PNG MP50 Transceiver Release 2

with AXS-SW-0221

and

PNG CHG50 / CHG55 Charger

Operation Manual

Document number:	AX-PNG-UMAN-1220
Revision:	Issue C
Date:	2018-Jun-05

Revision history

Revision	Date	Description	List of effective pages
Issue A	2017-11-10	First revision for Release 2 (AXS-SW-0221)	
Issue B	2018-02-23	Included MP50M, and corrected initial dimming	
Issue C	2018-06-05	Included references to FCC standards Clarified that direct mode is unencrypted Clarified optional menus Corrected SW version number text Included description of saturated message	

Table of contents

Intentionally left blank

Section 1: General information

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.
- Interception free 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.
- 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 minimising 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.

1.1 System

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 PNG Base Station and one or more handheld rechargeable radios (MP50), chargers for the handhelds, as well as an optional PNG Control Panel connected to the PNG Base Station. The PNG Base Station and Control Panel are installed in the aircraft and supplied with power from the aircraft system.

The MP50 implements functionality to suppress surrounding noise, and to secure optimal voice activation performance. It implements 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 MP50 is designed to be mechanically robust and waterproof down to a depth of 3 meters to withstand extreme operating scenarios typically experienced in a SAR configured air craft.

The MP50 is available in two versions, MP50 with Li-Ion battery and MP50M with NiMh battery.

Through the internal microphone in the MP50, it is possible to communicate with the survivor/ground rescue party without helmet removal.

Depending on the configuration and part number, the MP50 is equipped with a GPS receiver. The position of the MP50 may be polled by the PNG Base Station, and presented on the PNG Control Panel in the aircraft. In addition the Base Station can be connected to a moving map system and send handheld position data at regular intervals.

The PNG Base Station is typically connected to the aircraft ICS, and may support multiple connection points for audio. The base station is capable of delivering a PTT signal to other systems, as well as triggering transmission based on a received PTT signal or VOX activation.

1.2 Radio

The PNG system operates a wireless link between the base station and the MP50 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 base station will support the full 397 to 470 MHz range (depending on the antenna installation in the aircraft), while the MP50 supports 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 MP50 operates at an output power of up to 400mW using a licence 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 three simultaneous transmitting handhelds.

The MP50 supports Maritime VHF mode, and channels can be configured in the 156-162 MHz band.

1.3 Identification of article

PNG Transceivers in the **MP50** series with part numbers in the **AXS-HH-XXXX*** series.

PNG Table Chargers in the **CHG50** series with part numbers in the **AXS-CHG-010X*** series

PNG Aircraft Chargers in the **CHG55** series with part numbers in the **AXS-CHG-015X*** series

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

Section 2: Operation

The PNG system consists of one PNG Base Station and one or more handheld radios (MP50). 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 and 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 configurations. 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 base station is normally not changed, but may be required in some special conditions. Such conditions may be caused by radio interference, where alternative frequency 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 MP50 supports organising the communication on the wireless link into groups. Groups are a set of duplex audio channels on the wireless link, and a set of physical audio interfaces on the PNG Base Station. The PNG system will support 2 groups depending on the available radio resources (channel bandwidth).

The MP50 is 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 MP50.

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

2.2 Configurations

Both the MP50 and the PNG Base Station use configurations to control the behaviour of the devices. They can hold a number of configurations, with different operation 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 base station to the intercom)

The different pre-programmed configurations can be selected at start or during mission from the PNG Control Panel. 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, EMS and MEDIVAC missions.

On the MP50, 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 intercom user data are encrypted according to the AES-256 encryption standard before they are transmitted over the air. When delivered from factory, the PNG handheld 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.

Note: Direct mode communication (Maritime VHF, and other FM modulated configurations) is open unencrypted communication. Only communication through BST50 is encrypted.

2.3 Noise cancelling

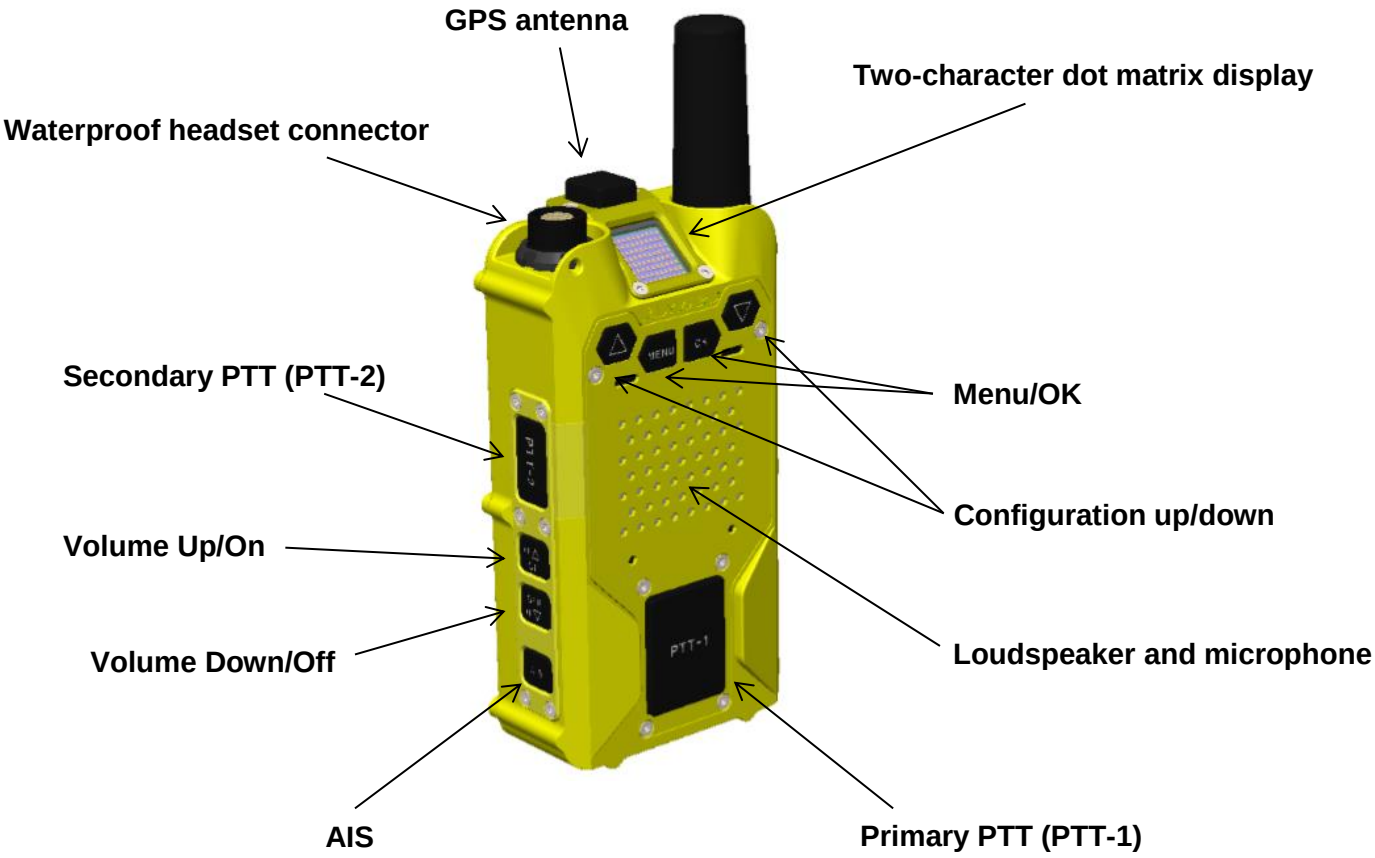
The MP50 implements active noise cancelling of the microphone signal. Noise cancelling ensures very high performance of the VOX operation, and speech intelligibility, even in extremely noisy environments such as directly in front of a landing helicopter or similar. The noise cancelled signal is transmitted on the radio, and used in the side tone. When using the MP50 in windy environments, the microphone should always have a windsock mounted. It should be noted that in quiet environments the noise cancelling can be noticed as a light noise in the side tone during the quiet periods, and should be expected.

2.4 Microphone detect

The MP50 implements active microphone detection when a headset is connected. The MP50 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.

If no microphone is detected, the MP50 will be in walkie-talkie mode.

2.5 General UI



The MP50 is equipped with a small dot matrix display located at the top, angled to be readable from front and top. There are two PTT buttons: one large primary located at the front, and a smaller secondary located at the side of the unit.

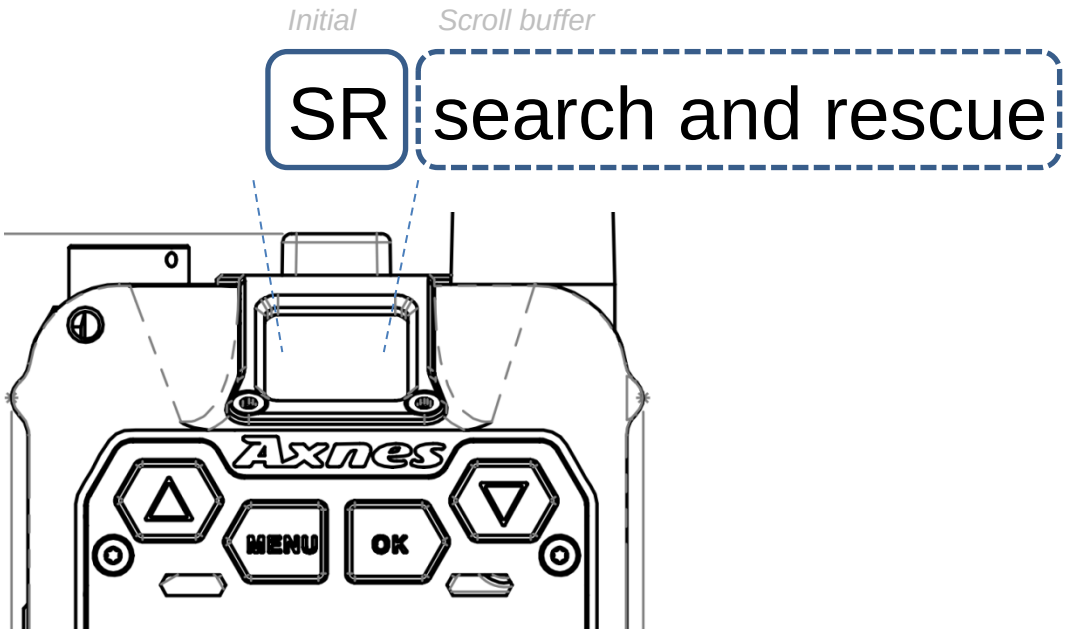
The primary PTT is protected by extrusions to avoid inadvertent activation, as well as allowing localization of the button when operating in low visibility.

The volume control and power ON/OFF buttons are located on the side of the unit.

There is also an AIS button for activating sending of position reports compatible with the AIS system. Activation of position reports will send AIS-SART formatted messages. The AIS compatible functionality can also be activated remotely from the PNG Control Panel.

On the front, there are two buttons for selecting the active configuration when in intercom mode, or the active channel when in direct mode. There are also two buttons for menu navigation (MENU and OK). These four buttons (MENU, OK, configuration up and configuration down) are used to implement a four-way menu navigation.

The MP50 implements vocal audio feedback on some of the user operations. The vocal feedback helps with the navigation and alerts the operator of unintended operation of buttons and functions.



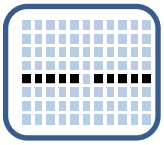
The display can show two letters at a time, and implements scrolling of text to display longer strings. Most menu entries are therefore presented with a two-letter acronym, before the full menu name is scrolled.

2.6 Power on/off

The MP50 is turned on by pressing the volume up/ON button. The MP50 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 MP50 displays the last four digits of the serial number.

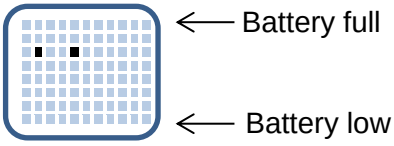
If the MP50 is turned on in intercom mode, it will immediately start searching for the base station.

The MP50 is turned off by holding the volume down/OFF button for 3 seconds, until a double dash is displayed to indicate shutdown.

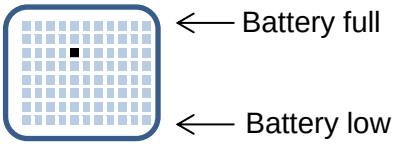


2.7 Display indications

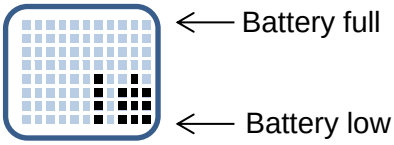
Searching for intercom: When the MP50 is turned on and searching for intercom, the display will indicate active searching with two alternating blinking dots in the display. The alternate blinking dots will stop as soon as a connection to the base station and intercom has been established. The vertical position of the two blinking dots indicates the battery status.



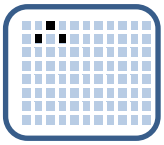
Connected to intercom and battery status: When connection to the intercom has been established, the unit will display a standby mode. The standby mode is indicated by one blinking dot in the display, indicating that the base station and intercom are connected. The vertical position of the dot indicates battery status.



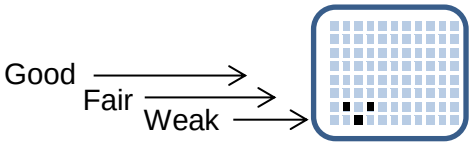
Charging: When the MP50 is placed in a charger, the charge status is indicated with a battery symbol and a bar indicating the charge status. The battery is animated when charging and steady when charging is prevented (due to temperature) or battery full.



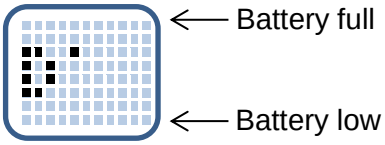
Transmit: When the MP50 is transmitting, the transmit status is indicated with a blinking arrow pointing upwards.



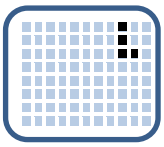
Receive: When the MP50 is receiving, a blinking arrow pointing downwards is displayed. The position of the arrow indicates the signal strength in three levels: Good, fair and weak.



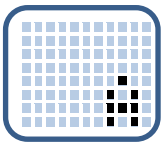
Direct mode indication: When the MP50 is in Direct mode (maritime VHF), a ‘D’ will be blinking in the display in standby mode



Local mode indication: When the MP50 is in person-to-person/Local mode, ‘L’ will be blinking in the display in standby mode.



AIS indication: When the AIS functionality is active, ‘A’ will be blinking in the display.



2.8 Walkie-talkie mode

The MP50 can be connected to a headset or it can be used as a handheld walkie-talkie when conditions allow.

In walkie-talkie mode, the MP50 will be operating in half duplex push to talk mode. PTT1 and PTT2 is active as defined in the active configuration.

2.9 Adjusting volume

Depending on the headset/helmet connected to the MP50, the volume may be individually set to preferred volume by using the volume up/down buttons on the side of the MP50. When the MP50 is power off-on cycled, it will start up with a default volume setting.

The volume in walkie-talkie mode and headset mode are set individually.

2.10 VOX / PTT mode

When a headset is connected to the MP50, it will by default be set to VOX mode. It will remain in VOX mode until PTT mode is activated by pressing the primary PTT button.

Pressing the secondary PTT button will not take the MP50 to PTT mode, but activate transmission to the secondary group as defined by the active configuration.

When the MP50 is in PTT mode, VOX mode can be re-enabled by pressing the Configuration Down and the primary PTT simultaneously. A power off/on will reset to VOX as well.

2.11 VOX sensitivity

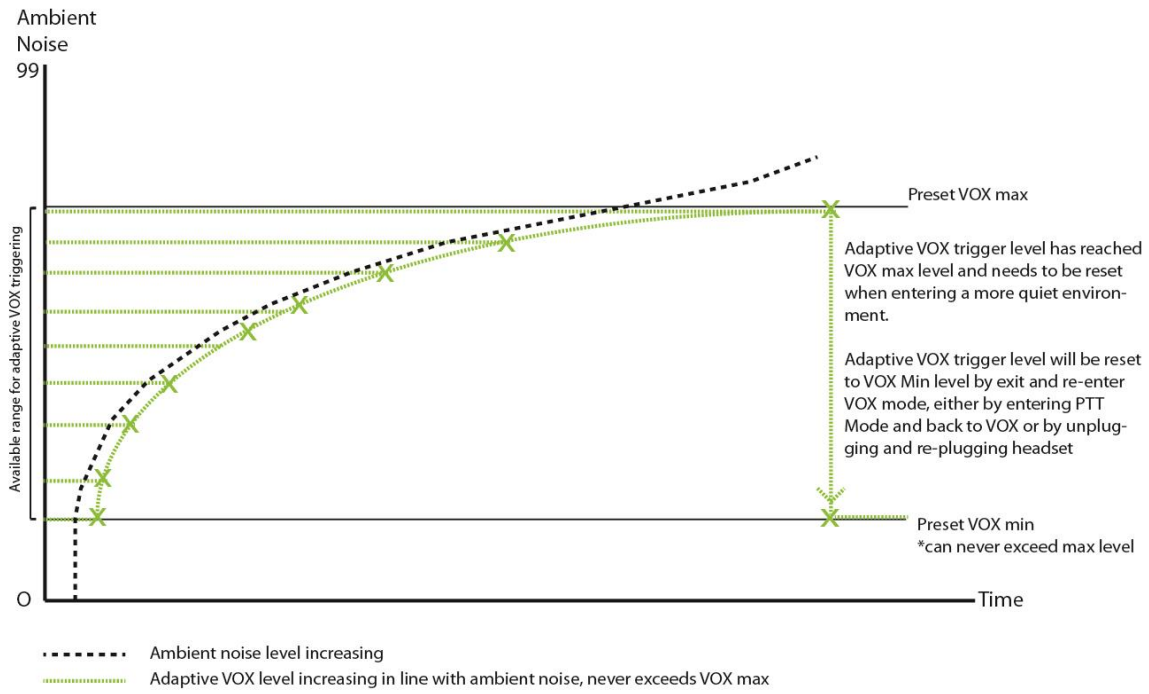


Figure 2-1 VOX trigger level functionality

The MP50 has automatic VOX sensitivity. When starting the MP50, 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 MP50, 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 MP50 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 Local mode

The MP50 has an internal microphone which can be used for casualty communication, by activating Local mode. Local mode is available when a headset is connected.

In Local mode, audio picked up from the surroundings is mixed with any radio received audio and injected into the headset, and allows communication with individuals around the operator without removal of the helmet. The microphone signal from the headset is muted, so the communication between the MP50 operator and the surroundings is not transmitted.

Local mode is activated by pressing the Configuration Up and the primary PTT simultaneously.

To leave Local mode and enter VOX mode, press the Configuration Up and the primary PTT simultaneously.

2.13 Charging

The MP50 is charged when placed in a CHG50 or CHG55 charger. Detection of the charger will be indicated with a battery symbol, and the charge status is indicated with a gradually filling bar as charging progresses.

If the MP50 is turned off when installed in the charger, the MP50 will indicate charging status, but remain in radio off mode.

If the MP50 is turned on when installed in the charger, the MP50 will indicate charging status, and remain in active radio mode.

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.

2.14 Changing configuration/channel

In intercom mode, different pre-configured configurations may be selected by pressing the configuration up or down buttons. The short name of the configuration is displayed before the long name is scrolled.

When in direct mode, the different channels are navigated in the same manner.

2.15 Changing direct/intercom mode

The MP50 has two operational modes. It can be in either intercom mode where it is connected to the aircraft installed PNG Base Station, or it can be in direct mode where it is

communicating over the maritime VHF band. Switching between intercom mode and direct mode is done by pressing both configuration buttons (up and down) simultaneously. When changing mode, the last used VHF channel or last used intercom configuration is activated.

2.16 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:

Configuration up or down: Current selected configuration/channel

OK:

- Battery status indicated as B1 to B9
- Receive signal strength R0 to R9
- GPS lock status (off/searching/locked/sleep)

Even if key lock is active, it is possible to change between direct mode and intercom mode by pressing configuration up/down simultaneously.

2.17 GPS positioning

The MP50 includes a GPS module to allow position reporting to the PNG Base Station. When the positioning is enabled in the MP50 menu, the GPS module operation is controlled by the base station, and no local control is needed. The GPS status can be checked by pushing the OK button while key lock is active, and will give one of the following statuses:

- ‘off’ - the GPS positioning is disabled in the MP50 menu.
- ‘searching’ - the MP50 is searching for GPS signals. If the status continues in ‘searching’ for a long time, it is recommended to move to a position with assumed better GPS satellite coverage.
- ‘locked’ - the MP50 has got a GPS lock and is able to send position reports to the PNG Base Station.
- ‘sleep’ - the MP50 has had a GPS lock, but no base station is currently polling for position reports. The GPS module goes to sleep mode, but will be reactivated when the base station starts polling for position reports.

2.18 AIS

The MP50 has implemented an AIS-SART compatible device location beacon. This is an optional feature. The position of the MP50 can be sent as AIS-SART compatible position reports. This functionality can be activated either from the MP50 using the AIS-button, or it can be activated remotely from the PNG Control Panel.

Note: The MP50 is not an AIS-SART transponder. The MP50 implements functionality to send AIS-SART compatible messages, to improve ongoing operations.

To activate the AIS functionality from the MP50, press the AIS button for 5 seconds. During these 5 seconds, a blinking “A1” message will cover the screen. After 5 seconds, the “A1” message goes from blinking to steady, meaning that the AIS functionality has been activated. When releasing the AIS button, a small “A” is now blinking in the lower right corner for as long as the AIS functionality is active.

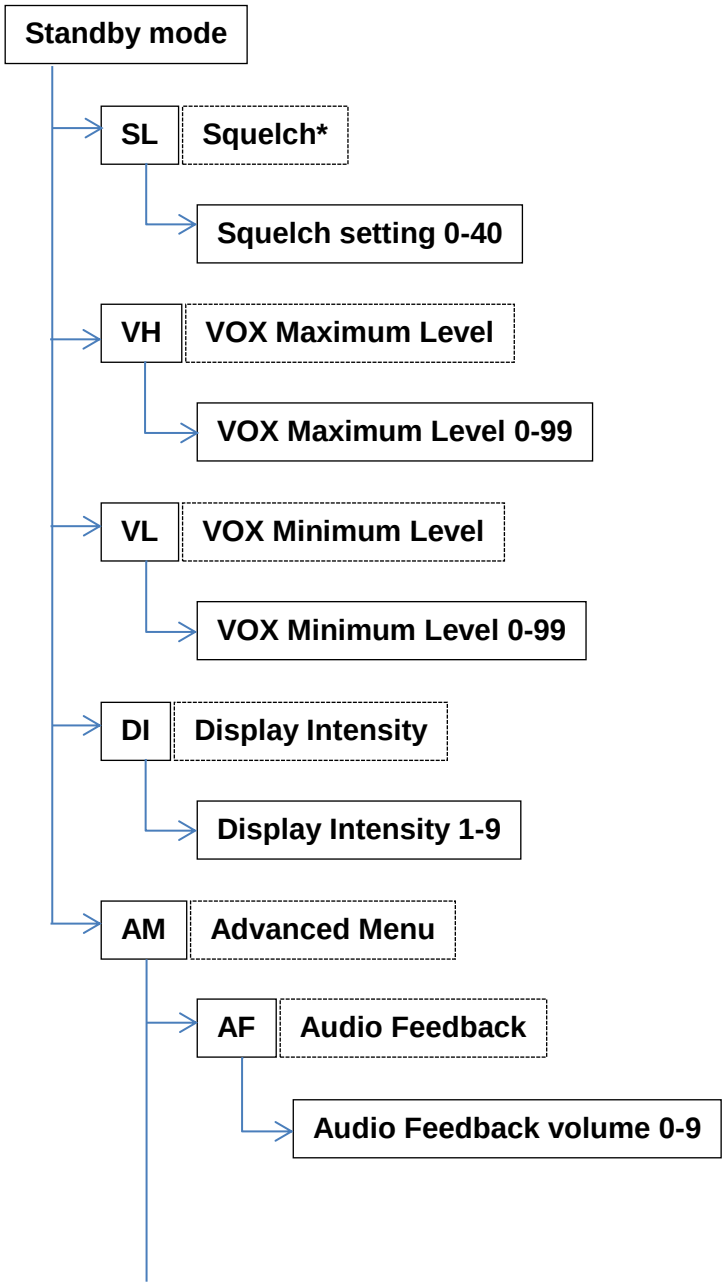
Note: When activating the AIS functionality, the MP50 will start sending distress signals to the surroundings. This shall NOT be used for testing as the signals will be received as real distress signals by AIS-SART receivers. For test purposes, use the AIS Test Mode in the MP50 menu.

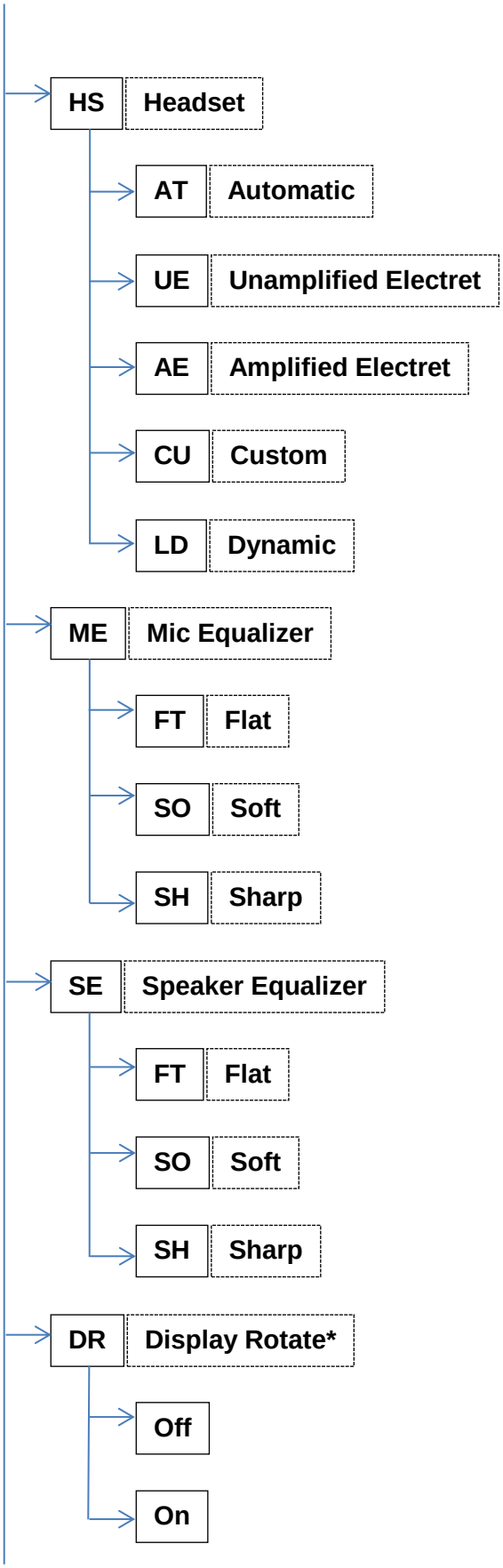
To deactivate the AIS functionality from the MP50, press the AIS button for 5 seconds. During these 5 seconds, a blinking “A0” message will cover the screen. After 5 seconds, the “A0” message goes from blinking to steady, meaning that the AIS functionality has been deactivated. When releasing the AIS button, the small “A” is no longer blinking in the lower right corner.

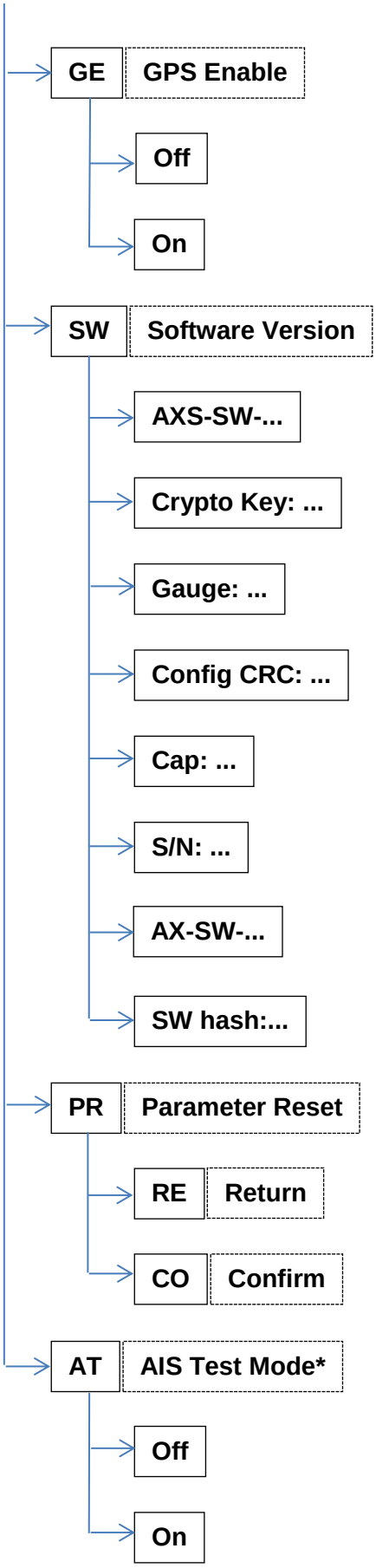
Activation and deactivation of the AIS functionality is announced with an audio message.

2.19 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:







*Note: Menu entries are visible dependent on device configuration or mode.

Squelch: The Squelch setting is only valid in direct mode. Squelch is used to separate white noise from actual transmissions, by adjusting the receive trigger level. Increasing squelch will block white noise and weak transmitters, while reducing the squelch will let weaker transmitters through. The actual setting of squelch is dependent on the operational environment. The setting is persistent over a power off-on cycle.

Note: The Squelch menu is only visible when the MP50 is in direct mode.

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 MP50 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 MP50 or a headset connected directly to the intercom can be used. The setting is persistent over a power off-on cycle.

VOX Maximum Level: When the VOX trigger level increases because of ambient noise, the trigger level can never pass the VOX maximum level, even if the ambient noise indicates that a higher trigger level should have been used. The setting is persistent over a power off-on cycle.

VOX Minimum 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.

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.

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 located in the breast-pocket. The setting is persistent over a power off-on cycle.

GPS Enable: Enable/disable GPS position polling. Minimum rate for position update to base station is affected by the amount of active GPS reporters. Few active GPS reporters will shorten the time between position reports. 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

AIS Test Mode: This menu can be used to send one burst of AIS-SART test messages from the MP50.

2.20 Audio feedback

The MP50 implements audio feedback on events that are of importance to the operator. The following spoken feedbacks are given:

Connected – Connection established to PNG Base Station

Connection lost – Connection to PNG Base Station lost

Locked – Key lock enabled

Unlock – Key lock unlocked

Direct – Direct mode selected

Intercom – Intercom mode selected

Local – Entering Local mode

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

AIS Activated – Sending of AIS-SART position reports activated

AIS Deactivated – Sending of AIS-SART position reports deactivated

Incorrect scrambling key detected – Configured scrambling key not compatible with base station.

Saturated – Radio signal in to MP50 is to strong. May occure if the MP50 is in very close proximity to the BST50 antenna.

The following non-spoken audio feedbacks are given:

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

Short Bip-Bip: A very short audio feedback to indicate audio decode failure. The MP50 has detected a transmission from the PNG Base Station, but not been able to receive and decode fully. Caused by poor radio conditions.

Congestion Biiiip------Biiiiip: Audio feedback to indicate that uplink communication cannot be allocated from MP50 to PNG Base Station. This can be caused by poor radio conditions, or congestion on the radio resources.

2.21 Error conditions

The MP50 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 MP50 off and then on again.

If the MP50 becomes unresponsive, a hardware reset can be initiated by holding the power OFF button for 12 sec.

If error condition is persistent, the MP50 should be sent for service at an Axnes authorised repair centre.

It should be noted that GPS malfunction will not prevent use of the MP50. The GPS status is checked by pressing the OK button in standby. GPS malfunction will be reported as 'GPS Error'.

2.22 Trouble shooting

Problem	Possible solution
No communication with the intercom	If no communication with the intercom can be established, the following should be checked: Check that MP50 operates in intercom mode, refer to section 2.15 Changing direct/intercom mode, and section 2.7 Display indications. Check that MP50 and the PNG Base Station configuration are set correctly, refer to section 2.14 Changing configuration/channel.
No transmit in VOX mode	If the MP50 is not transmitting in VOX mode, this is likely to be caused by too high VOX trigger level. The following actions can be taken: • Reset the VOX trigger level to the configured VOX Min level, refer to section 2.11 VOX sensitivity. • Reduce the VOX Min level, refer to section 2.11 VOX sensitivity. The MP50 may also incorrectly detect the microphone. If the microphone type is known, the microphone detect can be overridden in the menu, refer to section 2.19 Menu.
Continuous transmit in VOX mode	If the MP50 triggers transmit inadvertent, the VOX trigger level may be too low. The following actions can be taken: • Increase the VOX trigger level, refer to section 2.11 VOX sensitivity. • Increase the VOX Min level, refer to section 2.11 VOX sensitivity.
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 2.19 Menu.
White noise in direct mode	If the MP50 receives white noise in direct mode, the squelch may be set too low. The squelch

	should be adjusted to the appropriate level. Refer to squelch setting in section 2.19 Menu.
No reception in direct mode	If the MP50 does not receive in direct mode, the squelch may be set too high. The squelch should be adjusted to the appropriate level. Refer to squelch setting in section 2.19 Menu.
Unit will not charge	If the MP50 will not charge when installed in the charger, the following should be checked: • Check the MP50 temperature. MP50 temperature should be between 0°C and 50°C. • Check the charger contact on the MP50 and in the cradle. Charger contacts should be clean and free of corrosion. • Check leads to charger cradle and that it is powered. The AC adapter has an LED indicating power.
The PNG Base Station does not receive GPS position reports	If the PNG Base Station does not receive position reports from the MP50, this may be due to low signal coverage for the GPS module. The GPS coverage is expected to be limited inside buildings, narrow terrain, and in heavy weather conditions. If the MP50 is used in water, it should be carried so that the GPS module is exposed above water to give the best possible signal reception. Further check that GPS is activated in the GPS menu. Active state is reported as On. Check GPS status by pressing OK button while key lock is on.

If the problem still persists, the MP50 should be sent for service at an Axnes authorised repair centre. Authorised repair centres are published at www.axnes.com

Section 3: Recommended maintenance

All units should be kept clean. The MP50 should be rinsed off with fresh water after exposure to salt water, and charger contacts should be kept clean and free of corrosion.

The CHG50 and CHG55 are operated on condition, and no service intervals are recommended.

CHG55 has rubber details, to keep MP50 in correct position. If friction between the CHG55 and MP50 gets too high, the MP50 can be experienced to be sticky to the CHG55. The rubber details can then be lubricated with silicone paste or other suitable lubrication.

The MP50 has recommended battery and seal change every three years. Latest recommendations shall be checked at Axnes resource website:

http://www.axnes.com/

or contact Axnes AS at:

Phone: +47 37 04 08 00

E-mail: post@axnes.com

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

Section 4: Technical data

4.1 Technical data for MP50

4.1.1 Operation

Radio:	UHF Duplex, single frequency VHF Maritime band
VOX operation:	Axnes AS patented NIVOX, ensures no loss and operation in high noise environment
Number of wireless users:	Unlimited
Number of groups:	2
Number of radio configurations:	52 intercom configurations, 50 VHF channels
Encryption:	AXS-SW-0221 using AES-256
Operating temperature:	-20°C to +55°C with internal battery. -40°C to +55°C with external battery
Charging temperature:	**MP50:** 0°C to +50°C **MP50M:** 5°C to +45°C
Storage temp. (survival):	-40°C to +60°C
Storage temp. (recommended):	+10°C to +35°C
Water resistance:	EN 60629 IP68, 3 meters depth for 30 minutes
Altitude:	25000 feet
NVG:	Optional NVIS class B friendly
AIS SART MMSI:	97071xxxx, where xxxx is the 4 last digits of the device serial number, Note 2

4.1.2 Power supply

Supply:	**MP50**: Internal rechargeable Li-Ion 3.6V 4700mA battery **MP50M**: Internal rechargeable NiMh 3.6V 1600mA External battery option: 5–15V
Operating time (typ):	**MP50:** Standby: 30 hours Transmit: 7 hours Receive: 12 hours **MP50M:** Standby: 11 hours Transmit: 2.5 hours Receive: 4.5 hours **Note:** Actual use time will be affected by battery temperature.
Charging time (typ):	**MP50:** 3 hours **MP50M:** 2 hours Longer charge time may be expected at high and low temperatures.

Protection:	Protection against input voltage polarity swap, over-charge, over-discharge, over-currents, over- and under-temperatures.

4.1.3 Headset Interface

Speaker output level:	Adjustable up to 0.5W in 8 ohm load, 1KHz test signal
Supported Microphones:	Dynamic, Electret, amplified Electret with automatic microphone detection
PTT control:	Support for two alternative PTT inputs
Configuration:	CAN-Bus interface for configuration
Power out:	Auxiliary 5V current limited power available
Power in:	External battery 5-15V

4.1.4 Mating Connectors

Headset:	Fischer AL1231S1031A019SR11-11
Antenna:	SMA female

4.1.5 Radio characteristics

Frequency:	UHF: 397-470 MHz (customer configurations) VHF: 156-162 MHz, Note 1
Channel separation:	25 KHz
Modulation:	FM, 16QAM
Frequency stability:	<5 ppm
Receiver sensitivity	<-97dBm at BER 10^{-2} <-107 dBm at 12 dB SINAD FM
Output power:	30-400 mW (nom 400mW)
Antenna impedance:	50 Ω

4.1.6 GPS

Operation:	Remote activation
GNSS:	GPS
GPS channels:	48
Time to First Fix:	< 1s hot start, < 35s cold start
Sensitivity:	-155 dBm tracking, -140 dBm cold start

4.1.7 Dimensions

Physical dimensions:	131 x 69 x 33 mm

Weight:	445g

4.1.8 Material

Material:	Aluminium 6082-T6 / 5042 (Salt Water Resistant) Silicon rubber details
Colour:	Available in Yellow, olive green or black.

Note 1: The following birdie frequencies should be avoided if possible because of reduced receiver sensitivity: 156, 408, 420, 432, 444, 450, 456, 468 MHz.
US market is limited to 405-470MHz.

Note 2: Availability of function is market dependent.

4.2 Technical data for CHG55

4.2.1 Operation

Operating temperature:	-45°C to +70°C
Storage temperature:	-55°C to +85°C
Thermal fuse:	Optional 100°C resettable thermal fuse

4.2.2 Power supply

Supply:	12-32V DC, Nominal 28V DC
Protection:	3A Fuse on input. Protection against input voltage polarity swap. Protection against over-voltage on input supply (triggered at 33VDC). Current limit on input supply (2A). Current limit on output (1.8A) allowing short circuit on output.

4.2.3 Connectors

Unit mounted power:	Amphenol: MS3112E-8-4P

4.2.4 Dimensions

Physical dimensions:	91x171x82 mm

Weight:	420g

4.2.5 Material

Material:	Aluminium 6082-T6 / 5042 (Salt Water Resistant)
Colour:	Available in Yellow, olive green or black.

4.3 Technical data for CHG50

4.3.1 Power supply

Supply voltage:	90 – 264 VAC
Mains Plug supported	Australia, US/China, British and EU. Changeable.
Output:	12VDC / 2.5A
Operating temperature	-10°C to +40°C
Storage temperature	-20°C to +85°C

4.3.2 Dimensions

Physical dimensions adapter:	W=43mm, H=82 mm, D=35 mm
Physical dimensions deskstand:	W=80mm, H=58,1 mm, D=57,1 mm
Adapter Weight:	250g
Deskstand Weight:	222g

4.3.3 EMC and Safety of power supply

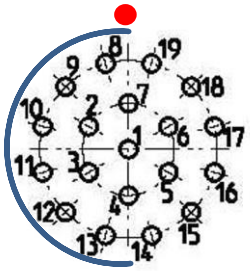
CEC Mark	Complies with standby power (@ no load) < 0.3 W.
EMC—Radiated/ Conducted	EN55022, CISPR22, FCC Part 15 Class B
Agency Approvals	UL / TUV / EN60950—1, CE, CB
Safety Standards	UL, CE, CB, EN60950-1
EMC—Environmental	EN61000-3-2,3 EN61000-4-2,3,4,5,6,8,11

4.3.4 Material

Material:	Aluminium 6082-T6 / 5042 (Salt Water Resistant)
Core block:	POM (Polyoxymethylene) uncoated.
Colour:	Core block: Matte Black, TH110-7005 Dynalon. Cradle: Semi-gloss yellow, LV351-RAL 1016

Note: Should only be used with supplied power supply.

4.4 MP50 Connector pinout



Pin	Function	Levels
1	GND	Digital ground
2	USB D+	For future use, do not connect
3	USB D-	For future use, do not connect
4	USB id	For future use, do not connect
5	PTT1	Connect to ground for PTT1 activation. Otherwise open.
6	For future use (spare)	Do not connect
7	Power/VBUS	5V max 20 mA
8	CAN_H	CAN BUS high for device programming
9	CAN_L	CAN BUS low for device programming
10	Serial port, data from MP50	For future use, do not connect
11	Serial port, data to MP50	For future use, do not connect
12	Speaker +	Max +/- 5V. Max 0,5W in 8 ohm load, 1KHz test signal
13	Speaker -	
14	Headset detect	For future use, do not connect
15	Ground	Analogue ground
16	Microphone +	500µV to 1V, Bias 2-12V, Bias impedance 150 to 4K ohm.
17	Microphone -	
18	PTT2	Connect to ground for PTT2 activation. Otherwise open.
19	External battery	5-15 V external battery connection

Section 5: Qualifications

The PNG system is qualified to the relevant sections of:

- RTCA DO-160G Environmental conditions and test procedures for airborne equipment.
- RTCA DO-178C / EASA ED-12C Software Considerations in Airborne Systems and Equipment Certification
- Specification EN 302 561 V1.2.1 (2009-12) Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using constant or non-constant envelope modulation operating in a channel bandwidth of 25 kHz, 50 kHz, 100 kHz or 150 kHz; Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive
- Specification EN 301 178-1 V1.3.1 (2007-02) Portable Very High Frequency (VHF) radiotelephone equipment for the maritime service operating in the VHF bands (for non-GMDSS applications only); Part 2 Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive
- Specification IEC EN60529 Edition 2.1 2001-02 Degrees of Protection Provided by Enclosures (IP code): IP68, 3m depth for 30min.
- FCC 47 CFR Part 15B 15.109 and 15.107 Radiated emissions and AC powerline conducted emissions
- Head and body SAR UHF according KDB447498 D01 v06 General RF Exposure Guidance
- Head and body SAR VHF according KDB447498 D01 v06 General RF Exposure Guidance
- FCC 47 CFR Part 80 and Part 2, VHF transceiver: 80.205/2.1049, 80.209/2.1055, 80.211/2.1051, 80.213/2.1047, 80.215/2.1046, 80.217 (b)
- FCC 47 CFR Part 90 and Part 2, UHF transceiver: 90.205/2.1046, 90.209/2.1049, 90.213/2.1055, 90.207/2.1047, 90.210/2.1051, 90.210/2.1053, 90.221, 90.214

Detailed qualifications are published in the PNG specification, AX-PNG-SPC-0019.

Section 6: Abbreviations

AES	Advanced Encryption Standard
AIS SART	Automatic Identification System Search And Rescue Transmitter
BS	Base Station
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