



USER MANUAL

BEACON TESTER
NET-200

MODIFY RECORD

No.	Modify by	Date	Paragraph	Revision	Reason
1	Q/A	2013/05/08		01	
2	Q/A	2018/12/15	6 etc.	02	General update
3	Q/A	2021/09/14		03	General modification

TABLE OF CONTENTS

1. GENERAL DESCRIPTION.....	1
2. MAIN SPECIFICATIONS	3
3. COMPLETE SET	6
4. PREPARATION	7
4.1. CONTROL AND CONNECTION TOOLS.....	7
4.2. SWITCHING ON/OFF THE TESTER	9
4.3. SWITCHING ON/OFF THE LCD HIGHLIGHTING.....	9
4.4. MAIN MENU	9
5. BEACON TEST PROCEDURE.....	22
5.1. GENERAL COMMENT ACCORDING TO THE BEACON TEST PROCEDURE..	22
5.2. TEST PROCEDURE IN BEACON TEST MODE (SELF TEST)	22
5.3. DATA TRANSFER TO THE PC OR LAPTOP	24
5.4. ANTENNA MEASUREMENT PROCESS SPECIAL FEATURE.....	25
6. TESTER CALIBRATION	27
7. GENERAL INSTRUCTIONS	28
8. SAFETY PRECAUTIONS	29
9. STORAGE RULES	30
APPENDIX UNIT CONVERSION TABLE	31

1. General description

1.1 BEACON TESTER (further TESTER) is designed to check the maritime emergency radio beacons operating via COSPAS-SARSAT system such as Emergency Position Indicating Radio Beacon (EPIRBs). Tests can be carried out in volume of annual test requirements or in volume of shore-based maintenance requirements under IMO resolutions or for fast check after beacon's encoding or installation. Tester can receive the transmission from any 406MHz COSPAS-SARSAT beacon transmitting either in test mode or in real alert emergency mode. The signal can be received through with antenna or the tester can be connected directly with cable through a suitable attenuator (option). Radiated tests in real alert emergency mode should be barred out using screened room (or enclosure) only.

Tester's front view is shown on the Fig. 1-1.



Fig.1-1. Tester's front view

1.2 This tester can also be used for testing personal locator beacons (PLB).

1.3 The tester allows to perform:

- reception, demodulation and decoding of the emergency information transmitted on channel 406 MHz;
- frequency measurement of 406 MHz signal;
- audio-control of the sweep of 121.5 MHz signal presence;
- level measurement on 406 MHz channel;
- level measurement on 121.5 MHz channel;
- estimation of the positive/negative phase deviation of modulated signal;
- measurement of total transmission time of 406 MHz signal;
- measurement of unmodulated carrier duration of 406 MHz signal;
- estimation of the equivalent radiated power of 406 MHz signal through broadcast.

1.4 The tester is designed to operate at the temperature range from 0 °C to + 45 °C and relative air humidity should be no more than 95%, which is determined by used LCD.

1.5 The tester power supply is performed by 4 AA batteries 1.5 V, as well as by external DC source with voltage 4.5...7 V and load current no less than 300mA. The tester is power-supplied by USB cable when connected to computer or net USB adapter.

2. Main specifications

2.1 Tester provides carrier measurement on a frequency of 406 MHz with accuracy to ± 500 Hz.

NOTE:

The operation range of the tester is extended to 406020...406040 kHz and divided on 7 sub ranges (see item 4.4.1.1). The default range is 406028 kHz when the tester is turned on. The chosen channel should correspond to operation frequency of tested beacon.

2.2 The tester provides audio-control of the sweep signal presence on a frequency of 121500 ± 10 kHz.

2.3 The tester provides demodulation and decoding of the emergency information and displays on your choice the HEX-code (15 Hex ID or the message 1-112 bit) as well as all decoded information in text view with all measured parameters. Besides, the BCH code is calculated and compared with received one, and the result is displayed.

2.4 The tester provides measurement of positive/negative phase deviation value with accuracy to $\pm 2.8\%$.

2.5 The tester provides measurement of total transmission time of the message with accuracy to $\pm 0.2\%$ and time of preamble duration with accuracy to $\pm 0.2\%$.

2.6 The tester provides measurement of received signal level on a frequency of 406 MHz within the range 19 - 43dBm or 0.08W - 20W with accuracy to

- ± 3.0 dB with antenna;
- ± 0.5 dB with attenuator.

2.7 The tester provides measurement of received signal level on a frequencies of 121.5MHz within the range 13-20dBm, 20-100mW with accuracy to

- ± 3.0 dB with antenna;
- ± 0.5 dB with attenuator.

2.8 The tester allows to perform the measurement of beacon parameters with standard external antenna (from 3 to 15 meters), as well as via high-frequency cable and attenuator connection. Calibration test of the power meter is performed for 5 meter distance.

2.9 Tester RF-input resistance is about 50 ± 1.5 Ohm.

NOTE:

Peak signal level which is supplied to the tester RF-input should be not more than 1.0W (mean square value) or 20 mW.

Direct connection of the beacon to the tester's input without attenuator leads to the irreparable DAMAGES of the tester.

2.10 Tester allows to save up to 10 measuring results in non-volatile memory (overall measurements in *MEASURE/TEST CH406 MHz* mode).

2.11 Single measurement circle time is not more than 2 min.

2.12 The tester can be power-supplied by 4 AA batteries 1.5V, as well as by external direct current source with approximate voltage 4,5...7V and load current no less than 300mA connected to USB input of the tester with standard USB connector (of PC USB connector or network USB adaptor).

2.13 Tester's current consumption:

- in standby mode with no LCD highlighting-no more than 130mA;
- in standby mode with LCD highlighting - no more than 200mA;
- in measure mode with LCD highlighting - no more than 300mA.

2.14 Approximate continuous operation time of the tester from the internal batteries is about 6 hours.

2.15 Tester will be switched off automatically in 15 min. after the latest keystroke.

2.16 Tester weight: 0.55kg (main unit)

2.17 Tester size: 195 x 101 x 43 mm (main unit)

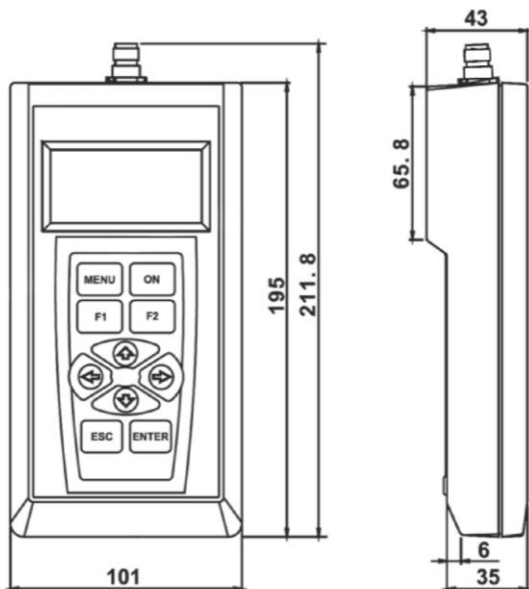


Fig.2-1. Tester size

3. COMPLETE SET

3.1 Complete set of the tester corresponds to the following tab. 3-1.

Table 3-1

No.	Item	Q-ty
1	BEACON tester (main unit)	1
2	Antenna	1
3	PC cable (USB A – USB A 1.5m)	1
4	User manual	1
5	Packing bag	1
6	Software and software user's manual	1



Antenna



PC cable



Tester (main unit)

4. PREPARATION

4.1. Control and connection tools

4.1.1 On the front panel of the tester there are a graphic LCD indicator and keypad (Fig. 4-1).

4.1.2 Top right key **ON** is intended for turning on-off the tester. (Fig. 4-1).

4.1.3 **MENU** key is intended to open the main menu from any sub menu.

4.1.4 **Up, Down, Left, Right** keys (↑, ↓, ←, →) are intended for navigation in menu items.

4.1.5 **ESC, ENTER** lower keys are intended for access, exit and perform menu functions.

4.1.6 **F1, F2** keys are intended for performing some particular functions in some menu items. See the tips on the LCD.

4.1.7 On the top side of the tester there is RF-slot for antenna connection. On the bottom panel there is USB-input for PC or USB-adapter connection. (Fig. 4-1).

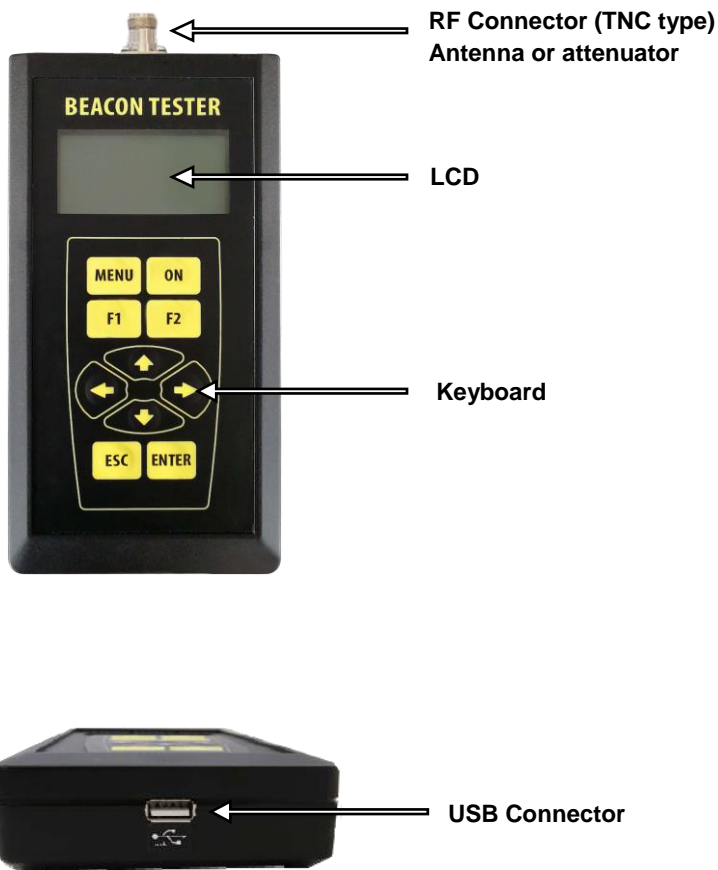


Fig. 4-1. Tester's Control and connection tools

4.2. Switching on/off the tester

Press **ON** key and hold it down until the NSR logo and the device identity is appeared on the LCD to turn on the tester.

Switching of the tester is followed by the audio signal. Release **ON** key after hearing the alarming signal.

Whereas at startup of the device the voltage of the batteries is lower than required one, battery low icon will appear in the top right corner of the display. If source voltage is lower than 4.1 V "REPLACE BATTERY!" note will appear on the display and the tester will be turned off automatically within 3 seconds.

4.2.1 The tester will be turned off by following operations.

- hold the **ON** key until the tester is turned off;
- source voltage is lower than 4.1 V ("REPLACE BATTERY!" will appear on the display and the tester will switch off automatically within 3 seconds).

4.3. Switching on/off the LCD highlighting

Switching on/off the LCD highlighting can be performed by **F1** and **F2** keys, when in **MAIN MENU** or startup logo is displayed.

4.4. MAIN MENU

After turning on the tester, the NSR logo and the device identity is appeared on the LCD.

To enter the main menu, one should press the **ENTER** key or **MENU** key. Vertical navigation up and down the main menu, one can perform by using **Up** and **Down** keys.

ENTER key is used to enter the particular submenu. **ESC** key is used to quit the submenu. Use **MENU** key to return to the main menu.

Main menu has the following items:

===**MAIN MENU**===

MEASURE

VIEW MESSAGES

SETTINGS

MANUFACT SETTINGS

Maritime

Firmware: - 3.23

MEASURE - beacon parameters measurement;

VIEW MESSAGES - displaying measuring results saved in memory;

SETTINGS - tester parameters settings;

MANUFACT SETTINGS - tester service menu.

Each item has subdivision. One can move through them in the same way as through the main menu.

Press **ESC** key to return to the previous menu item.

Press **MENU** key to return to main menu.

Firmware - Firmware version.

4.4.1 **MEASURE** menu item

MEASURE menu contains following items:

---- **MEASURE** ----

TEST CH 406 MHz

TEST CH 121 MHz

Frequency 406 MHz

TEST CH 406 MHz - automatic mode for main beacon parameters measurement on 406MHz channel;

TEST CH 121 MHz - 121.5 MHz channel audio monitoring and signal level measurement;

Frequency 406 MHz - 406 MHz channel frequency measurement.

After choosing **MEASURE** item, the tester allows to select the measurement source/path:

-- Measure by --

Antenna
Attenuator

Demo mode

Antenna - the measurements will be carried out with ANTENNA through the broadcast;

Attenuator - the measurements will be carried out with attenuator through cables, i.e. the tested beacon should be connected to attenuator input and attenuator should be connected to tester RF-input with RF-cables.

Attenuator (option) is symmetrical input device, so any input can be used as input or output.

Demo mode – emulation mode, it is intended for exhibitions for example.

4.4.1.1 TEST CH 406MHz menu item - automatic measuring mode on 406MHz channel.

In **TEST CH 406MHz** mode tester measure the following beacon parameters:

- demodulation and decoding of the received emergency signal;
- frequency measurement;
- signal level measurement;
- total time transmission measurement;
- time of preamble measurement;
- signal phase deviation measurement.

- **Choose channel** -
CH: 406.022
CH: 406.025
CH: 406.028
CH: 406.031
CH: 406.034
CH: 406.037
CH: 406.040

After pressing **ENTER** key while using **TEST CH406MHz** menu item, the list of all the 406 MHz channel range is appeared on the screen. The last used channel or channel proper value measured with **MEASURE / Frequency 406MHz** mode will be highlighted. *It is required to choose the channel that corresponds to the beacon!*

- **TEST CH 406.040** -

Waiting for signal

By pressing **ENTER** key, the tester will be turned to the beacon parameters measuring mode. The following title will appear on the screen:
“Waiting for signal”.

The measurement is attended by the audio alarm of the detected signal of the sweep tone.

After receiving the message, all parameters of the beacon will appear on the screen:

07:30 14/09/2021
Mes#3 Test Ok Ok
ID: 0004000000FFBFF
EPIRB-MMSI/LOC
MMSI: 123456
CC: 413
BeacN: 00
↓ F1-Mes# F2-Save

HH:MM dd/mm/yyyy - Time and date of measurements;

Mes#X - memory cell number, where test results will be saved by pressing **F2** key (where X – value from 1 to 10);

Test or **Dist** - message type (**Test** (testing mode), **Dist** (emergency mode), *do not emit false Distress signals!*). Test message differs from the emergency one by the vertical synchro timing negate log; such message is not processed by the satellite;

Ok or **BAD** - BHC code comparison result (**Ok** - received code corresponds to the calculated one, **BAD** - the BCH code does not correspond to the calculated one. This check allows to estimate the code accuracy calculation and the message errors absence;

ID - 15 byte hexadecimal beacon identifying code (15 Hex ID);

EPIRB-MMSI/LOC (example) - protocol type;

MMSI - Maritime Mobile Service Identify;

CC:413 - Country code;

BeacN - Beacon number;

↓ **F1-Mes#** **F2-Save** - you can save the measurements by pressing **F2** key under the number **Mes#X** which is increased automatically by cycle or changed by **F1** key, and go to the next screen to check other parameters by pressing ↓ .

By pressing **Down** (↓) key, the additional data of the beacon's message will be displayed on the screen:

Default position

P406: 43.2 dBm
F406: 406040.08kHz
FF FE D0 80 02 00
00 00 7F DF FB 00
20 B7 83 E0 F6 6C
 ↑ ↓ **F1-Mes#** **F2-Save**

P406: 43.2 dBm - power level of channel 406MHz;

F406:406040.08kHz - carrier frequencies in channel 406MHz;

FF FEF6 6C - full information in HEX format.

Press **UP** (↑) key to return to the previous menu, or press **Down** (↓) key to go to the next screen.

Phase: +60° -61°

Tpre: 160.2 ms

TTT: 520.1 ms

↑ F1-Mes# F2-Save

Phase: +60° -61° - positive and negative phase deviation value;

Tpre - duration of non-modulated preamble;

TTT - total transmission time.

Press **UP** (↑) key to return to the previous menu to view previous beacon's message parameters.

Press **ESC** or **MENU** key to go to main menu.

Also you can see the all saved data in **VIEW MESSAGES** item of the **MAIN MENU**.

4.4.1.2 *TEST CH 121MHz* menu item

Test CH 121MHz is intended to measure the impulse signal level on the frequency of 121.5MHz and a auditory monitoring of the sweep tone presence in a channel of 121.5MHz.

- TEST CH 121 MHz -

Waiting for signal

After pressing **ENTER** key while using *TEST CH121MHz* menu item, the following title will appear on the screen: "*Waiting for signal*".

The measurement is attended by the audio alarm of the detected signal of the sweep tone.

- **TEST CH 121 MHz** -

F121: 121499.9 kHz

P121: -26, 2 dBm

Stop measure - Enter

The following information (for example) will briefly appear on the screen:

F121:121499.9Hz - carrier frequency of channel 121.5MHz;

P121: -26,2dBm - power level in channel 121.5MHz.

Press **ENTER** key to stop the measurement.

- **TEST CH 121 MHz** -

F121: 121499.9 kHz

Max P121: 0,0 dBm

Measure completed

Change Mes# - F1

Save - F2 Mes#3

On completing of the measuring session, the test result will appear on the screen:

F121:121499.9Hz - carrier frequency of channel 121.5MHz;

Max P121: 0,0dBm – max. power level in channel 121.5MHz.

You can save the measurement results by pressing **F2** key under the current number **Mes#X** or changed by **F1** key.

X is the memory cell number which was saved in **MEASURE / TEST CH 406 MHz** mode. This way one can add 121.5 MHz measurement results to the X memory cell with 406 MHz channel parameters.

4.4.1.3 *Frequency 406 MHz* menu item

Frequency 406MHz is intended for the frequency measurement of impulse signal on the channel of 406MHz. Also the frequency measurement in this mode is not depended on of the frequency range chosen in TEST CH 406 MHz mode. Besides, the measured value allows select frequency range automatically for TEST CH 406 MHz mode.

- **Frequency 406 MHz**

Press ENT to start

- **Frequency 406 MHz**

Waiting for signal

- **Frequency 406 MHz**

406040, 070 kHz

Entering the menu, the title «**Press ENT to start**» will appear on the screen. To start up measurements, press the **ENTER** key. After this the tester is ready to receive the signal and measure the 406MHz channel frequency, the note “**Waiting for signal**” will appear. Now turn on the beacon and measurement results will be displayed on LCD (as shown on the left).

NOTE:

Each keystroke of the **ENTER** activates new measurement session and its result will appear on the screen.

If the frequency channel of the tested beacon is unidentified, the **MEASURE / Frequency 406MHz** is strongly recommended before make measurement of the beacon parameters in **TEST CH 406 MHz** mode.

4.4.2 VIEW MESSAGES menu item – Saved data review

Entering this part of the menu, user can see the last saved data on the display. The information presented in the following way:

07:30 14/09/2021

Mes#3 Test Ok

ID: 0004000000FFBFF

EPIRB-MMSI/LOC

MMSI: 123456

CC: 413

BeacN: 00



Default position

P406 : 43.2 dBm

F406 : 406040.08 kHz

P121 : 0.0 dBm

F121 : 121499.9 kHz

FF FE D0 80 02 00



00 00 7F DF FB 00

20 B7 83 E0 F6 6C

Phase: +60° -61°

Tpre: 160.2 ms

TTT: 520.1 ms



HH:MM dd/mm/yyyy - Time and date of measurements;

Mes#X - memory cell number, where test results will be saved by pressing **F2** key (where X – value from 1 to 10);

Test or **Dist** - message type (Test (testing mode), Dist (emergency mode));

Ok or **BAD** - BHC code comparison result;

ID - 15 byte hexadecimal beacon identifying code (15 Hex ID);

EPIRB-MMSI/LOC - protocol type;

MMSI - Maritime Mobile Service Identify;

CC: - country code;

BeacN - beacon number.

P406 - power level in 406 MHz channel;

F406 - frequency level in 406 MHz channel;

P121 - power level in 121.5 MHz channel;

F121 - frequency level in 121.5 MHz channel.

FF..... - full information in HEX format.

By press ↓ key, the additional message data will be displayed. Press ↑ key, return to the previous menu.

Phase - positive and negative phase deviation value;

Tpre - duration of non-modulated preamble;

TTT - total transmission time.

Press ↑ key to return to the previous menu.

Tool tips with the possible further options are as follows:

- ➔ - view the next stored message with id **Mes#X+1**;
- ➔ - view the previous stored message with id **Mes#X-1**.

The viewing is carried out by circle starts at 1 to 10 or otherwise.

4.4.3 SETTINGS menu item

---- **SETTINGS** ----

Battery voltage
LCD contrast
Setup date/time
Sound on/off
Clear msg cell
Calibration info
Change attenuator

After entering this menu, one can see the following menu items:

Battery voltage - tester's power supply level indication;

LCD contrast - LCD contrast settings;

Setup date/time - time and date settings;

Sound on/off - audio alarms on-off;

Clear msg cell - delete the stored messages;

Calibration info - Manuf. date & Calib. Date;

Change attenuator - change attenuation meaning of attenuator.

All the set values are saved in the non-volatile memory after the turning off the tester.

4.4.3.1 *Battery voltage* menu item - tester power supply indication

- **Battery voltage** -

5.10V

Press ENT to start

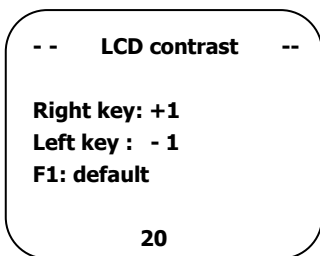
After entering this menu, the meaning of voltage of the current power supply is shown on the screen:

- internal battery elements (if there's no connection to the USB);
- USB connection voltage, if there is network.

The tester will be switched to the USB power supply channel automatically after being connected to USB power source!

Each keystroke on the **ENTER** key initiates one-shot measurement.

4.4.3.2 *LCD contrast* menu item - LCD contrast settings



After entering this menu, the current value of the LCD contrast is shown by **ENTER** key pressing on the screen within the range from 10 to 32 and users tool tips as well.

Right key: +1 - increase contrast;

Left key: -1 - decrease contrast;

F1: default - default settings (20).

4.4.3.3 *Set date/time* menu item - time and date settings



After entering this menu, the current time and date, format flag are shown on the screen.

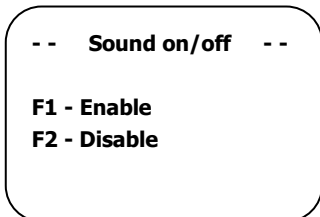
Use **Left** (←), **Right** (→) keys for cursor movement. Use **Up** (↑), **Down** (↓) keys for time and date setting.

Press **F1** key for setting to zero.

Press **ENTER** key for define value saving.

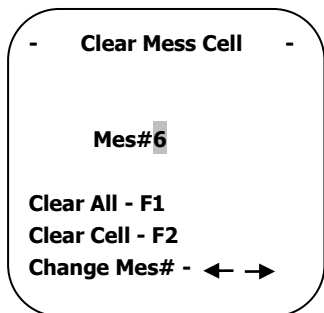
Press **F2** key to change the date format between **EUR DD/MM/YYYY** and **US MM/DD/YYYY**. Press **ENTER** key to save the meaning.

After pressing **ESC** key to exit the menu current values will be saved.

4.4.3.4 Sound on/off menu item - audio alarm on-off


After entering this menu, one can see tool tips:

F1 - Enable – press **F1** key, sound on;
F2 - Disable - press **F2** key, sound off.

4.4.3.5 Clear msg cell menu item - delete the stored messages


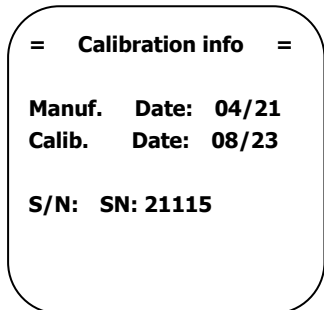
In this menu, one can delete selected message or all messages stored.

Mes#X: current message;

Use ←, → to select message that you need to delete and press **F2** key.

The viewing is carried out by circle starts at 1 to 10 or otherwise.

To clear all messages, press **F1** key.

4.4.3.6 Calibration info menu item - Manuf. date & Calib. Date


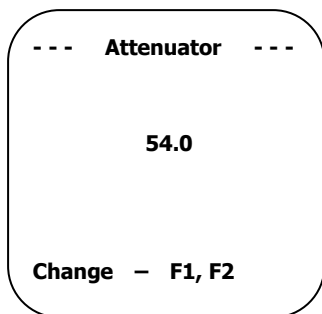
In this menu, one can identify the following information:

Manuf. Date: 04/21 (for example) - manufacturing date;

Calib. Date: 08/23 (for example) - date of next calibration;

S/N: serial number.

4.4.3.7 *Change attenuator* menu item - change attenuation meaning



In this menu, one can also change attenuation meaning of attenuator with help of **F1**, **F2** keys.

4.4.4 **MANUFACT SETTINGS** menu item

MANUFACT SETTINGS menu is intended for manufacturer usage and device service maintenance. This menu items is used for tester service settings and calibration. Use **MANUFACT SETTINGS** menu only in case of necessity.

5. Beacon test procedure

5.1. General comment according to the beacon test procedure

NOTE:

On checking and technical maintenance of the emergency beacon, pay the strong attention to avoid transmission of the false emergency signal!

The test procedure via antenna in real operating mode of the beacon (with distress signal) should be carried out in shielded room which provides radio frequency signal attenuation not less than 80dB (under recommendation of COSPAS-SARSAT Committee).

The present tester has advanced receive path sensitivity comparing to the previous model. That's why the required distance should be no less than 3 meters in order to avoid receiver damages when measurements are carried with antenna! The power meter is calibrated within 5 meter distance.

5.2. Test procedure in BEACON test mode (Self test)

5.2.1 Prepare the beacon and the tester for the test procedure under this manual instructions and instruction of beacon operations manual for self test mode.

5.2.2 If the beacon is connected to the tester via the RF-cable - use the manufacturer-supplied RF-attenuator (on the individual order).

Direct output connection of the beacon to the tester's input without attenuator leads to the irreparable damages of the testing device.

5.2.3 The measurement of the channel frequency of 406MHz in **MEASURE / Frequency 406MHz** mode is recommended before test procedure in case when operating frequency of the tested beacon is unknown. If the beacon

operation frequency is identified, the test procedure may be carried out in **MEASURE / TEST CH 406MHz mode**.

5.2.4 The common test procedure are as follows:

- Choose **MEASURE** menu item, then choose the source - Antenna or Attenuator, then **Frequency 406 MHz** menu item, then press **ENTER** key.

- The following title will appear on the screen:

Press ENT to Start

Press **ENTER** key - after that the tester goes to waiting mode of the beacon signal and the following title will appear on the screen.

Waiting for signal

- Turn on the tested beacon to the Self Test mode according to the instructions on the user manual. The distance between the tester and the beacon should be no less than 3 meters (5 meters is recommended).
- The frequency value will appear on the screen at the end of the measuring session.
- Press **ESC** key to quit this mode and go to the **TEST CH 406 MHz** mode by pressing **ENTER** key. The list of the operation channels with dedicated one (with frequency proper value received in Frequency 406Mhz mode) will appear on the screen.
- Press **ENTER** key to see the title:

Waiting for signal

And then one can hear audio signal of sweep modulation presence in the channel of 406 MHz.

- Turn on the beacon again to the Self Test mode and wait for test message. After the message is received all beacon and message parameters will be displayed. See 4.4.1.1.
- In case if all the parameters are correct, one can save the measurement results in the non-volatile memory by pressing **F2** key. If the parameters are not correct, try to change relative position of the beacon and the tester and the distance between them.

5.2.5 TEST procedure of the 121.5 MHz home transmission

121.5 MHz home transmitters can be tested in two ways:

- **MEASURE/TEST CH 406MHz** - 121.5 MHz channel audio monitoring of signal presence is working all time, because for the different beacon types this channel can be turned on only for short time before and after 406 MHz message sent.
- **Test CH 121 MHz mode** - in this mode the tester measures the level of a 121.5MHz signal allowing to check the channel not only by audio monitoring possibilities. Also measurement results can be stored in the same memory cell with X number where the other parameters received in **MEASURE/TEST CH 406 MHz** mode were saved.

Pay your attention that, for the signal level measurement in the channel 121.5 MHz the most types of the beacons should operate in real operation mode what can cause false distress signal emission on the frequency of 406 MHz as well as on 121.5 MHz. That's why this test procedure **must be** carried out in sheltered room or with attenuator and cables.

5.3. Data transfer to the PC or laptop

The tester can be easily connected to any personal computer or laptop with USB cable.

PC tester connection is performed via USB – channel with integral circuit USB –UART (USB Serial Converter) manufactured by FTDI - FT232R.

It is necessary to install FTDI drivers for normal operation of the tester.

The following software installation procedure is recommended:

1. Unpack zip-file to the any specified folder on your hard disk;
2. Start up BEACON TESTER NET-200 (no installation required).
3. Use USB – cable (supplied) to connect device to the PC and turn the tester on.
4. You will see the message about the new USB-device detected by the PC.

Then choose drivers_FTDI as the drivers setup resource from the software package.

5. Turn the device off and disconnect it from PC;
6. Connect the device to the PC, turn it on and enter the main menu. Further data transfer process is held by the terminal program.

NOTE:

Memory saved data transfer is performed directly from the MAIN MENU and PC software – one shouldn't enter any tester menu item! PC software allows to request data of the certain single measurement determined by the cell number or all of the ten possible memory units.

5.4. Antenna measurement process special feature

5.4.1 Measurement of transmit power equivalence (TPE).

TPE is a multiplication result for antenna power supply and antenna. It means that transmitted power is sufficiently depends on measurement carrying conditions and field density measurement set point. As in most cases it is hard to avoid RF-signal remirror (the operators or bottoming surface for instance), one has to know that TPE estimated value has rateable nature. Besides allowance for TPE according to the COSPAS-SARSAT C/S T.001 certification type approval taking into account allowance for transmitter power ± 2 dB and antenna power gain = (+4/-3) dB is about:

$$\text{TPE min} = 37 - 2 - 3 = 32 \text{ dBm or } 1.6 \text{ W}$$

$$\text{TPE max} = 37 + 2 + 4 = 43 \text{ dBm or } 20 \text{ W}$$

for 90% of space determined by 5° and 60° degrees of elevation. For the rest part calculated TPE could be far less.

5.4.2 Measurement procedure in strong remirror condition.

Quite often the beacon testing is carried out in space-limited environment ship condition, when the strong remirror of the radio signal takes a place. Remirror

of the signal is possible even on the open area if there's no particular landing area for the beacon – water-line close-bodied box with radius no less than 1.25 m. In this case the tester antenna receives two waves – direct and the surface remirrored. Under such conditions there's appeared a complicated fringe pattern with deep amplitude level which lead to the errors in message transmitting and decoding on the frequency of 406MHz and wrong frequency and frequency deviation indication.

That's why 3-5 different points measuring sessions taking one's bearings for cause of received signal level with more signal level position are recommended.

5.4.3 Electric angle and frequency on the channel 406 MHz meter feature.

Strict requirement for 406 MHz frequency short-term stability impose the necessity to use oven-controlled crystal oscillator in all the beacons with constituent response time. It provides the transformation of the oscillator frequency to the nominal value. As the frequency is an electric angle rate of change then frequency change at the time of process stabilization directly affects the electric angle – it gets added phase incursion, which is lost when frequency is stabilized. In test mode time period between switching on the beacon 406 MHz message is about a few seconds that's why the measuring result for phase and frequency or coded information may fall outside the tolerable limits. In this Case, one may need to repeat the measurements with changing relative position and distance between the tester and the beacon. Coded information integrity check, and 406 MHz frequency channel check, according to the MSC/Circ.1039 requirements, one should held in sheltered room with switching the beacon to the work mode (after 15 min warming up)!

6. Tester calibration

This tester – is a complex special-use electronic device. Thus it is should be calibrated only by manufacturer or approved representative with corresponding equipment.

The calibration should be done every two years.

7. General instructions

It is necessary to keep the device in packing bag not less than for two hours at normal conditions when it was at high temperature deviation.

Keep it the packing bag in at normal condition within 12 hours after storage of the tester in conditions of high humidity.

8. Safety precautions

One can operate the tester only after reading this manual carefully and also after particular safety inductions.

9. Storage rules

This hardware product should be protected from residue, acid fumes, alkalis and other corrodent additions influence.

In a warehouse there should be appropriate temperature-from 278 K (5° C) to 313 K (40° C) and relative air humidity no more than 80%.

Appendix Unit conversion (dBm to W)

dBm	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
30	1.00	1.02	1.05	1.07	1.10	1.12	1.15	1.17	1.20	1.23
31	1.26	1.29	1.32	1.35	1.38	1.41	1.45	1.48	1.51	1.55
32	1.58	1.62	1.66	1.70	1.74	1.78	1.82	1.86	1.91	1.95
33	2.00	2.04	2.09	2.14	2.19	2.24	2.29	2.34	2.40	2.45
34	2.51	2.57	2.63	2.69	2.75	2.82	2.88	2.95	3.02	3.09
35	3.16	3.24	3.31	3.39	3.47	3.55	3.63	3.72	3.80	3.89
36	3.98	4.07	4.17	4.27	4.37	4.47	4.57	4.68	4.79	4.90
37	5.01	5.13	5.25	5.37	5.50	5.62	5.75	5.89	6.03	6.17
38	6.31	6.46	6.61	6.76	6.92	7.08	7.24	7.41	7.59	7.76
39	7.94	8.13	8.32	8.51	8.71	8.91	9.12	9.33	9.55	9.77
40	10.0	10.2	10.5	10.7	11.0	11.2	11.5	11.7	12.0	12.3
41	12.6	12.9	13.2	13.5	13.8	14.1	14.5	14.8	15.1	15.5
42	15.8	16.2	16.6	17.0	17.4	17.8	18.2	18.6	19.1	19.5
43	20.0	20.4	20.9	21.4	21.9	22.4	22.9	23.4	24.0	24.5
44	25.1	25.7	26.3	26.9	27.5	28.2	28.8	29.5	30.2	30.9
45	31.6	32.4	33.1	33.9	34.7	35.5	36.3	37.2	38.0	38.9
46	39.8	40.7	41.7	42.7	43.7	44.7	45.7	46.8	47.9	49.0
47	50.1	51.3	52.5	53.7	55.0	56.2	57.5	58.9	60.3	61.7
48	63.1	64.6	66.1	67.6	69.2	70.8	72.4	74.1	75.9	77.6
49	79.4	81.3	83.2	85.1	87.1	89.1	91.2	93.3	95.5	97.7
50	100	102	105	107	110	112	115	117	120	123
51	126	129	132	135	138	141	145	148	151	155
52	158	162	166	170	174	178	182	186	191	195
53	200	204	209	214	219	224	229	234	240	245
54	251	257	263	269	275	282	288	295	302	309
55	316	324	331	339	347	355	363	372	380	389
56	398	407	417	427	437	447	457	468	479	490
57	501	513	525	537	550	562	575	589	603	617
58	631	646	661	676	692	708	724	741	759	776
59	794	813	832	851	871	891	912	933	955	977

Example: The power level 37,4dBm is equal to 5.5W.

The recalculation is carried out by equation:

$$P[W] = 100.1 * P[dBm]^{-3} .$$

The back calculation is carried our under:

$$P[dBm] = 10 * (\log P[W] + 3) .$$