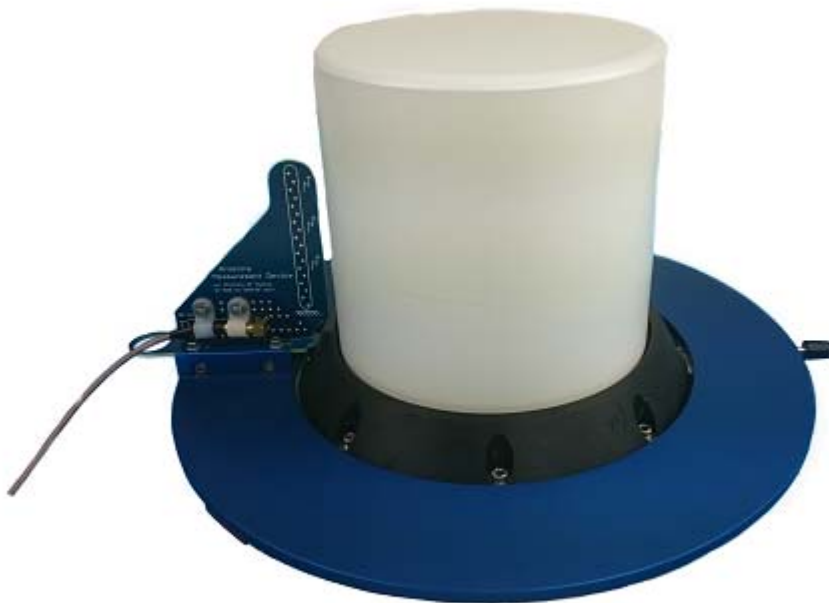


# User Manual Installation and Operating

## RT-600 Ramptester

**RHO**  
Elektronik GmbH **THEIA**



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## **Note**

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

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# 1 Safety Instructions

RHOTHETA Elektronik GmbH is constantly trying to keep the safety standard of the products up to date and to offer the customers the highest possible level of security.

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 manufactured in accordance with the EC Certificate of Conformity, 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 product RT-600 Ramptester may not be used in any way that a person / thing is injured or damaged.

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 Symbols

### NOTE

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

**ATTENTION**

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

**WARNING**

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

## 1.2 Basic Safety Instructions

### **ATTENTION**

**Read and observe the following instructions, warnings and safety instructions of the manufacturer!**

- At all work, the local or national safety and accident prevention regulations must be observed.
- Use only the manufacturer prescribed components and / or use only recommended material by the manufacturer and do not change this.
- Connect only approved accessories kits or additional equipment.
- The product may only be opened by authorized service personnel.
- The unit voids its type approval on operating with unauthorized modifications on the device or not the intended use.

## 2 EU Declaration of Conformity

Hereby RHOTHETA Elektronik GmbH declares that the product RT-600 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-600 Ramptester is the DF (Direction Finder) performance measurement equipment designed for quick test and maintenance of the RT-600 SAR Direction Finder. The Ramptester consists of the antenna measurement device and an optional RF signal generator, which allows tests on any desired frequencies in the RT-600 defined frequency range. The antenna measurement device allows the bearing testing in 45° steps and can be simply attached to the RT-600 AU (Antenna Unit). Thus, the RT-600 Ramptester provides an extensive and convenient performance test of the Direction Finder installed on an aircraft, 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-600 SAR Direction Finder installed on the aircraft.

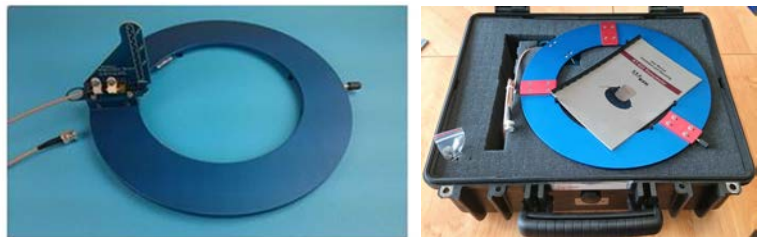
- Antenna Unit (AU)
- Display & Control Unit (DCU)



Basic Equipment:

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- Antenna Measurement Device
- Pressure gauge
- User Manual
- Test Protocol Template



Optional Equipment:

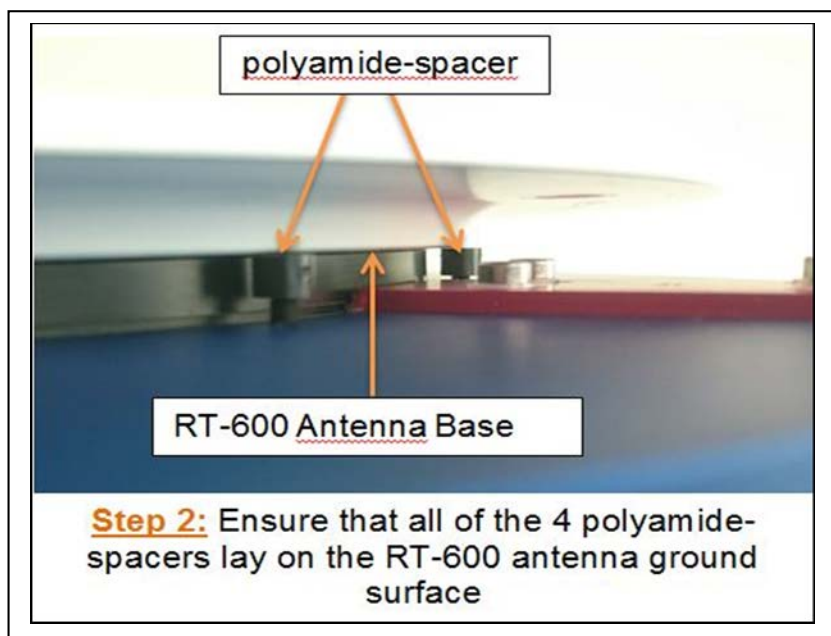
- RF Signal Generator
  - PN **RT-14400WP**
  - Freq: 35-4400 MHz
  - Level: -80 to +10dBm
  - Battery, charging circuit
  - Cables
  - Carrying case

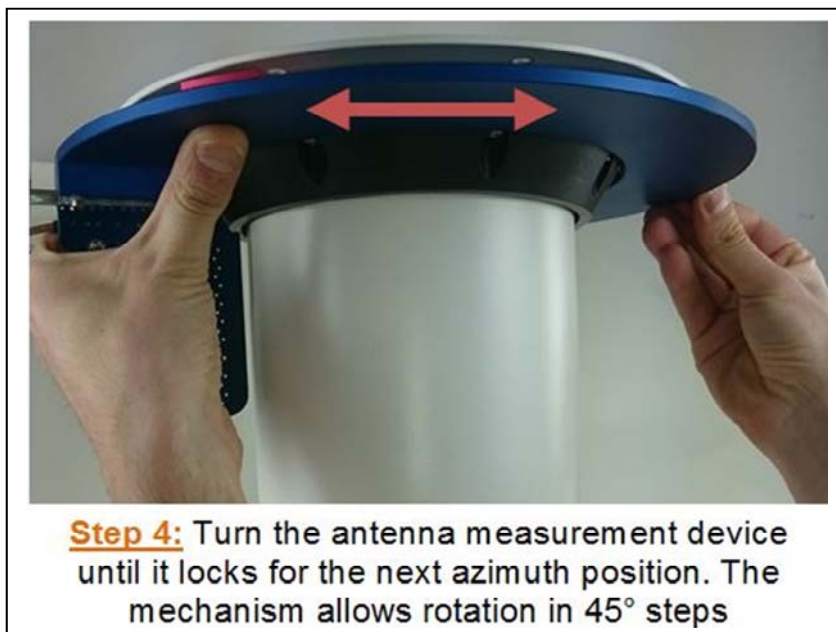
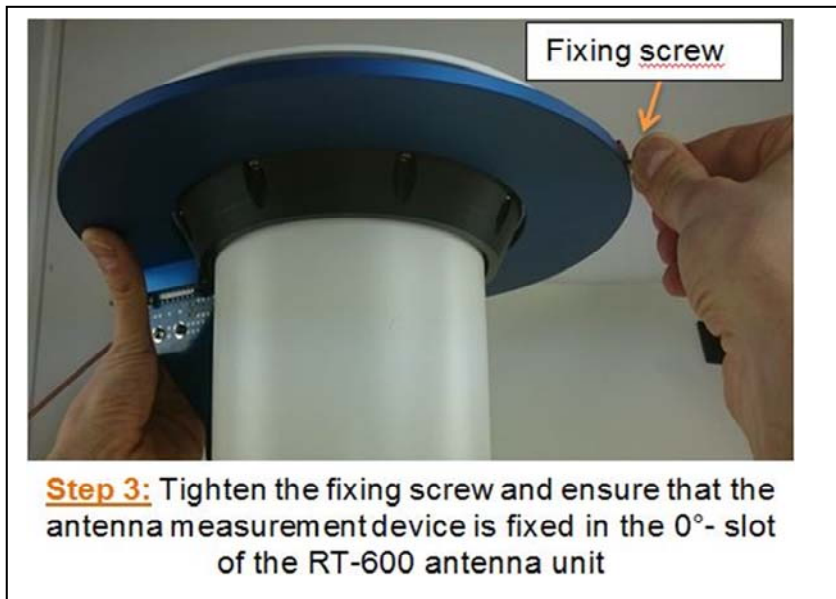


## 5 Test Procedure

### 5.1 Test Preparation

- a.) Ensure that the RT-600 is switched on and connected to the audio system of the aircraft.
- b.) Mount the antenna measurement device on the RT-600 antenna unit as it shown in the following pictures

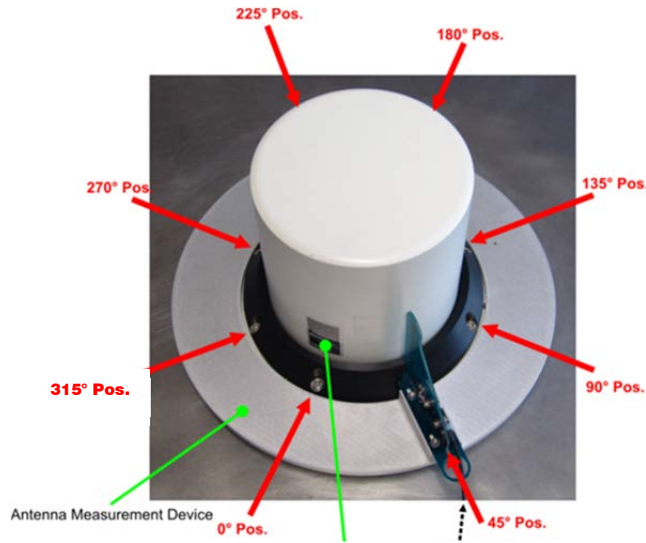




- c.) Connect the R&S SMC-100A generator or another signal generator that fulfills the requirements of the test procedure (see page 9 and 11) with the antenna measurement device



## 5.2 Bearing Accuracy Measurement



**FIG 1: RT-600 and Antenna Measurement Device; azimuth positions**

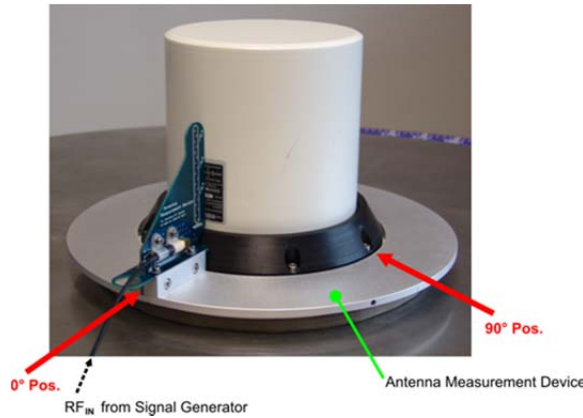
Test Procedure: Bearing Accuracy			
Nr.	Procedure	Setting	
1	Set the RT-600 frequency to the desired frequency.		
2	Set the signal generator frequency to the measurement frequency.		
	Depending on purchased frequency options of RT-600, RHOTHETA recommend the testing of following frequencies. Additional 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
3	Set the generator level.	-50 dBm	
4	Set the generator modulation.	AM = OFF FM = OFF	
5	Adjust the antenna measurement device to the 0° Position.		
6	Rotate the antenna measurement device 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
1	Frequency	--	121,500 MHz	--
2	0° Position	350° ... 10 °		OK <input type="checkbox"/>
3	45° Position	35° ... 55 °		OK <input type="checkbox"/>
4	90° Position	80° ... 100 °		OK <input type="checkbox"/>
5	135° Position	125° ... 145 °		OK <input type="checkbox"/>
6	180° Position	170° ... 190 °		OK <input type="checkbox"/>
7	225° Position	215° ... 235 °		OK <input type="checkbox"/>
8	270° Position	260° ... 280 °		OK <input type="checkbox"/>
9	315° Position	305° ... 325 °		OK <input type="checkbox"/>
10	Frequency	--	156,800 MHz	--
11	0° Position	350° ... 10 °		OK <input type="checkbox"/>
12	45° Position	35° ... 55 °		OK <input type="checkbox"/>
13	90° Position	80° ... 100 °		OK <input type="checkbox"/>
14	135° Position	125° ... 145 °		OK <input type="checkbox"/>
15	180° Position	170° ... 190 °		OK <input type="checkbox"/>
16	225° Position	215° ... 235 °		OK <input type="checkbox"/>
17	270° Position	260° ... 280 °		OK <input type="checkbox"/>
18	315° Position	305° ... 325 °		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



**FIG 2: Antenna Measurement Device and RT-600 AU Sensitivity Measurement**

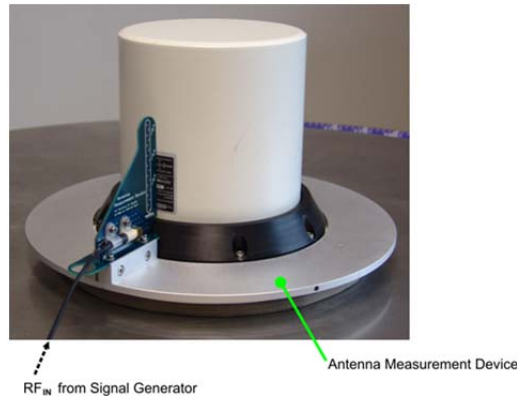
Test Procedure: Bearing Sensitivity			
Nr.	Procedure	Setting	
1	Set the RT-600 frequency to the desired frequency.		
2	Set the RT-600 squelch level. (The output of the RF Generator should be set on OFF)	5% above the noise level	
3	Set the signal generator frequency to the desired frequency and switch off all modulations (AM = OFF, FM = OFF)		
	Depending on purchased frequency options of RT-600, RHOTHETA recommend the testing of following frequencies. Additional frequencies can be tested on demand	VHF Air Band	121,500 MHz
		VHF Marine Band	156,800 MHz
		Military Air band	243,000 MHz
		Cospas-Sarsat	406,025 MHz
4	Adjust the level of the RF generator and set the output on ON.	-60 dBm	
5	Adjust the antenna measurement device to the 0° position and wait until the bearing value has been stabilized. Note the bearing result.	0° -60 dBm	
6	Adjust the antenna measurement device to the 90° position and wait until the bearing value has been stabilized. Note the bearing result.	90° -60 dBm	
7	Adjust the level of the RF generator and set the output on ON.	-70 dBm	
8	Adjust the antenna measurement device to the 0° position and wait until the bearing value has been stabilized. Note the bearing result.	0° -70 dBm	
9	Adjust the antenna measurement device to the 90° position and wait until the bearing value has been stabilized. Note the bearing result.	90° -70 dBm	
10	Reduce the signal generator level until no bearing is displayed. Note the generator limit level.		

Protocol: Bearing Sensitivity Measurement (Example)				
Nr.	Description	Limits	Result	Passed
1	Frequency	--	121,500 MHz	--
2	0° Position; P <sub>Gen</sub> = -60 dBm	350° ... 10 °		OK <input type="checkbox"/>
3	90° Position; P <sub>Gen</sub> = -60 dBm	80° ... 100 °		OK <input type="checkbox"/>
4	0° Position; P <sub>Gen</sub> = -70 dBm	340° ... 20 °		OK <input type="checkbox"/>
5	90° Position; P <sub>Gen</sub> = -70 dBm	70° ... 110 °		OK <input type="checkbox"/>
6	DF Receiving OFF level (Note generator RF level)	--		--
7	Frequency	--	156,800 MHz	--
8	0° Position; P <sub>Gen</sub> = -60 dBm	350° ... 10 °		OK <input type="checkbox"/>
9	90° Position; P <sub>Gen</sub> = -60 dBm	80° ... 100 °		OK <input type="checkbox"/>
10	0° Position; P <sub>Gen</sub> = -70 dBm	340° ... 20 °		OK <input type="checkbox"/>
11	90° Position; P <sub>Gen</sub> = -70 dBm	70° ... 110 °		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



**FIG 3: RT-600 and Antenna Measurement Device; Audio Test**

Test Procedure: Audio Test			
Nr.	Procedure	Setting	
1	Set the RT-600 DF and the signal generator to the desired frequency. Adjust the antenna measurement device to any position.		
	Depending on purchased frequency options of RT-600, RHOTHETA recommend 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.		-50 dBm
4	Set the DCU volume.		50%
5	The 800 Hz tone should be hearable loud and clear (External speaker or out of the aircraft audio system)		

Protocol: Audio Test (Example)				
Nr.	Description	Limits	Result	Passed
1	Frequency	--	121,500 MHz	--
2	Audio output	loud and clear	--	OK <input type="checkbox"/>
3	Frequency	--	156,800 MHz	--
4	Audio output	loud and clear	--	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, supply the device to an electronics recycling after the final taken out of service.

**Or**

- The RHOTHETA Elektronik GmbH takes back all products that are subject to the requirements of the WEEE Directive (2002/96/EC) of the European Union to supply these products to professional disposal.

### 6.2 Disposal outside the European Union

For disposal the equipment in accordance with national regulations in countries outside the European Union, ask your dealer or 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	
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	VTS Version	AU-Variant V
VDC	Volts of Direct Current	
VTS	Vessel Traffic Service	