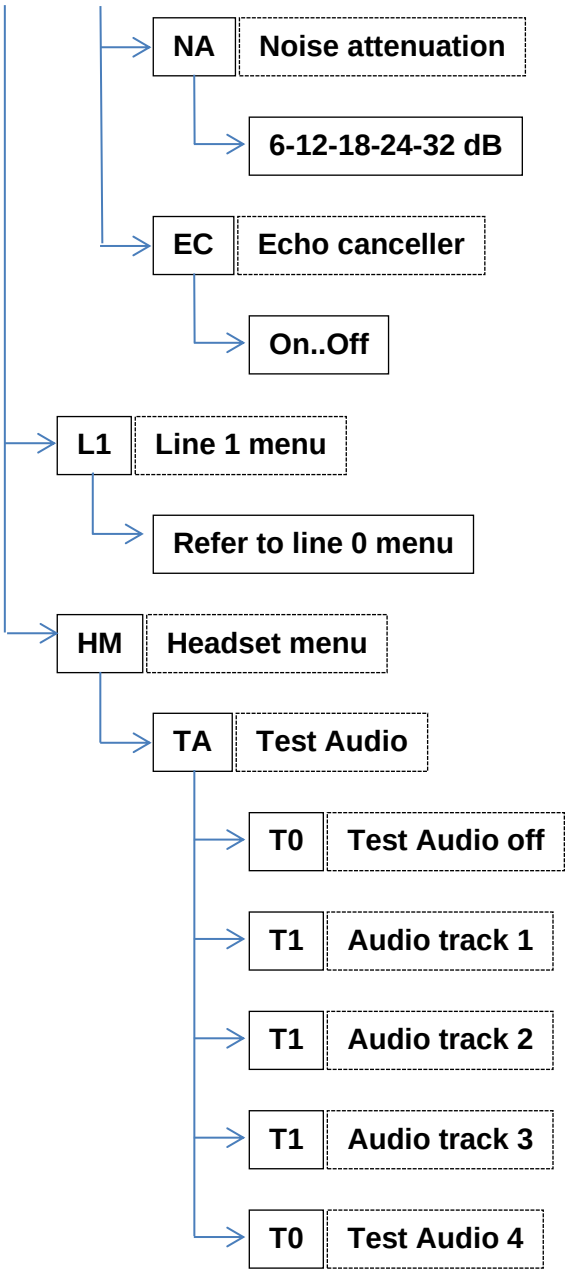
- Main SW version
- Crypto Key Name
- Battery Gauge parameter version
- CRC of the configuration (can be used to identify the configuration)
- Capabilities programmed
- Programmed serial number (Shall match S/N on the Label)
- Boot SW version
- SW hash of main SW.

Parameter Reset: Reset the parameters that can be modified from the Menu back to factory default values. (Squelch, Audio Feedback, Headset type, VOX max. level, VOX min. level, Display intensity). To reset the parameters:

- Enter the Parameter Reset menu
- Change from Return to Confirm with the configuration up or down arrow
- Push OK

2.13.2 Install menu





Test audio: The BST30/35 has several pre-recorded audio tracks that can be played back and sent to the handsets. This can be used to test and configure the system.

Out level: Sets the level of the audio from the BST30/35 to a connected intercom. A low impedance system will normally require lower level than a high impedance system. Adjusting this parameter is essential to avoid echo in the system. Refer to [1] chapter 12 Interfacing to intercom.

VOX Level: The equipment is by default set to minimum VOX level when VOX mode is entered. The VOX trigger level will increase as the environmental audio conditions force the level up. The setting is persistent over a power off-on cycle.

Manual gain: Adjusting for the level received from the intercom. Balancing the intercom level to wireless audio level is essential for optimal operation of the system. Refer to [1] chapter 14.3 ICS Tuning.

Min AGC: Selects lower limit for what AGC shall pick up. Refer to [1] chapter 14.

Noise reduction: Turns on and off noise reduction on the line interface.

2.14 Audio feedback

The BST30/35 implements audio feedback on events that are of importance to the operator. The following spoken feedbacks are given:

Locked – Key lock enabled

Unlock – Key lock unlocked

VOX – Entering VOX mode

PTT – Entering PTT mode

Charging – Attached to battery charger

Battery low – Low battery status

Shutting down – System turn off

Temperature high – Unit is operated above recommended temperature

Dynamic – Headset with dynamic microphone connected

Non-amplified electret – Headset with unamplified electret microphone connected

Amplified – Headset with amplified electret microphone connected

The following non-spoken audio feedbacks are given:

Short Bip: Key press indication on volume, configuration, menu and OK keys.

2.15 Error conditions

The BST30/35 will conduct an initial inbuilt test and any errors detected will be displayed with an error code in the display.

If an abnormal condition is detected, an error code will continuously be displayed as:

E[error code]

where [error code] is a vendor specific number.

A malfunction might be corrected by rebooting the system by switching the BST30/35 off and then on again.

If the BST30/35 becomes unresponsive, a hardware reset can be initiated by holding the power OFF button for 12 sec.

If error condition is persistent, the BST30/35 should be sent for service at an Axnes authorized repair center.

2.16 Trouble shooting

Problem	Possible solution
Dim display	If the display is dim and difficult to read, the display intensity will be reset with a power off-on cycle. The display intensity can also be adjusted in the menu, refer to section 2.13 Menu.
Unit will not charge	If the BST30/35 will not charge when connected to a charger, the following should be checked: • Sufficient power rating on the charger (min 45W) • Charging disabled in menu or configuration • Check the BST30/35 temperature. BST30/35 temperature should be between 0°C and 50°C. • Check the charger contact on the BST30/35. Charger contacts should be clean and free of corrosion.
Handsets not connecting to BST30/35	• Check channel settings • Check antenna connection • Check that BST30/35 is in radio on mode • Check that encryption key is identical on base station and handsets

If the problem persists, the BST30/35 should be sent for service at an Axnes authorized repair center. Authorized repair centers are published at www.axnes.com

Section 3: Technical data

3.1 Technical data for BST30/35

3.1.1 Operation

Radio:	Duplex, single frequency
Frequency:	397-470 MHz, customer specified channels
VOX operation:	Axnes Aviation patented NIVOX, ensures no loss and operation in high noise environment
Number of wireless users:	Unlimited
Number of groups:	2
Number of radio configurations:	Up to 20
Encryption:	Scrambling and AES-256
Operating temperature:	BST30: -45°C to +70°C BST35: -20°C to +55°C
Storage temperature:	BST30: -55°C to +85°C BST35: -20°C to +55°C
Moving map interface:	RS232

3.1.2 Power supply

Supply voltage:	12 – 33 VDC, nominal 28VDC
Current consumption (typ):	Operation 180mA (@ 400mW TX and 28V) Charging 1200mA (@28VDC)
Protection:	7A internal fuse Reverse voltage protection
Charger input:	USB-C 45W, wall adapter
Internal battery capacity	70Wh supports 10h usage

3.1.3 Line interface 0 and 1

Line output level:	0.8-850mV rms, 150Ω load impedance, 1KHz test signal 0.46-37.5mV rms, 5Ω load impedance, 1KHz test signal
Line input impedance:	600Ω at 1 kHz
Line input level:	70-5000 mV rms
PTT out:	Supported on audio interface 0. Open collector output, active low with an option for two level (470R an 0R).

3.1.4 Headset interface

Line output level:	Adjustable up to 0.5W in 8 ohm load, 1KHz test signal. Speaker signal is ground referenced, allowing for single ended headsets
Line input level:	Dynamic, Electret, amplified Electret with automatic microphone detection
PTT in:	Active ground, internal pullup.

3.1.5 Connectors

Power and audio interfaces:	Amphenol 451 02 Y 20 41 P 50
Antenna port:	BNC female
Service and configuration port:	USB type C

3.1.6 Radio characteristics

Frequency:	397-470 MHz (customer configurations) Note 1.
Channel separation:	25 KHz
Modulation:	16QAM/8PSK
Frequency stability:	<5 ppm
Receiver sensitivity	<97dBm at BER 10^{-2}
Output power:	30-400 mW (nom 400 mW)
Antenna impedance:	50 Ω

3.1.7 Dimensions BST30/35

Physical dimensions:	141x53x134 mm (incl connectors)
Weight:	BST30: 890 g BST35: 1160 g

3.1.8 Material

Material:	Powder painted aluminum chassis

Note 1: The following birdie frequencies should be avoided if possible, because of reduced receiver sensitivity: 408, 420, 432, 444, 456, 468 MHz.

3.2 BST30/35 Connector pinout

BST30/35 Connector P1 pinout:

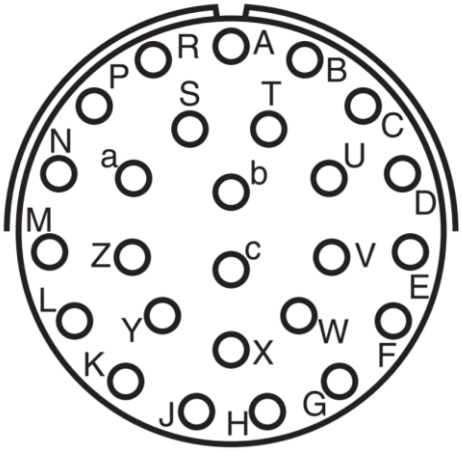


Figure 3-1

Pin	Name	Function
A	Line 0 In+	Balanced analog line 0 positive inputs to BS from intercom
B	Power GND	BST30/35 externa power supply ground
C	Power In	BST30/35 externa power supply positive, nominal 28VDC
D	Headset Mic-	Balanced against Headset Mic+, analog line inputs from headset microphone to BS
E	Headset Speaker+	Single ended analog output from BS to headset speaker
F	CAN High	CAN Bus High signal. Legacy, typically not used.
G	CAN Low	CAN Bus Low signal. Legacy, typically not used.
H	PTT Out	Discrete logical outputs (output from BS)
J	Reserved	Not to be wired. For future use
K	RS232_TX	RS232 signal from BS to moving map system
L	RS232_RX	RS232 signal to BS. Not to be used. Future options.
M	Line 1 Shield	Shield termination for line 1.
N	Line 1 Out +	Balanced analog line 1 positive outputs to intercom from BS.
P	Line 0 Out +	Balanced analog Line 0 positive outputs to intercom from BS.
R	Line 0 Out -	Balanced analog line 0 negative outputs to intercom from BS.

S	L Line 0 In -	Balanced analog line 0 negative input from intercom from BS.
T	Line 0 Shield	Shield termination for line 0
U	Headset Mic+	Balanced against Headset Mic-, analog line inputs from headset microphone to BS
V	Headset GND	Headset ground, single ended reference for headset speaker.
W	Intercom GND	Intercom ground (optional)
X	Headset PTT In	Discrete logical inputs (input to BS)
Y	Power out	Programmable power out. Default disabled.
Z	Line 1 In+	Balanced analog Line 1 positive inputs from intercom to BS.
a	Line 1 Out-	Balanced analog line 1 negative outputs from BS to intercom.
b	Line 1 In-	Balanced analog Line 1 positive inputs from intercom to BS.
c	Headset Shield	Shield termination for headset

Power out, PTT and RS232 signals shall be referred to intercom ground.

PTT in supports two level PTT, were PTT1 is indicated with ground, and PTT2 is indicated with 470 ohm to ground.

For further detailing of pining refer to [1].

Section 4: Recommended maintenance and storage

The PNG components service and storage requirements are listed in the table below. The indicated storage temperature short term is temperature range for transport.

Any repairs are to be undertaken by Axnes AS or approved partners only.

It is recommended to keep the unit clean with a moist cloth and remove any dirt dust and salt deposits. Protective oil can be used on fasteners as applicable. Clean electrical contacts when disconnected as needed.

Latest service information and approved service centers will be available at Axnes resource website:

http://www.axnes.com/

or contact Axnes AS at:

Phone: +47 37 04 08 00

Email: post@axnes.com

Item	Service interval	Storage	Range
BST30	On condition	Temperature short term	-55 to 85 ºC
		Temperature long term	5 to 35 ºC
		Environment	Indoors, dry, non-condensing
		Conditioning interval	NA
		Conditioning procedure	NA
		Shelf life	NA
BST35	3 years, battery and seal replacement	Temperature short term	-20 to 55 ºC
		Temperature long term	5 to 35 ºC
		Environment	Indoors, dry, non-condensing
		Conditioning interval	6 months
		Conditioning procedure	Recharge battery to charge state 50-70%
		Shelf life	24 months from delivery to first time operational use when fulfilling conditioning requirement

Section 5: Accessories

The PNG BST30/35 Base stations are delivered without any support equipment or accessories, as the need for those are dependent on the configuration, install and use case.

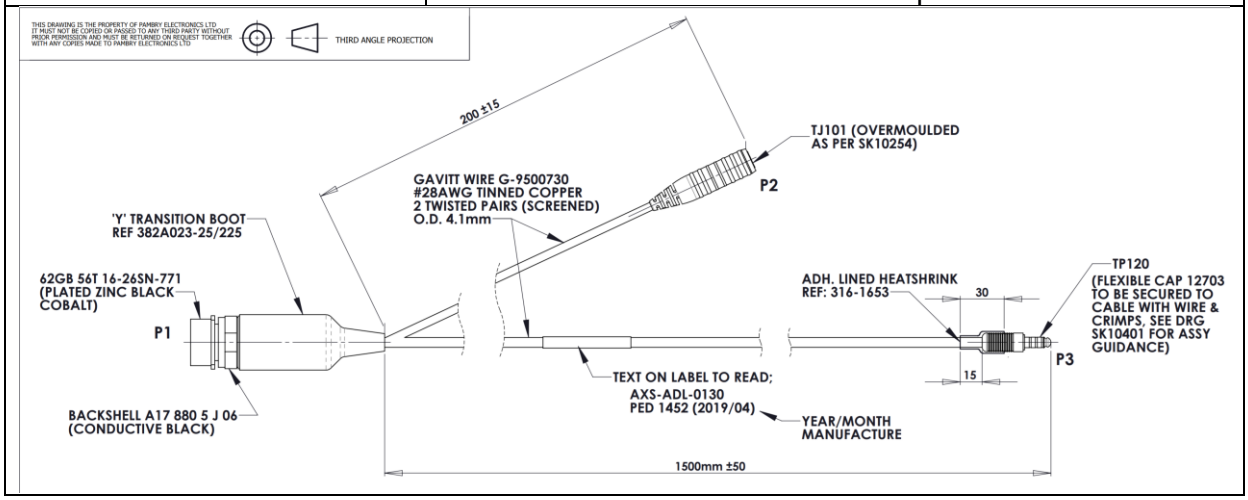
It is recommended to consider order the following components from Axnes:

- USB Charger if the unit is battery operated, and will not be charged from aircraft/vehicle power supply
- Antenna matching the frequency band and installation requirements
- Adapters for power supply and intercom connection, depending use case and installation requirement
- Pouch for carrying or temporary install

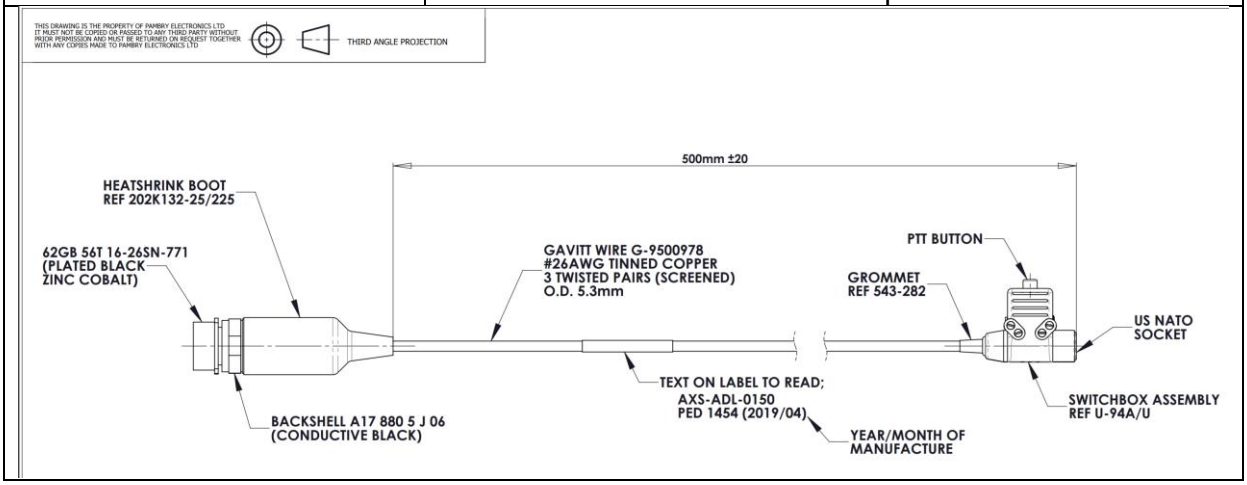
For complete list of accessories, contact an Axnes sales representative.

AXS-ACC-0050	Pouch, Black, Mollle for BST3X
AXS-CHG-0350	USB Charger, EU, for BST35
AXS-CHG-0351	USB Charger, US, for BST35
AXS-ANT-0500	Antenna, 400-450 MHz, 150mm BNC
AXS-ANT-0510	Antenna, 420-470 MHz, 150mm BNC
AXS-ACC-0050	Pouch, Black, Mollle for BST3X

AXS-ADL-0130	BST3X Headset/Intercom Audio Adapter



AXS-ADL-0150	BST3X Audio & PTT Headset Adapter



Section 6: Qualifications

The PNG system is qualified to the relevant sections of FCC 47 CFR PART2,Part 15B, PART 90.

Note 1: Changes or modifications not expressly approved by Axnes AS can void the user's authority to operate the equipment.

Note 2: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Note 3: The BST30/35 must be installed on a fixed location where personnel will not be closer than 20 cm from the antenna.

Section 7: Abbreviations

AES	Advanced Encryption Standard
AIS SART	Automatic Identification System Search And Rescue Transmitter
BS	BaseStation
CP	Control Panel
CRC	Cyclic Redundancy Check. Used for validation of datasets.
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HH	HandHeld
HS	HeadSet
HW	Hardware
ICS	InterCom System
MMI	Man Machine Interface
NIVOX	None Interrupted Voice activated transmission
NVG	Night Vision Goggles
PNG	Not an acronym, PNG is the name of the new system
PTT	Push To Talk
SW	Software
UART	Universal Asynchronous Receiver Transmitter
UHF	Ultra High Frequency
UI	User Interface
USB	Universal Serial Bus
VHF	Very High Frequency
VOX	Voice Activated Transmission