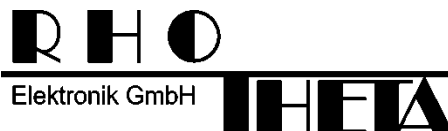


**User Manual
Installation and Operating**

Ramptester

for

**RT-400, RT-500-M, RT-800
Radio Direction Finders**



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Note

The manufacturer reserves the right to make modifications to the product described here at any time and without previous information.

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1 Safety Instructions

RHOTHETA Elektronik GmbH is constantly trying to keep the safety standard of their products up to date and to offer their customers the highest possible level of safety. RHOTHETA products are designed and tested in accordance with the valid safety regulations. The compliance with these standards is continuously monitored by our quality assurance system.

This product is tested and left the factory in perfect technical and safety-relevant condition. To maintain this condition and to ensure safe operation, the user must pay attention to all instructions and warnings given. For any questions regarding these safety instructions, RHOTHETA Elektronik GmbH can be contacted at any time.

The observance of the safety instructions will help to prevent personal injury or damage caused by all kinds of dangers. This requires that the following safety instructions must be read carefully and understood before using the product, as well as observed when using the product. The additional safety instructions such as for protecting persons appear in relevant parts of the product documentation and must also be paid attention to.

In addition, it is the responsibility of the user to use the product appropriately. The RT-8556 ramptester may not be used in any way that results in personal injury or property damage.

The use of this product other than its designated purpose or in disregard of the instructions of the manufacturer is the responsibility of the user. The manufacturer takes no responsibility for the misuse of the product.

The manufacturer is not liable beyond the scope of legal rules!

1.1 Legend of Signal Words

Note

This symbol designates tips or additional notes that must be paid attention to and make work easier.

Caution

Means that ignoring the instructions may lead to property damage or loss of data.

Warning

Means that ignoring the instructions, there may be a danger to health or life.

1.2 Basic Safety Instructions

Caution

Read and observe the following instructions, warnings and safety guidelines from the manufacturer!

- At all times, the local or national safety and accident prevention regulations must be observed.
- When installing or operating with the product, always follow the manufacturer's instructions.
- Only place the product on appropriate locations.
- Do not expose the product to environmental conditions (heat, humidity, wind load etc.) that exceed the specified conditions in the manuals.
- Use only the manufacturer prescribed components and/or use only recommended materials and do not change them. Any other use or unauthorized modifications to the product will void the authorization to operate it.
- Connect only approved accessories kits or additional equipment.
- Ensure that the connections with information technology equipment, e.g. industrial computers, comply with the IEC 62368-1 standard that applies in each case.
- The product may only be opened by authorized service personnel.

2 EU Declaration of Conformity

Hereby RHOTHETA Elektronik GmbH declares that the product RT-8556 Ramptester (Basic Equipment) is in compliance with the essential requirements and other relevant provisions of:

- Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment

The full text of the Declaration of Conformity can be found at:

[http:// www.rhotheta.com](http://www.rhotheta.com)

The EU Declaration of the Optional Equipment is on request available at RHOTHETA Elektronik GmbH or directly at the manufacturer of the Optional Equipment.

3 General Description

The RT-8556 ramptester is a DF (direction finder) performance measurement equipment designed for quick test and maintenance of the RT-400, RT-500-M, and RT-800 radio direction finder systems (RDFs). The ramptester consists of the antenna measurement device (ramptester itself) and an optional RF signal generator, which allows tests on any desired frequencies in the RT-8556 defined frequency range. The antenna measurement device allows the bearing testing in 45° steps and can be simply attached to the RT-400/RT-500-M/RT-800 AU (antenna unit). Thus, the RT-8556 ramptester provides an extensive and convenient performance test of the direction finder installed on a vessel, which includes the bearing accuracy, bearing sensitivity and audio modulation tests on every customer desired frequency channel.

4 Equipment for Test On-Site

Device under test is the RT-400 / RT-500-M / RT-800 direction finder.

- Antenna unit (AU) →



Basic Equipment:

- RT-8556 ramptester (antenna measurement device) →
- RF cable
- User manual
- Test protocol template



Optional Equipment:

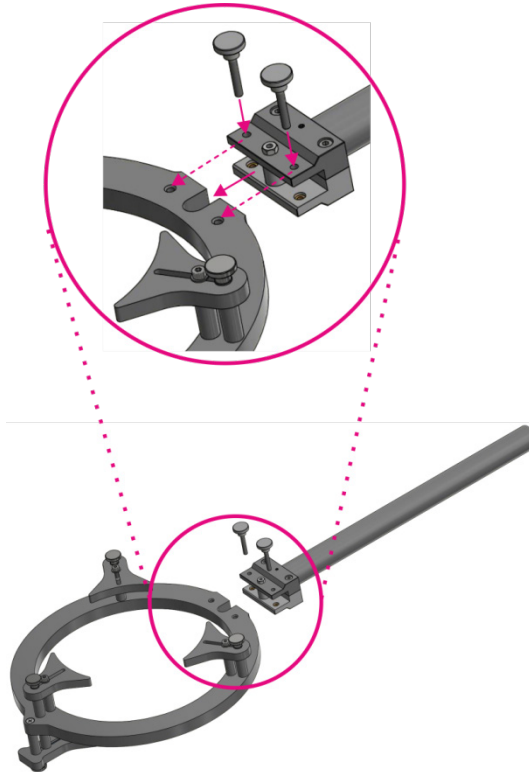
- RF Signal Generator →
- PN **RT-14400WP**
- Freq: 35-4400 MHz
- Level: -80 to +10dBm
- Battery, charging circuit
- Cables
- Carrying case



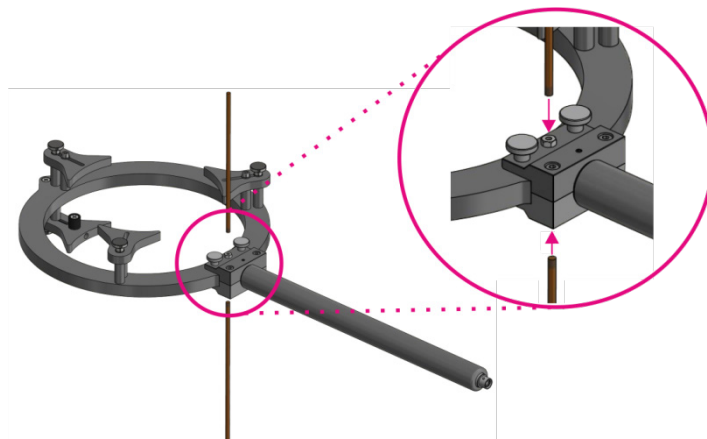
5 Test Procedure

5.1 Test Preparation

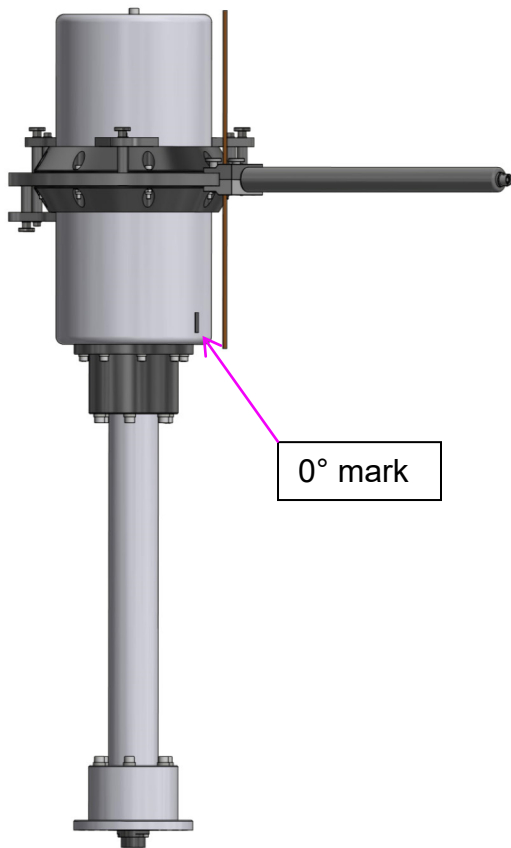
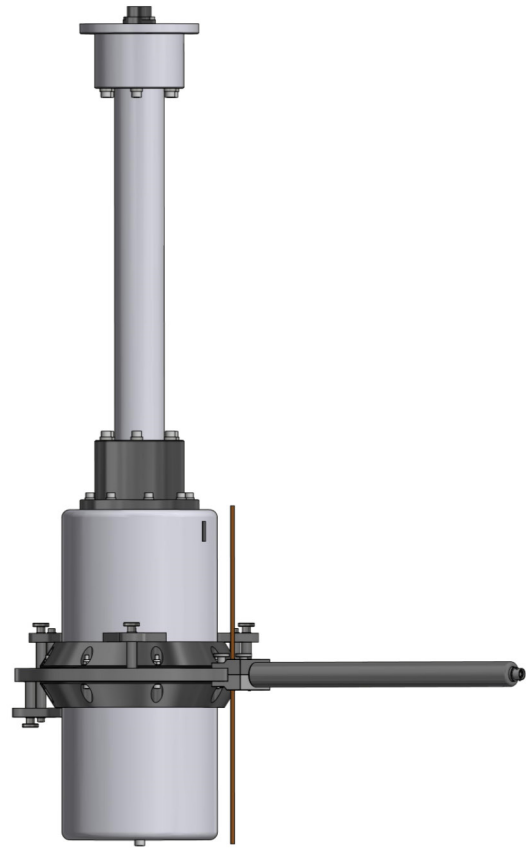
- Assemble the ramptester in two steps:
 1. Connect the measuring ring of the ramptester to the handle tube at the position of the groove and fix the parts with the knurled screws.



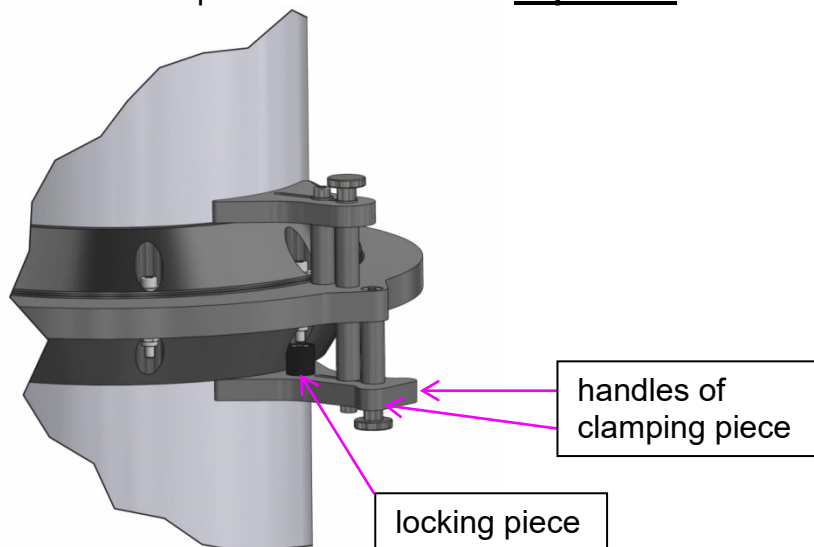
2. Then screw the two dipole radiators into the corresponding threads.



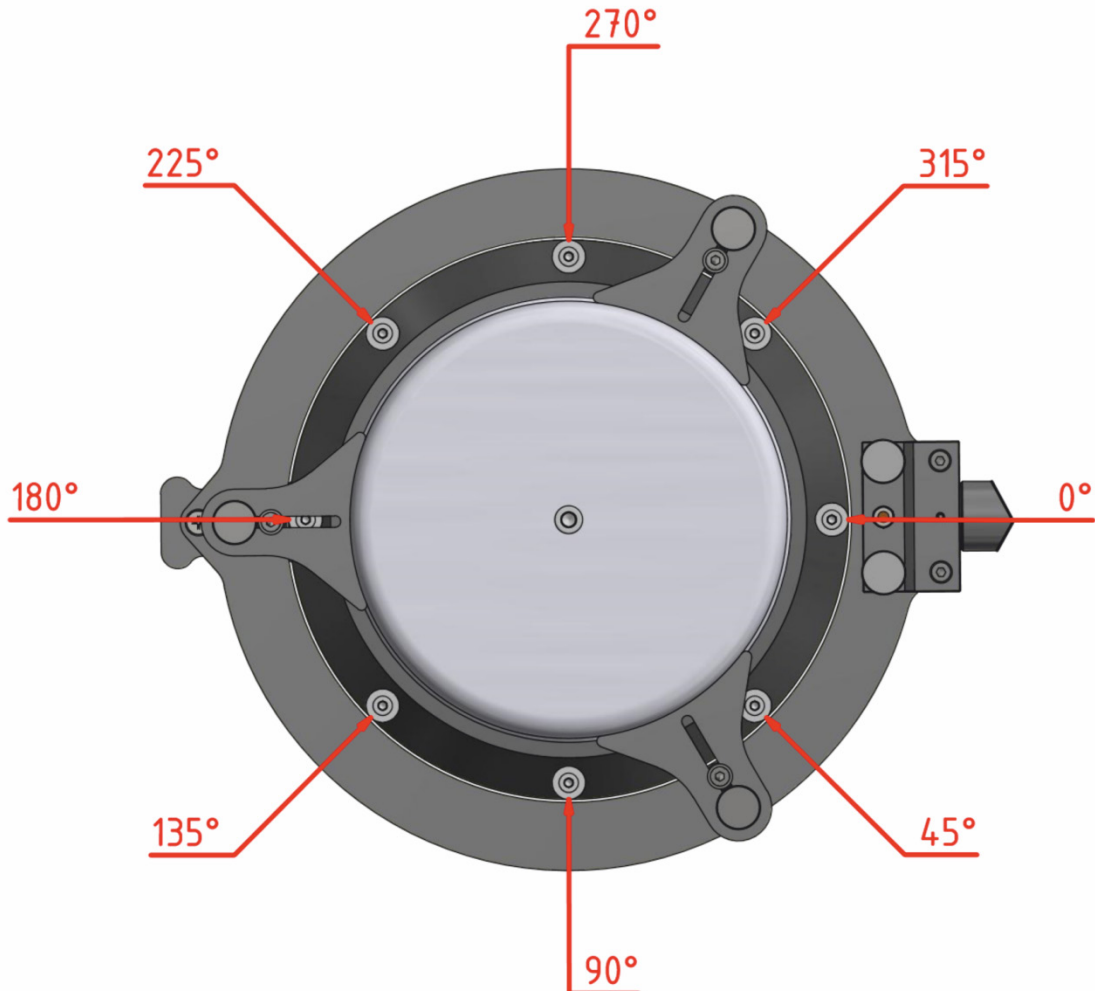
- Mount the ramptester on the DF antenna unit.
Basically, the three guide pieces (brackets) must be on top.

Standard mounting:**Upside-down mounting:**

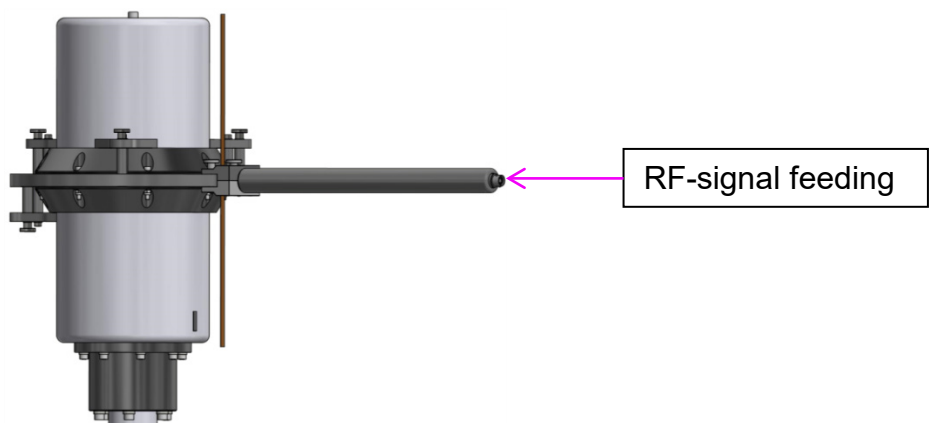
1. Loosen the knurled screws in the three guide pieces of the measuring ring and push the guide pieces outwards.
2. Loosen the knurled screw on the clamping piece. Impose the ramptester on the antenna unit (AU). Pull on the handles of the clamping piece (it has a built-in spring) and release as soon as the clamping piece is placed under the antenna ring. Turn the measuring ring so that the locking piece of the clamping piece is at the 180° position and the dipole antenna is at the **0° position**.



3. Press the three guide pieces (brackets) against the antenna and tighten the knurled screws.
4. Now you can turn the measuring ring on the handle tube and the ramptester remains fixed to the antenna, the locking function of the clamping piece allows exact 45°-steps.



- Ensure that the DF is switched on (for the audio test (s. 5.4) use either the external speaker or connect the DCU to the audio system of the vessel).
- Connect the RT-14400WP generator - or another signal generator that fulfills the requirements of the test procedure - with the ramptester.



5.2 Bearing Accuracy Measurement

Test Procedure: Bearing Accuracy

| Nr. | Procedure | Setting |
|-----|---|----------------------|
| 1 | Set the DF frequency to the desired frequency. | |
| 2 | Set the signal generator frequency to the measurement frequency. | |
| | Depending on purchased frequency options available on the DF, RHOTHETA recommends testing of following frequencies. Additional frequencies can be tested on demand. | VHF Air Band |
| | | VHF Marine Band |
| | | Military Air Band |
| | | COSPAS-SARSAT |
| 3 | Set the generator level. | -30 dBm |
| 4 | Set the generator modulation. | AM = OFF FM = OFF |
| 5 | Adjust the ramptester to the 0° Position. | |
| 6 | Rotate the ramptester to each azimuth position and note the bearing results in the test protocol. | |
| 7 | Chose the next frequency and start with the first step. | |

Protocol: Bearing Accuracy Measurement (Example)

| Nr. | Description | Limits | Result | Passed | Result | Passed |
|-----|---------------|----------------|-------------|-----------------------------|-------------|-----------------------------|
| 1 | Frequency | -- | 121,500 MHz | | 156,800 MHz | |
| 2 | 0° Position | 350° ... 10 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 3 | 45° Position | 35° ... 55 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 4 | 90° Position | 80° ... 100 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 5 | 135° Position | 125° ... 145 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 6 | 180° Position | 170° ... 190 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 7 | 225° Position | 215° ... 235 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 8 | 270° Position | 260° ... 280 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 9 | 315° Position | 305° ... 325 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 10 | Frequency | -- | 243,000 MHz | | 406,025 MHz | |
| 11 | 0° Position | 350° ... 10 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 12 | 45° Position | 35° ... 55 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 13 | 90° Position | 80° ... 100 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 14 | 135° Position | 125° ... 145 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 15 | 180° Position | 170° ... 190 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 16 | 225° Position | 215° ... 235 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 17 | 270° Position | 260° ... 280 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 18 | 315° Position | 305° ... 325 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |

Note

Other frequencies can be tested according to the test procedure. The see test protocol template can be adopted appropriately.

5.3 Bearing Sensitivity Measurement

| Test Procedure: Bearing Sensitivity | | |
|-------------------------------------|--|--------------------------|
| Nr. | Procedure | Setting |
| 1 | Set the DF frequency to the desired frequency. | |
| 2 | Set the DF squelch level. (The output of the RF Generator should be set OFF) | 5% above the noise level |
| 3 | Set the signal generator frequency to the desired frequency and switch off all modulations (AM = OFF, FM = OFF) | |
| | Depending on purchased frequency options available on the DF, RHOTHETA recommends the testing of following frequencies. Additional frequencies can be tested on demand | VHF Air Band |
| | | VHF Marine Band |
| | | Military Air Band |
| | | COSPAS-SARSAT |
| 4 | Adjust the level of the RF generator and set the output ON. | -50 dBm |
| 5 | Adjust the ramptester to the 0° position and wait until the bearing value has been stabilized. Note the bearing result. | 0° -50 dBm |
| 6 | Adjust ramptester to the 90° position and wait until the bearing value has been stabilized. Note the bearing result. | 90° -50 dBm |
| 7 | Adjust the level of the RF generator and set the output ON. | -60 dBm |
| 8 | Adjust the ramptester to the 0° position and wait until the bearing value has been stabilized. Note the bearing result. | 0° -60 dBm |
| 9 | Adjust the ramptester to the 90° position and wait until the bearing value has been stabilized. Note the bearing result. | 90° -60 dBm |
| 10 | Reduce the signal generator level until no bearing is displayed. Note the generator limit level. | |

Note

Before starting the test, make sure that the noise level is not higher than the signal level.

Protocol: Bearing Sensitivity Measurement (Example)

| Nr. | Description | Limits | Result | Passed | Result | Passed |
|-----|---|---------------|-------------|-----------------------------|-------------|-----------------------------|
| 1 | Frequency | -- | 121,500 MHz | | 156,800 MHz | |
| 2 | 0° Position; P _{Gen} = -50 dBm | 350° ... 10 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 3 | 90° Position; P _{Gen} = -50 dBm | 80° ... 100 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 4 | 0° Position; P _{Gen} = -60 dBm | 340° ... 20 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 5 | 90° Position; P _{Gen} = -60 dBm | 70° ... 110 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 6 | DF Receiving OFF level (Note generator RF level) | -- | | -- | | -- |
| 7 | Frequency | -- | 243,000 MHz | | 406,025 MHz | |
| 8 | 0° Position; P _{Gen} = -50 dBm | 350° ... 10 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 9 | 90° Position; P _{Gen} = -50 dBm | 80° ... 100 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 10 | 0° Position; P _{Gen} = -60 dBm | 340° ... 20 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 11 | 90° Position; P _{Gen} = -60 dBm | 70° ... 110 ° | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 12 | DF Receiving OFF level (generator level) | -- | | -- | | -- |

Note

Other frequencies can be tested according to the test procedure. The see test protocol template can be adopted appropriately.

5.4 Audio Test

Test Procedure: Audio Test

| Nr. | Procedure | Setting |
|-----|---|----------------|
| 1 | Set the DF and the signal generator (if it provides modulation) to the desired frequency. Adjust the ramptester to any position. | |
| | Depending on purchased frequency options available on the DF, RHOTHETA recommends the testing of following frequencies. Additional frequencies can be tested on demand. | VHF Air Band |
| | | 121,500 MHz |
| | | VHF Maine Band |
| | | 156,800 MHz |
| | Military Air Band | 243,000 MHz |
| | COSPAS-SARSAT | 406,025 MHz |
| 2 | Set the generator modulation depending on the used frequency and set the output on ON. | |
| | Amplitude modulation for the VHF air band or military band | AM: 60% |
| | | AF: 800 Hz |
| | | FM: OFF |
| | Frequency modulation for other frequencies | FM: 3 kHz |
| | | AF: 800 Hz |
| | | AM: OFF |
| 3 | Set the generator on the appropriate level. | -30 dBm |
| 4 | Set the DCU volume. | 50% |
| 5 | The 800 Hz tone should be hearable loud and clear (external speaker or out of the audio system of the vessel). | |

Protocol: Audio Test (Example)

| Nr. | Description | Limits | Result | Passed | Result | Passed |
|-----|--------------|----------------|-------------|-----------------------------|-------------|-----------------------------|
| 1 | Frequency | -- | 121,500 MHz | | 156,800 MHz | |
| 2 | Audio output | loud and clear | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |
| 3 | Frequency | -- | 243,000 MHz | | 406,800 MHz | |
| 4 | Audio output | loud and clear | | OK <input type="checkbox"/> | | OK <input type="checkbox"/> |

Note

Other frequencies can be tested according to the test procedure. The see test protocol template can be adopted appropriately.

6 Product Disposal

6.1 Disposal within the European Union

Product Disposal



■ Product labeling according to EN 50419

At the end of product life, this product may not to be disposed together with normal household waste. Even disposal via the municipal waste disposal collection for electrical and electronic equipment is not permitted.

The correct disposal of this product helps to protect the environment and prevent any potential damage to the environment and human health, which can occur due to improper handling of the product.

- Therefore, carry out the inoperative device, an electronics recycling.
- or
- The RHOTHETA Elektronik GmbH takes back all products that are subject to the requirements of the WEEE Directive (2012/19/EU) of the European Union to supply these products to professional disposal.

6.2 Disposal outside the European Union

For proper disposal of used electronic equipment in accordance with the respective national regulations in countries outside the European Union please check it with your dealer or the local authorities.

7 List of abbreviations

| Abbreviation | Meaning | Remarks |
|--------------|---|--------------------|
| AM | Amplitude Modulation | |
| AMD | Antenna Measurement Device | |
| AU | Antenna Unit | |
| CP-SS, C-S | COSPAS-SARSAT System | |
| DCU | Display & Control Unit | |
| DF | Direction finder | |
| Deg | Degree (° = 60') | |
| ELT | Emergency Locator Transmitter | |
| FM | Frequency Modulation | |
| GND | Ground | |
| GPS | Global Positioning System | |
| ID | Identification | |
| IP | Ingress Protection rating | IP67 |
| LAN | Local Area Network | |
| LCD | Liquid Crystal Display | |
| LED | Light-Emitting Diode | |
| MOB | Man-Over-Board | |
| MSSI | Maritime Mobile Service Identity | Ship's Ident. No. |
| NF | Audio Frequency | |
| NMEA (0183) | National Marine Electronics Association | Interface standard |
| PLB | Personal Locator Beacon | |
| PS RAM | Averaging Random Access Memory | |
| PTT / SBS | Push-To-Talk / Self Bearing Suppression | |
| RAM | Random Access Memory | |
| RF | Radio Frequency | |
| Rx | Receiver | |
| S/N | Signal to Noise | |
| SAR | Search And Rescue | |
| SNR | Signal to Noise-Ratio | |
| SQL | Squelch | |
| TFT | Thin Film Transistor (see also LCD) | |
| Tx | Transmitter | |
| V | VTSS Version | AU-Variant V |
| VDC | Volts of Direct Current | |
| VTS | Vessel Traffic Service | |