WTE-BT-01

406 + AIS SART
PORTABLE BEACON TESTER

User Manual

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Introduction

The WTE-BT-01 is a portable and simple to use beacon tester that allows testing of AIS and 406 rescue beacons.

The WTE Beacon Tester has been designed to help meet the beacon test requirements for SOLAS and IMO circulars 1039 and 1040, as well as to assisting in locating and identifying beacons for search and rescue operations.

Key Features

The following features make this device a powerful and versatile tool for testing and locating radio beacons:

- Generation and storage of beacon reports, including decoded transmission details, signal strength and frequency accuracy.

- Extremely simple to use with single button test operation.

- Ability to test 406 distress radio beacons (EPIRB, PLB, ELTs) and confirm 121.5 MHz homing signal.

- Ability to test AIS SART radio beacons (EPIRB AIS, PLB AIS, AIS-SART).

- Stand-alone operation, without the need for connected equipment to analyse results.

- USB connection for downloading/inspecting of generated reports on most computers and devices.

- Inbuilt simple spectrum analyser, allowing confirming operation of many VHF/UHF radio transmitters from 121 MHz to 480 MHz.

- Signal strength tools for homing signal direction finding (using a directional antenna).

- Dual AIS receivers for summary of vessel operation in the area.

- Portability and alert functionality for Search and Rescue applications.

- Ergonomic design that fits comfortably in your hand.

- Monitoring function to raise alerts if beacons have activated in the area or after returning beacons to brackets (meeting IMO 1039 [3.3] requirements).

- Able to store many thousands of timestamped test results and generated reports.

- Up to 10 hours continuous use using alkaline AAA cells.

Safety Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it.

The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

!
∎

This is the safety alert symbol. It is used to alert you to a potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

!WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

!CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury

NOTICE
NOTICE is used to address practices not related to physical injury.

NOTICE
HAZARD OF EQUIPMENT DAMAGE • This product is not chemical resistant. Detergent, alcohol, aerosol sprays, and/or petroleum products may damage the front panel. Clean using a soft cloth moistened in water. • The radio can be damaged if there is any potential difference between the chassis-ground, Serial signal ground, power (-) input, or antenna coaxial shield. Before connecting any wiring, ensure that all components are earthed to a common ground point. • The antenna port can be damaged if signals greater than 13 dBm are injected/received.   Do not directly connect any other transmitter to the RF connector. • Extreme Heat or High temperatures can damage WTE-BT-01 components. DO NOT expose or operate the unit in extreme heat (above 70 degrees Celsius) or leave in direct sunlight or any other UV source. • Although this product is designed to be rugged, it will not survive excessive shock or vibration abuse. • The WTE-BT-01 IP rating is IP-52. The WTE-BT-01 should not be considered as waterproof. DO NOT directly expose to rain or use in a condensation forming environment.

FCC NOTICE

This device complies with Part 15.247 of the FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference and

2. This device must accept any interference received, including interference that may cause undesired operation.

This device must be operated as supplied by the equipment supplier. Any changes or modifications made to the device without the written consent of the equipment supplier may void the user's authority to operate the device.

NOTICE

This symbol on the product or its packaging indicates that this product must not be disposed of with other waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment.

The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and help ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, contact the dealer from whom you originally purchased the product.

Startup Operation

Once battery cells have been fitted, the WTE-BT-01 remains in its OFF state. Battery cells must be fitted in order for the internal clock to maintain time.

The unit continues to consume extremely little power until the POWER button is pressed. By default the unit is configured to utilise the "Auto-shutdown" feature after 3 minutes of inactivity.

On power on, the beacon tester displays a startup screen and performs basic self test functions. The primary screen after start-up is user configurable, and will typically be configured to a beacon "TEST" screen allowing a test to be initiated when the ENTER button is pressed.

When operating normally, the screen will show content on the LCD and if a beacon record has not been selected for display, the current time will be shown, updating once a second.

Beacon testing operation is described in section "Beacon Testing"

Buttons
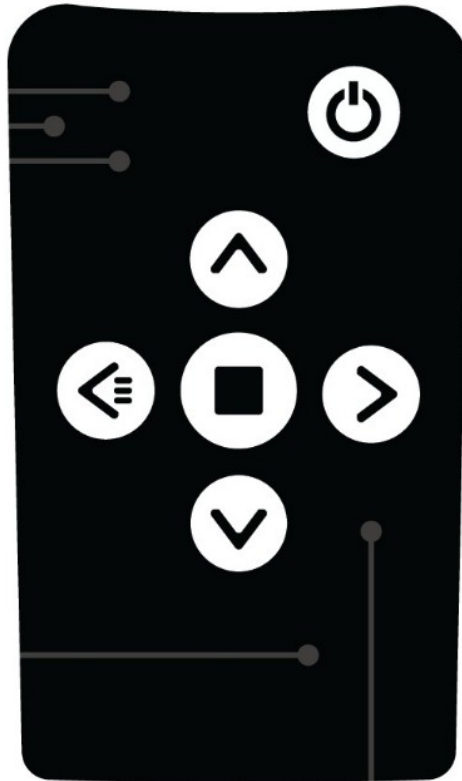
POWER:

Press to power on/off the unit.

MENU/BACK:

When on the MAIN SCREENS used to enter the MENU. When inside the MENU, used to return back one level from within the MENU, until returning back to the MAIN SCREENS.

UP:

When on the MAIN SCREENS used to cycle between sub-screens. When in the MENU used to navigate or alter selected configuration items.

DOWN:

When on file related screens of the MAIN SCREENS shifts between entries. When in the MENU used to navigate or alter selected configuration items.

RIGHT:

When on the MAIN SCREENS used to cycle between main screen. Within the MENU used to enter sub MENU items or select items for configuration.

ENTER:

Used to select file related items from within the MAIN SCREENS. Also used to accept a value on a confirmation popup screen.

Icon Bar

The WTE-BT-01 top icon bar provides information about the display screen and operating status.

On this screen the battery condition, alert indication and system time can be monitored at a glance.

The far right text indicates the selected main screen. This is either "BT", "406", "RSS" or "AIS". Pressing the RIGHT button cycles through these screens.

Each screen can have sub screens. When these are available, there is a small UP arrow next to the sub-screen number (shown as "1" on the example below). These screens can be accessed by pressing the "UP" button.

Icon	Description
	The far left battery icon indicates remaining battery capacity. When a line is drawn through the icon, the battery cells should be replaced.
SOS	The alert shown on the screen is a distress message, and NOT a test.
TEST	The alert shown is a TEST message.
S	There currently is a signal present that has opened the squelch (better viewed on the RSS screen), that has been present for at least the configured TRIG period of time. This could be any signal that exceeds the configured squelch setting.
H	A valid emergency homing signal has been detected for at least the configured TRIG period of time. This is the sweep signal that is present on 121.5MHz or 243MHz transmitted by 406 beacons and used for search and rescue final location. This icon takes priority over the "S" icon. The signal strength of the homing signal must also exceed the squelch setting.
	An alert has been raised based on the current ALERT configuration within the last 60 seconds.

Beacon Test Screens

The BT (Beacon Test) screens are used to both select the type of beacon test that will be performed and also view historic test results.   See "Beacon Test Operation" for details on how to perform a beacon test.
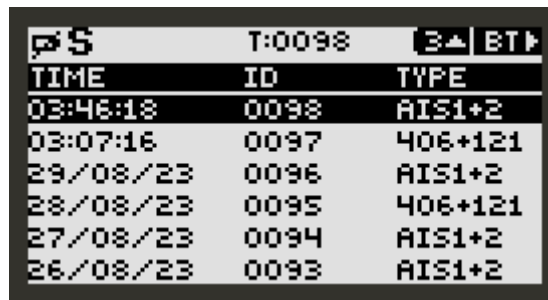
The first beacon test screen is used for 406 beacon testing that may or may not include a 121.5MHz homing transmitter. This screen shows the test result from the last 406 beacon test performed. If a test record has been selected to view, the time at the top of this screen will be replaced with the test ID. If there is an intention to perform a 406 beacon test and generate a test report, this screen must first be selected. Although this screen shows radio performance aspects of a 406 test, further decoded details are available from the 406 Decode Screens.

The second screen is used for AIS beacon testing. This screen must be first selected if a AIS test is to be performed. Further decoded details are available if required from the AIS Decode Screens.
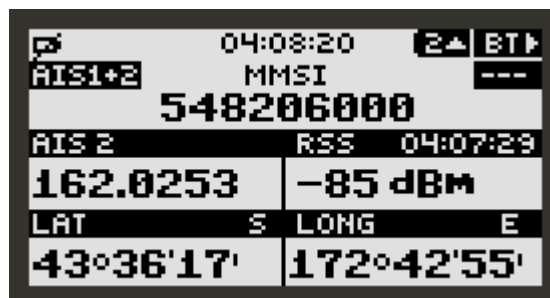
The third beacon test screen shows a list of all stored test results, and the type of test that was performed. On the left column, the date is displayed. If the date of the test is the current day, then the time of the test is displayed instead. Any entry can be selected, and pressing the ENTER button will allow either the 406 or AIS test results to be displayed. Test reports are by default automatically generated after each test, but if manual report generation has been configured, then when any test result is selected, the option is provided to regenerate the test report for that particular test.

406 Decode Screens

The 406 main screen provides several decode sub screens that display details regarding the 406 message processed. This may either be received, or loaded from a prior 406 test performed while on the BT screens.   When a test record is being viewed the time will be replaced with the test ID and will appear like "T0061".

Recent database files stored on internal SD card provide translations from country ID to country name and also provide details of beacon model and manufacturer.

RSS Screen

The RSS "Received Signal Strength" and sweep detection screen provides a clear indication of signal strength, rapidly updated, and if connected to a directional aerial aids in final location of common man-overboard transmitters, 406 beacons and voice transmissions from many common transmitters. The RSS screen can be configured to display and provide an alert for any frequency from 120MHz to 470MHz, but particularly useful for the distress homing signals transmitted on 121.5MHz and 243MHz.

Alerts can be raised when the signal level has increased above a configured squelch level for the set trigger period. Optionally, and more usefully, an alert can be raised only when the 121.5MHz downwards sweep on the channel that will greatly decrease the probability of false alerts.

As shown above, when a signal level increases above -100 dBm for 3 seconds the RSS receiver begins to look for a valid sweep signal.   The 'S' icon will now be displayed indicating that the RSS squelch is open.

If the downwards sweep is present for 3 seconds an alert will be raised (if RSS alerts are enabled) and the 'S' icon will change to the 'H' icon (to indicate that a homing signal has been detected). Any squelch level, squelch trigger period and sweep trigger period can be configured. Sweep detection can be disabled if required.

AIS Screens

AIS screens provide details of the last processed AIS SART message. This may either be received, or loaded from a prior AIS test performed while on the BT screens.   When a test record is being viewed the time will be replaced with the test ID and will appear like "T0061".

The SART (Search and Rescue Transponder) screen provides information relating to AIS distress type transmitters operating on both 161.975MHz and 162.025MHz.   Recent database files stored on internal storage provide manufacturer details ("ais_mid.txt"). This file may be updated as required, since these details are also saved to generated test reports.

The AIS vessel list screen provides a list of the most recently received vessels, updated as new transmissions are decoded. The last transmission from each vessel can be selected to provide additional information such as current location.

The AIS raw data screen displays decoded AIS packets from both channels in real time.   All AIS messages are decoded.   This screen is useful as a diagnostic tool to inspect AIS transmissions in the area, however this product does output this data on an accessible interface.   Displayed in the top line is the AIS message type, followed by the total number of AIS messages received.
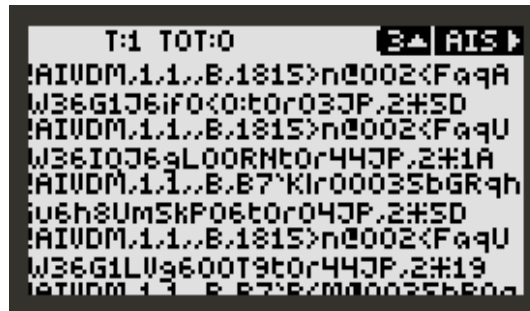
Beacon Testing

Beacon testing is extremely simple, and once configured can be performed with a single key press after startup. If a test is in progress, the test can be cancelled by pressing any key.

406 Beacon Test Procedure

Procedure Test Assumptions:

- The WTE-BT-01 is configured to perform both 406 and 121.5MHz tests.

- The WTE-BT-01 is configured so that GPS position testing is not required.

- The 406 beacon test screen has been configured to be the main screen (meaning that on start this will be the default screen).

- The WTE-BT-01 is configured to automatically generate a report file for each beacon test.

Procedure:

1. Press the POWER button and wait for startup to complete. The following screen will be displayed. Note the "BT" on the top right hand corner indicating that this is a Beacon Test screen. To the left "406+121" is displayed showing that the next test to be performed will be for both 406MHz and 121.5MHz beacon aspects.
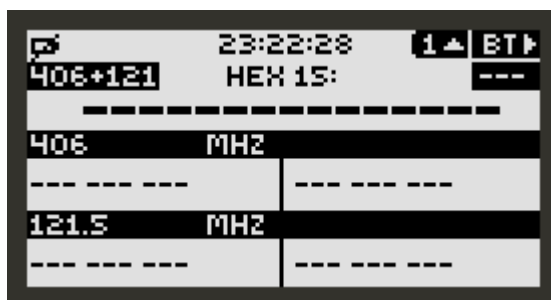
2. Press the ENTER button it initiate a beacon test.   There will be a prompt shown to press the test button on the 406 beacon.   (The test requires TWO transmission from the beacon, first one to decode the message, then another to measure RF frequency and power)
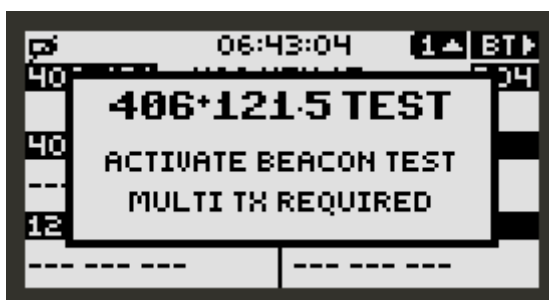
3. Situate the test beacon at least 3 meters from the tester. All tests should be performed with the same separation from the WTE-BT-01 and in the same location if relative signal strength measurements are required.

4. Press the test button on the beacon.

5. Press the test button on the beacon a second time.

6. Wait for the test to complete. If this is a non-GPS test, the test will take only a few seconds.

7. If both 406 and 121.5MHz signals are received and decoded, the following screen will be displayed and the WTE-BT-01 will automatically generate a report file. This screen content will remain displayed until either a button is pressed to clear the screen, or the WTE-BT-01 automatically powers down.

Note: 406 Beacon testing requires more than one transmission. After an initial beacon transmission, the HEX ID is stored. A further transmission is then required. Frequency error and power measurements are performed during this second transmission. This 2 transmission method provides excellent frequency accuracy results.

Transmission power must exceed the min level configured in the BEACON TEST Menu in order to be displayed.

AIS Beacon Test Procedure

AIS beacon testing requires the reception and decoding of several AIS messages. First, the WT-BT-01 must receive a valid AIS type 1 message, status 14. Once this message has been received further testing is performed, only considering messages with the same MMSI. This ensures that unwanted signals in the area are ignored.

Procedure Assumptions:

- The WTE-BT-01 is configured to perform both AIS1 and AIS2 tests.

- GPS beacon testing is not required.

- The AIS beacon test screen has been configured to be the main screen (meaning that on start this will be the default screen).

- The WTE-BT-01 is configured to automatically generate a report file for each beacon test.

Procedure:

1. Press the POWER button and wait for startup to complete. The following screen will be displayed. Note the "BT" on the top right hand corner indicating that this is a Beacon Test screen.   To the left "AIS1+2" is displayed showing that the next test to be performed will be for both AIS1 and AIS2 channels.
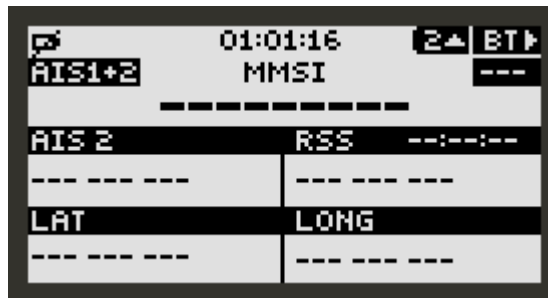
2. Press the ENTER button to initiate a beacon test.   There will be a prompt shown to press the test button on the AIS beacon.

3. Situate the test beacon at least 3 meters from the tester. All tests should be performed with the same separation from the WTE-BT-01, in the same location if relative signal strength measurements are required.

4. Press the test button on the beacon.

5. Press the test button on the beacon a second time.

6. Wait for the test to complete. If this is a non-GPS test, the test will take only a few seconds.

7. If both AIS1 and AIS2 signals are received and decoded, the following screen will be displayed, and the WTE-BT-01 will automatically generate a report file. This screen content will remain displayed until either a button is pressed to clear the screen or the WTE-BT-01 automatically powers down.

Note: AIS Beacon testing requires more than one transmission. After an initial beacon transmission, the MMSI is stored. A further transmission from each AIS channel being tested is then required. Frequency error and power measurements are performed during this second transmission.

Test Reports

Beacon reports can be generated automatically, ready for printing, or can be generated at a later time directly from WTE-BT-01 internally stored test records. Reports are stored as an HTML format, allowing direct viewing through browsers on computers or smart devices.

Messages from beacons are decoded and displayed allowing confirmation of correct programming, radio operation, accuracy and output power levels.   The WTE-BT-01 holds in its internal storage data files containing 406 beacon certificate details (certs.txt) and AIS beacon manufacturer identifiers (ais-mid.txt). These files may be corrected by the user as updates become available.

406 Beacon Reports

Shown below is an indicative 406 beacon test report. Content may vary depending on protocol in use and selected test mode. Note that there are several 406 beacon frequencies in use. The displayed error is the distance to the closest assigned 406 beacon frequency.

Date: 19/08/2023
Receiver Model: WTE-BT-01 Firmware v2.52
Last Calibration Date: 28/04/2023

406 Beacon Test Report

Test Time   05:29:12
Hex 15 ID: 400C5929DCFFBFF
Message Format: Long
Message Type: Test
Raw Data: FFFED0A0062C94EE7FDFF975503783E0F66C
Location Type: Std Location - Serial EPIRB
Country: (512)
Serial Information: 5358
Auxiliary Radio   None
Location: Unknown

121.5 Test Report

Sweep Detected: Yes

RF Measurements

Test	Frequency	Error	RSSI
406	406.028125 MHz	125Hz	-50 dBm
121.5	121.499125 MHz	-875Hz	-50 dBm

☐ Pass   ☐ Fail   Initials:

Notes:

AIS Beacon Reports

Shown below is an indicative AIS beacon test report. Content may vary depending on protocol in use and selected test modes.
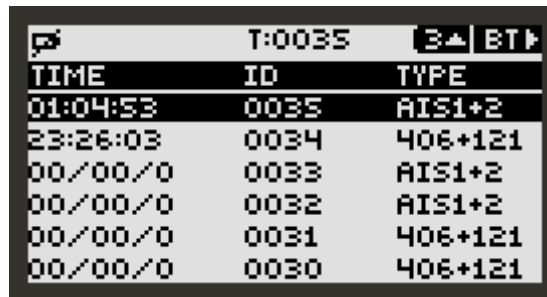
Date: 20/08/2023
Receiver Model: WTE-BT-01 Firmware v2.52
Last Calibration Date: 15/04/2023

AIS Test Report

Time: 05:20:33
MMSI: 548206000
Manufacturer: EFS
Latitude: 43°36'17"
Longitude: 172°42'55"

RF Measurements

Test	Frequency	Error	RSSI
AIS 1	161.975275 MHz	275 Hz	-44 dBm
AIS 2	162.025370 MHz	370 Hz	-59 dBm

☐ Pass   ☐ Fail   Initials:

Notes:

Manual Report Generation

Reports may be either automatically or manually generated at the end of each beacon test.
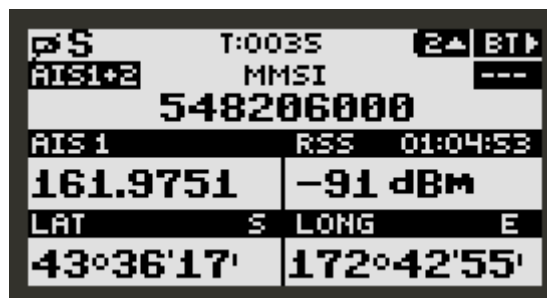
To generate a report manually:

1. Select manual report generation through the menu (MENU->BEACON TEST->REPORT MODE).

2. Exit the menu.

3. Move to the "BT" Screen page 3.

4. Select the test record.

5. Press the ENTER button. A report will be generated after confirmation received.

Alert Operation

The WTE-BT-01 can be configured to raise an alert through an internal piezo sounder under a variety of conditions. The duration of sounder operation and relay operation can be independently configured via the alert menu system.

406 alerts can be raised for transmissions that are:

- General Distress.
- General Distress plus any test transmission.

AIS alerts can be raised for transmissions that are:

- Type 1 messages, status 14 (SART active).
- Type 1 messages, status 14 plus status 15 (SART test).

RSS (Received Signal Strength) alerts can be raised for transmissions that are:

- Within a configured frequency of 120MHz and 470MHz.
- Above a configured signal strength threshold.
- Above a signal strength for a configured period of time or determined to contain a valid downwards sweep signal for a period of time.

Upon reception of a configured alert message type, the piezo operates independently for a configured period of time.

Sequence of events when an alert is processed:

1. Sounder Operates (for configured period of time).

2. The display shifts to either the 406, 121 or AIS decode screen as appropriate.

3. An alert pop-up to indicate a new alert is displayed (if this is a new alert).

If there is an ID and location available for the alert (not applicable for 121.5 alerts):

4. The configurable duplicate reject timer is started (preventing the same ID raising another alert until a period of inactivity has elapsed).

When any key is pressed the sounder will cease to operate.

Spectrum Analyser

The spectrum analyser is a very simple to use tool that provides a span of either 24kHz, 120kHz or 3MHz around a configured centre test frequency.   The receive bandwidth of 1kHz is suitable for inspection of potentially interfering adjacent channel signals. The analyser can display signals as low as -125dBm. Use for site inspection or to view a large range of frequencies, hugely simplifying search and rescue efforts looking for a channel that someone is talking on, or can be used to direction find to with a directional antenna.
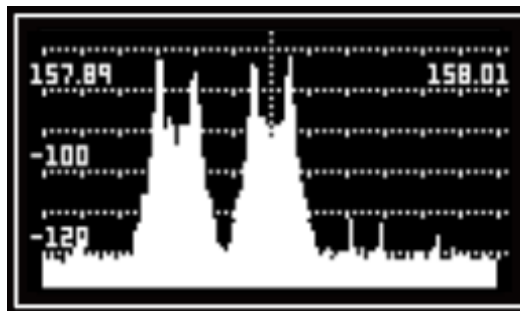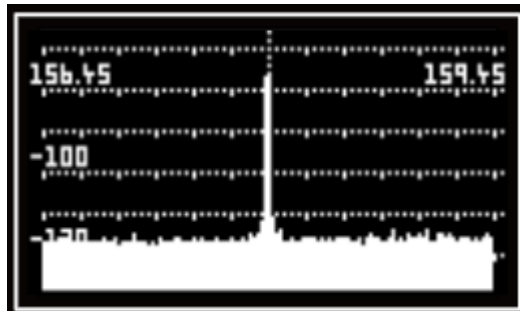
Configuration

At any time the "MENU" button can be pressed that will enter the configuration menu. Entering the menu aborts any testing or receive functions.
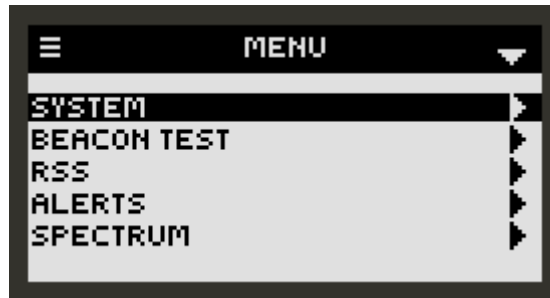
At any time the active buttons that may be pressed are shown on the screen, such as the "MENU", "UP", "DOWN" and "RIGHT" buttons. Using the above screen as an example, pressing the "RIGHT" button will enter the "ALERTS" sub menu. When reaching any configuration item, pressing the "RIGHT" button again will highlight the item to change.

Once inside the menu, pressing the "MENU" button again will go back up one level until the menu mode is exited. All configuration changes are stored only when leaving the menu.

SPECTRUM Menu
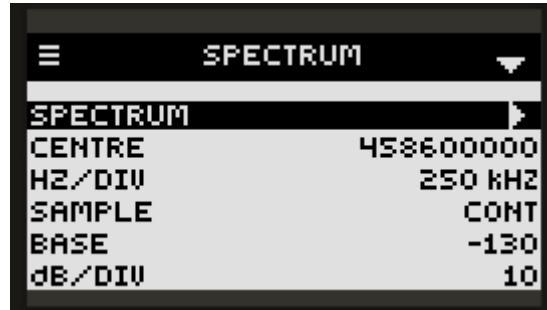
SPECTRUM

Displays the radio spectrum using the settings in this menu.   Signals between -128dBm and 0dBm can be displayed.   **Power levels above 13dBm (will destroy the receiver input and invalidate the WTE-BT-01 warranty**.

CENTRE

Displays the centre frequency to be displayed on the screen.

HZ/DIV

2kHz, 10kHz or 250kHz. The screen is 6 divisions wide in 120 steps.   The 500Hz setting is used for calibration purposes only.

When on the 10kHz setting the RBW (receiver bandwidth) is set to 1kHz. The span on this setting is 120kHz, allowing for adjacent channel power to be observed.

When on the 250kHz setting the RBW is set to 25kHz.   The span on this setting is 3 MHz.

SAMPLE

When set to CONT the spectrum analyser screen will be updated with new values approximately twice a second. When set to PEAK only higher values will be written to the screen. At any time, the ENTER button can be pressed on the SCREEN to clear the screen and load new PEAK values.

BASE

Defines the base signal level on the screen. When set to -100, only signals with a strength greater than -100 dBm will be displayed. Range is -130 dBm to -60 dBm.

dB/DIV

Scales the signal level displayed. Either 10 dB/DIV or 20 dB/DIV can be set. When 20 is set a

dynamic range of 120 dB is possible.

ALERTS Sub Menu

406

DISABLED:

406 messages of any type do not raise an alert. This is the default setting.

ACTIVE ONLY:

Only distress transmissions will activate an alert. All test transmissions are displayed, but will not raise an alert.

ACTIVE+TEST:

Both distress AND test transmission will result in an alert being raised.

AIS-SART

DISABLED:

AIS messages of any type do not raise an alert. This is the default setting.

ACTIVE ONLY:

Only AIS type 1 messages status 14 transmissions will activate an alert and close the relay. All test transmissions are displayed, but will not raise an alert.

ACTIVE+TEST:

Both AIS type 1 messages status 14 transmissions AND status 15 test transmissions will result in an alert being raised.

RSS

The RSS (Received Signal Strength) alert when enabled will operate the relay and sounder as configured. Disabling will result in no alert being raised.

SOUNDER TIME

The time in seconds that the on-board sounder will operate for when an alert is raised. Pressing any button after an alert is raised will result in sounder operation ceasing.

DUP REJECT TIME

The duplicate reject feature determines the period of time that must pass before an alert of the same ID or type will raise an alert again. Typically alert transmissions are sent every minute. Raising a new alert that needs cancelling again every minute when tracking an alert is not typically desirable. When the feature is set to a non-zero value a duplicate reject timer is restarted each time the same ID is received. If the transmission source was to cease for this period of time, then restart, a new alert would be raised. When set to 0, the feature is disabled and a new alert is raised for each transmission. The duplicate reject applies to AIS, 406, RSS and PROXIMITY alerts. Once an RSS alert has been raised, the signal level must decrease below the trigger threshold for the duplicate reject time before a new RSS alert can be raised.

SYSTEM Sub Menu
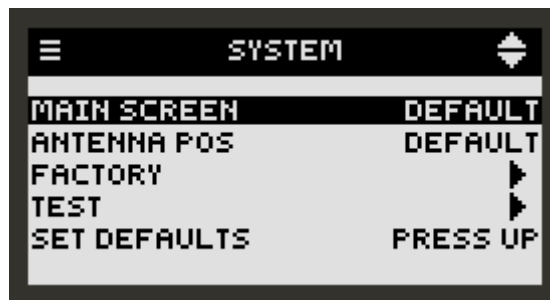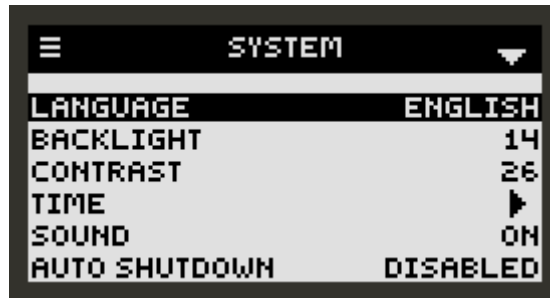
LANGUAGE

The currently used language. Currently only English and Spanish are included. Please advise if you require translations for another language.

BACKLIGHT

This is the time in seconds that the backlight stays on for after each key press. The backlight may be set between values of 0 and 30. A value of 0 results in the backlight being disabled, a value of 30 results in the backlight being permanently on.

TIME

Setting of the internal real time clock. Time and date should be set prior to performing any beacon tests. System time will be reset if AAA cells are removed for an extended period of time.

SOUND

Setting to OFF prevents the sounder from operating and disables all system sounds except when an alert is raised.

AUTO SHUTDOWN

This is the period of inactivity that will result in the unit automatically powering down. If a beacon test is in progress, the unit will not shutdown until the test has been completed, or the max beacon test period has been exceeded. By default the auto shutdown is set to 3 minutes.

MAIN SCREEN

This allows any page on any main screen to be set as the default main screen. This results in this screen being the screen that is first seen when powering up the unit, or after a period of inactivity the WTE-BT-01 will automatically revert to this screen.

Setting to DEFAULT will unset the last custom set screen and will return to the factory default main screen. Setting to USER SET will set the screen to be the screen that was last used before entering the menu.

ANTENNA POS

Selects the antenna to use when supplied with multiple antenna connections.   DEFAULT should be selected in most cases.

FACTORY

Tools for factory calibration and testing purposes only.

SET DEFAULTS

Allows all configuration items to be reverted to the default factory new state. When the confirm pop-up is selected, pressing the RIGHT button will allow the tick to be selected. Pressing the square ENTER button will now allow defaults to be set. Default settings will only be applied when leaving the menu.

BEACON TEST Sub Menu
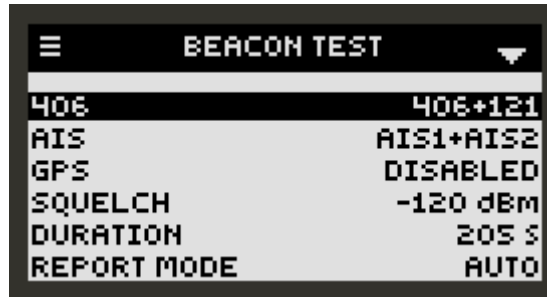
406

When a 406 test is to be performed this item configures 406 and 121.5 combined and separate test options.   Through this is setting, if required, a 121.5MHz or 406MHz test can be performed on its own.

AIS

AIS SART tests can be performed on either AIS1 (161.975MHz), AIS2 (162.025MHz) or both together.

GPS

If GPS is ENABLED, once a 406 or AIS test is started, the test cannot be completed until a valid GPS position has been transmitted by the beacon. This means that each test may take several minutes before a beacon fix has been acquired.   Ensure that the DURATION option has been configured to a suitable time to allow for the additional required test duration.

SQUELCH

When determining a test frequency error, the SQUELCH is the signal level that must be exceeded before performing a frequency error assessment. This may be useful in the presence of unwanted signals.

DURATION

This is the maximum permitted test duration.

REPORT MODE

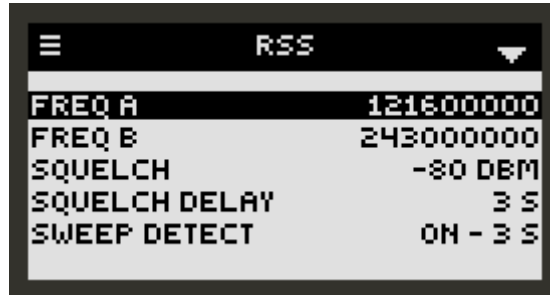If AUTO, an HTML report will be generated automatically after each test. If MANUAL, will prompt to generate a report at the end of each test.

RSS Sub Menu

The RSS menu allows configuration of scanning frequencies. If a signal of a configured level is detected, and then optionally the presence of a sweep tone, an alert can be raised.

FREQ A

This is the frequency used by the Received Signal Strength alert and RSS screen. The FREQUENCY parameter can be set between 120MHz and 470MHz. By default 121.5MHz is configured.

FREQ B

This is the secondary frequency used by the Received Signal Strength alert and RSS screen. The FREQUENCY parameter can be set between 120MHz and 470MHz. By default 243MHz is configured. This frequency may be configured to the same as FREQ A if dual frequency scanning is not required.

SQUELCH

This is the signal level that the received signal must exceed (for the SQUELCH DELAY period) in order to raise an alert.

SQUELCH DELAY

This is the time in seconds that the measured signal must have exceeded the configured SQUELCH level before an alert is raised. Each time the signal drops below the SQUELCH level the SQUELCH TRIG (as shown on the RSS screen) is reset and the full delay period must elapse again before an alert can be triggered.

If under normal operation the "S" icon is seen frequently (due to interfering signals in proximity), the SQUELCH level should be increased until the "S" icon is no longer seen under normal operation.

SWEEP DETECT

This item can be set to DISABLED or a value between 1 and 20. When DISABLED, an alert can be raised without the need to detect a valid sweep. When set to between 1 and 20, the sweep signal must be present for this period of time before an alert can be raised.

WTE-BT-01 Firmware Upgrade

In order to update the WTE-BT-01 firmware you will need:

1. The WTE Firmware Update Tool (available from http://www.wte.co.nz or provided if required from info@wte.co.nz).
2. One USB C cable.
3. An appropriate encrypted hex file supplied by WTE Limited.

   Note: Attempting to load a hex file not intended for use with the WTE-BT-01 will render the WTE-BT-01 inoperable. Uploading firmware should only be performed if instructed to do so by WTE Limited or an authorised agent.

Firmware Upgrade Utility

This bootloader software has been customised by WTE to simplify the firmware replacement process for the WTE-BT-01, This application automatically handles erasing and verifying of uploaded firmware.   This utility does not perform any decryption function (decryption is carried out by the WTE-BT-01 itself).
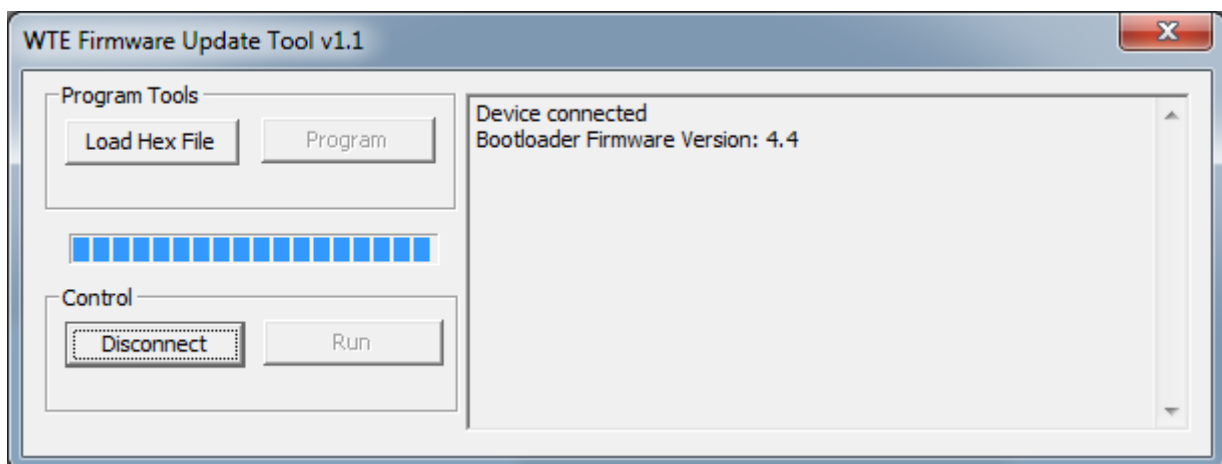
Upgrade Process

1. Run the application WTE-UBL.exe – this is the WTE Firmware Update Tool as shown above.

2. **BEFORE** applying power to the WTE-BT-01, press the "UP" button, and **HOLD** the button down.

3. Apply power to the WTE-BT-01 by pressing the "POWER" button.

4. The WTE-BT-01 backlight will flash on and off (approximately once every second) and display "MAIN BOOTLOADER" – **keep the "UP" button pressed**.  You now have 10 seconds to press the PC application "Connect" button on the WTE Firmware Update Tool before the WTE-BT-01 exits the bootloader mode of operation.

5. Press the WTE Firmware Update Tool "Connect" button. If connected, the PC application will display the message saying "Device Connected". The WTE-BT-01 backlight will now stay constantly on.

6. You can now **RELEASE** the WTE-BT-01 "UP" button.

7. On the PC application press the "Load Hex File" button.

8. Select the supplied WTE-BT-01 hex file. NOTE: the firmware used must MATCH the WTE-BT-01 receiver variant. A WTE-BT-01 can only be used with WTE-BT-01 encrypted firmware. Failure to comply will leave the device inoperable.

9. Press the WTE Firmware Update Tool "Program" button.

10. Wait for the WTE Firmware Update Tool to indicate that programming has been completed.

11. If successful, the WTE-BT-01 will automatically restart. If the USB cable is still connected, the "USB CONNECTED" screen may be displayed.

12. Remove the USB cable, and the WTE-BT-01 will restart again in its normal mode of operation.

13. If the WTE-BT-01 does not correctly start, then repeat this procedure.
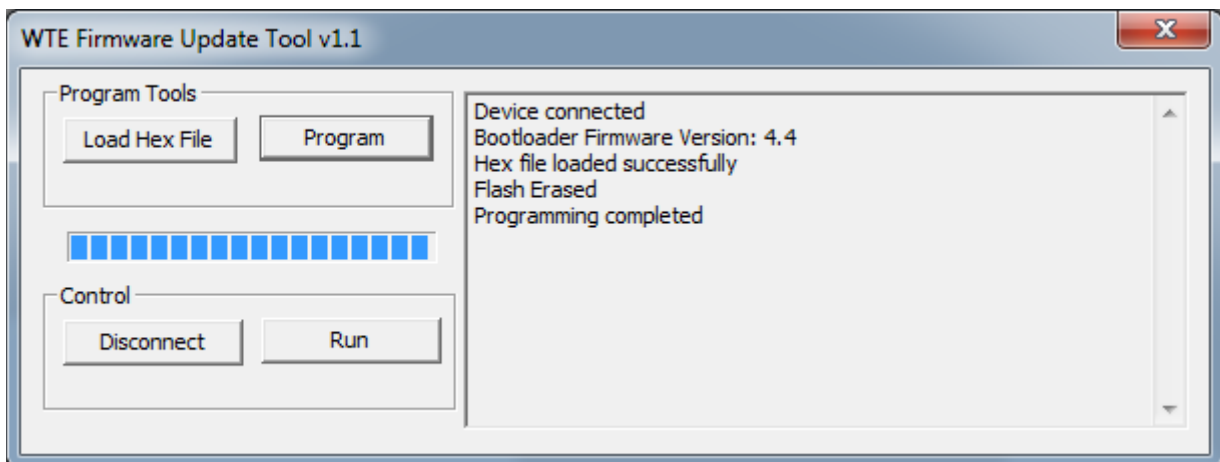
14. If successful the WTE-BT-01 will start normally when the "POWER" button is pressed. If the WTE-BT-01 does not correctly start, then repeat the procedure.

WTE-BT-01 Customisation

The WTE-BT-01 has been developed by WTE Limited, and therefore if a specific requirement exists, customisation of WTE products may be possible (at additional cost).

Examples of possible customisation:

- Decryption of data parameters (e.g. for military use).

- Support of additional protocols.

- Support for different Languages.

RF Connections

Either connect an antenna with SMA connector to the WTE-BT-01 or an attenuator.

NOTICE
HAZARD OF EQUIPMENT DAMAGE • The antenna port can be damaged if signals greater than 13 dBm are injected/received.   Do not directly connect any other transmitter to the RF connector. A transmitter may be indirectly connected through an attenuator that provides at least 50dB attenuation.   Failure to fit a 50dB attenuator will destroy the unit, and invalidate the product warranty.

USB Connection

Reports may be accessed by connecting a type C USB cable. The USB port can be accessed by removing the battery cover.

Connecting a USB cable to a computer or smart device will result in the unit restarting in a USB mass storage mode of operation. After connection, there may be up to a 20 second delay before files may be seen or accessed by another device.

Battery Pack

Should the device fail to operate when the "POWER" button is pressed, or the battery status indicator indicate that the battery condition is poor, then the 6 AAA cells of the battery pack should be replaced. Preferably replace with good brand alkaline or lithium cells.

Physical Dimensions

WTE-BT-01 physical dimensions are 202mm x 98mm x 33mm (Length x Width x Height)

Weight: 100 grams (without battery fitted).

Disclaimer

THE RESPONSIBILITY LIES COMPLETELY ON THE USER TO ENSURE THAT THIS DEVICE IS TESTED, THROUGH METHODS THAT ARE APPROPRIATE, TO CONFIRM THAT ALL SYSTEM COMPONENTS ARE WORKING CORRECTLY.

THIS DEVICE IS NOT INTENDED TO BE USED AS A PRIMARY LIFE SAVING TOOL, BUT MAY BE USED TO STRONGLY COMPLEMENT OTHER EMERGENCY DETECTION TOOLS ONLY WHEN CORRECTLY CONFIGURED AND TESTED.

THE PRIMARY LIFESAVING MECHANISM FOR 406 BEACONS SHOULD ALWAYS BE CONSIDERED TO BE THE 406 SATELLITE NETWORK, FOR WHICH THE 406 BEACON HAS BEEN DEVELOPED.

This document has been prepared in good faith and produced to assist in the use of this product, however WTE Limited reserves the right to modify, add or remove features without notice.

When product is supplied, it is the user who is responsible for payment of any customs fees/taxes that are imposed on importation.

No User-Serviceable Components. There are no user-serviceable components within the radio

RoHS and WEEE Compliance
WTE-BT-01 is fully compliant with the European Commission's RoHS (Restriction of Certain Hazardous
Substances in Electrical and Electronic Equipment) and WEEE (Waste Electrical and Electronic Equipment) environmental directives.

Restriction of hazardous substances (RoHS)
The RoHS Directive prohibits the sale in the European Union of electronic equipment containing these hazardous substances: lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs).

End-of-life recycling programme (WEEE)
The WEEE Directive concerns the recovery, reuse, and recycling of electronic and electrical equipment. Under the Directive, used equipment must be marked, collected separately, and disposed of properly.

Manufacturing marking and labels

WTE-BT-01 serial number can found on the unit, also serial number and model information are displayed on start-up or accessible via:

MENU->SYSTEM->FACTORY.

FCC Regulations allow for electronic labelling.

FCC details can be found via:

MENU->SYSTEM->REGULATORY

*Note: Publication number 784748-D01, FCC-Part 90 allows for devices with integrated display to not require a printed label on the device holding this information.

Maintenance

No User-Serviceable Components. Servicing is only to be performed by WTE Limited, or agent appointed by WTE Limited. Servicing outside of the warranty period is at the discretion of WTE Limited.

Product End Of Life

It is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and help ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling contact your local dealer or city council

Please recycle this device responsibly.

Product Warranty

WTE Limited products are warranted for a period of 12 months after purchase date against faulty workmanship or materials. Return the product, all freight paid by the customer and the product will be repaired or replaced.

The product warranty will be invalidated through evidence of:

- Unauthorised work carried out.

- Tampering, including evidence of removal of internal electronics from the case.

- Installation in wet or corrosive environments.

- Exposure to impact or excessive vibration.

- Use or installation outside of the specified operating parameters.

Abbreviations and Glossary

USB (Universal Serial Bus) - A common interface that enables communication between devices and a host controller such as a personal computer (PC).

kHz Kilohertz

LED Light Emitting Diode

mA Milliamps

MHz Megahertz

ms milliseconds

PC Personal Computer

IMO International Maritime Organisation

ppm Parts Per Million

RF Radio Frequency

RoHS Restriction of Hazardous Substances

RSSI Received Signal Strength Indication

RX Receiver

TCXO Temperature Compensated Crystal Oscillator

VDC Volts DC

WEEE Waste Electrical and Electronic Equipment

SOLAS Safety of Life At Sea

Specification

406 Frequency Range	All used 406 Beacon frequencies 406.020MHz – 406.045MHz (concurrently)
Battery	6 x AAA Alkaline.
Max Operating Time	10 hours
Temperature Limits	-30 to + 70 degrees Celsius.
Max Useful Input Power.	0 dBm. Connecting a 406 beacon directly (without attenuator) to the aerial input will result in certain damage. Use a 50dB attenuator for accurate power measurements.
121.5MHz Receiver Sensitivity	-110 dBm.
406 MHz Receiver Sensitivity	-118 dBm
AIS (A) MHz Receiver Sensitivity	-110 dBm
AIS (B) MHz Receiver Sensitivity	-110 dBm
Receiver Absolute Maximum Input Power	+13dBm. Do NOT connect directly to a 406 beacon without a 50dB attenuator.
Calibration	Required every 2 years.
Frequency Accuracy	+/-100Hz from -20 to 50 Celsius. This accuracy applies to 406MHz, 121.5MHz and AIS tests.
RSSI Range	-110dBm to 0dBm (not calibrated)

RSSI Resolution	1 dBm
Aerial Connector	SMA
Operating Current	85mA plus: 20mA when backlight enabled.
Firmware	Field upgradable.
Internal Storage Capacity	4GB
406 Error Correction	Correction of up to 5 bit errors per 406 packet.
AIS Decode Support	Both 161.975MHz and 162.025MHz. Alert only on type 1 SART status 14 or 15 as configured.
406 Location Protocol Support	All COSPAS SARSAT C/S T001 Issue 3 Rev 12 Location protocols. - User Location Protocol - Standard Location Protocol - Standard Test Location Protocol - National Location Protocol - National Test Location Protocol - RSL Location Protocol
Spectrum Analyser	Frequency range: 142-175, 350 - 499 MHz RBW: 1kHz/25kHz Span: 120kHz/3MHz Continual or peak display. Min signal -120dBm, max signal -10dBm. Input Power accuracy: 421-480MHz +/-8 dB, 120-175MHz +/-2dB.
121.5 Homing Signal	Sweep detection within 100ms
Test Support	SOLAS and IMO circulars 1039 and 1040
IP Rating	IP52.