RHOTHETA Solutions
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EAR/ WEEE Reg. No.: DE99530934
USt-IdNr. / VAT No.: DE133707842

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Incorporated: 10-30-2017 Florida USA
EIN: 82-3287734
Local Business Certificate: 169482
DUNS: 072454117
CAGE code: 82A60
NAICS: 334511, 423690, 811219
RHOTHETA Solutions

30 years developing RDF technologies for tracking and location in AIR, LAND and SEA

-Marine
-Airborne
-UAS
-VTS
-Air Traffic Control (ATC)
-Ground

View Products
Advanced Direction Finding and Location Systems for Air, Land & Sea
COSPAS-SARSAT
Tracking & Decoding
COSPAS-SARSAT System Overview

1. DISTRESS CALL UTILIZING EMERGENCY BEACON
2. SEARCH & RESCUE SATELLITES
3. LOCAL USER TERMINAL
4. MISSION CONTROL CENTER
5. RESCUE COORDINATION CENTER

EPIRB
ELT
PLB
Cospas-Sarsat Beacons

1. Analog: 121.5, 156.8, 243.0
2. Analog + Digital signals: C/S, AIS, DSC...
3. 2G Beacons -> Wideband C/S

Emergency Position Indicating Radio Beacon
Emergency Locator Transmitter
Ship Security Alert System
Personal Locator Beacon

EPIRBs
ELTs
PLBs
SSAS
AIS MOB
4 GPS Satellites

15-30% of beacons are Location Protocol

406 MHz Message with Embedded GPS location

C/S Satellites

LUT
MCC
RCC
DF Tracking/decoding C-S beacon
C-S lat-long = waypoint
COSPAS-SARSAT Phase 2

- LEO+MEO+GEO
- 3kHz-narrowband -> 76.8kHz-wideband DSSS signals
  - 406.500 MHz
  - 2G Beacons

DSSS_direct-sequence spread spectrum
Airborne Search-and-Rescue and Property Recovery
Airborne SAR and Property Recovery

RT-600-A

RT-600-L

Digital Mapping System (DMS)

DCU

AU

RS232

RS485

RS485

DMS and RT-600-L, with and without DCU

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www.RHOTHETAint.com
1-954-495-8700
Airborne SAR and Property Recovery

RT-600-A

Frequency options

- **VHF Emergency Band:** AM/8.333 kHz steps
  - 118.000 ... 124.000 MHz

- **VHF Marine Band:** FM/5.00 kHz steps
  - Channel 0 ... 88
  - 154.000 ... 163.000 MHz

- **UHF Emergency Band:** AM/25.0 kHz steps
  - 240.000 ... 246.000 MHz

- **COSPAS SARSAT:** PM/8.333 kHz steps
  - 400.000 ... 406.092 MHz

- **UHF FM Band:** FM/5.00 kHz steps
  - 406.100 ... 410.000 MHz

**RT-600 (A)**

- **Option F1:** VHF Air Band
  - AM/8.33 kHz steps
  - 118.000 ... 136.992 MHz

- **Option F2:** extended VHF Marine Band
  - FM/5.00 kHz steps
  - 137.000 ... 224.995 MHz

- **Option F3:** UHF Air Band
  - AM/25.0 kHz steps
  - 225.000 ... 399.975 MHz

- **Option F4:** additional UHF FM Band
  - FM/5.00 kHz steps
  - 406.100 ... 470.000 MHz
US Air Force – Civil Air Patrol
20 years using RT-500/RT-600 DFs

CAP SUCCESS STORY with SAR DF TECHNOLOGY

Taking the "SEARCH" out of SEARCH-AND-RESUE

- COSPAS-SARSAT™
  406.022 to 406.076 MHz
  (400 to 470 MHz)
- 121.5 MHz
- 156.8 MHz
- 243.0 MHz
- (118 to 400 MHz)
RT-600-L: Helping Airborne Public Safety Find Its Targets

RT-600-L

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RT-600-L: Helping Airborne Public Safety Find Its Targets

NOW with ARINC 429 Interface (Available 4th Qtr 2020)

- DF Status
- Active Frequency
- Active Band
- Bearing Values
- Signal Level
- Squelch Level
- COSPAS-SARSAT™ Data
- LoJack™ Data
RT-600-L:
Helping Airborne Public Safety Find Its Targets

Best use of the RT-600-L airborne RDF by public safety and other government agencies involved in stolen property recovery and SAR missions, exploiting its multi-band multi-mission capabilities to track LoJack®, ETS®, COSPAS-SARSAT® and other V/UHF AM/FM/PM/CW transmitters.

Public safety aviation units require ever more sophisticated tools to engage stolen property recovery and rescue missions.

Helping Airborne Public Safety Find Its Targets

RHO THETA offers a small form factor, DO160, 4.4lbs, self-contained DF sensor, consisting of an antenna unit (AU) with built in DF switching, wideband V/UHF receiver and CPU electronics.

Designed to perform tasks specific to the needs of US law enforcement, its small size and low power consumption make it perfect for aircraft big and small, fixed or rotary winged, as well as drones. Covering from 118MHz to 470MHz, it detects and tracks AM, FM, PM and CW transmissions. The RT-600-L is operated from a 3.3in display-control unit (DCU) or from the HMI of a digital mapping system.
DF Tracking with Digital Mapping and AR
UAS-based Search-and-Rescue and Property Recovery
Advanced DF-ing, Tracking and Location Solutions for
Public Safety - Search & Rescue Drones

Think of a Drone as a DF antenna tower:
↑ Drone Height = ↑ Radio Horizon = ↑ DF Range
UAS-based SAR and Property Recovery

REMOTE CONTROL STATION

GCS

DF SCOUT™

DF COMMANDER™

PLB

ELT

EPIRB

LOJACK™

ETS™

MEDICAL

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Vessel Traffic Service
Coastal / Port Surveillance
Search and Rescue
Radio Monitoring
RT-800

Receiving frequencies, frequency ranges:

- Standard Version
  - 118.000 to 123.975 MHz (8.33 kHz)
  - 154.000 to 162.995 MHz (5.00 kHz)
  - 240.000 to 245.975 MHz (25.0 kHz)
  - 400.000 to 406.093 MHz

- Optional extended frequency range
  - F1: 118.000 to 136.993 MHz (AM 8.33kHz)
  - F2: 137.000 to 224.995 MHz (FM/5.0 kHz)
  - F3: 225.000 to 399.975 MHz (AM/25.0 kHz)
  - F4: 406.100 to 470.000 MHz (FM/5.0 kHz)
DF + C-S + AIS

161.975 MHz (AIS1, ch 87B) 162.025 MHz (AIS2, ch 88B)
U.S. COAST GUARD ADDENDUM
TO THE
UNITED STATES
NATIONAL SEARCH AND RESCUE SUPPLEMENT (NSS)
To The
International Aeronautical and Maritime Search and Rescue Manual (IAMSAR)

COMDTINST M16130.2F
January 2013

Figure 3-15—SAROPS Search Plan for Helicopter Arriving one hour after Distress Alert with one hour On Scene Endurance Searching for 20-foot Power Boat; Night Search with NVGs and Illumination.

Figure 3-16 — Determining the Distress Alert Area for Nearly Reciprocal Bearings.
VTS & Coastal Surveillance

VHF-UHF bands 118 – 470 MHz
Marine
Search-and-Rescue
Radio Monitoring
Asset Recovery
# Marine SAR, Monitoring, and Asset Recovery

## MARINE PRODUCTS

<table>
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<tr>
<th>RT-100</th>
<th>RT-202</th>
<th>RT-300</th>
<th>RT-500-M</th>
<th>RT-B77</th>
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<tbody>
<tr>
<td>Man Over Board (MOB)</td>
<td>Man Over Board (MOB)</td>
<td>Search and Rescue (SAR)</td>
<td>Search and Rescue (SAR)</td>
<td>Emergency Frequency: 121.500 MHz</td>
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<tr>
<td>Emergency Frequency: 121.500 MHz</td>
<td>Emergency Frequency: 121.500 MHz</td>
<td>Radio Monitoring</td>
<td>Marine Asset Location &amp; Recovery</td>
<td>Test/Training Frequency: call us</td>
</tr>
<tr>
<td>Test/Training Frequency: call us</td>
<td>Test/Training Frequency: call us</td>
<td>AM, FM, Audio</td>
<td>118-470 MHz (4 Bands) (*)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>118-124 MHz AM 8.33/25 kHz</td>
<td>AM, FM, PM, Audio, Data</td>
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<tr>
<td></td>
<td></td>
<td>156-162.3 MHz FM 5.00 kHz</td>
<td>COSPAS-SARSAT™ Chs A-S</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>241-245 MHz AM 25 kHz (call us)</td>
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1-954-495-8700
US Coast Guard FRC Cutters using RT-500-M
When seconds count...

RADIO DIRECTION FINDERS

- Man Over Board
- Search and Rescue
- COSPAS-SARSAT™

WHEN SECONDS COUNT
RADIO DIRECTION FINDERS

- Man-Over-Board
- Search and Rescue
- Radio Monitoring
- Asset Recovery
- COSPAS-SARSAT 406MHz
- Radio Location

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Portable DF
Search and Rescue
Public Safety
Law Enforcement
PORTABLE - GROUND SAR

<table>
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<tr>
<th>RT-400</th>
<th>DF SCOUT™</th>
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<tr>
<td>Automatic 360° Doppler DF-ing</td>
<td>Android App for DF Remote Control</td>
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<tr>
<td>Search and Rescue (SAR)</td>
<td>GPS, Compass, WiFi</td>
</tr>
<tr>
<td>118-470 MHz (4 Bands) (*)</td>
<td>Open Street Maps</td>
</tr>
<tr>
<td>AM, FM, PM, Audio, Data</td>
<td></td>
</tr>
<tr>
<td>COSPAS-SARSAT™ Chs A-S</td>
<td></td>
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<tr>
<td>5° DF accuracy</td>
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Air Traffic Control
Navigation
Radar Identification
RT-1000 Single-Channel

Installation and configuration examples on site

- Frequency range air band: 118.000 to 136.975 MHz
- Frequency range marine band: 156.000 to 174.000 MHz
- Operating channels air band: 760 (25 kHz); 2278 (8.33 kHz); 10 preselected
- Channel spacing: 25 kHz / 8.33 kHz
ATC Navigation & Radar Identification
RT-1000 Multi-Channel

Installation and configuration example for single-site-solution

<table>
<thead>
<tr>
<th>Number of DF channels</th>
<th>Simultaneous operation</th>
<th>Up to 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range¹</td>
<td>Air band VHF</td>
<td>118.000 – 136.975 MHz</td>
</tr>
<tr>
<td></td>
<td>Marine band VHF</td>
<td>156.000 – 174.000 MHz²</td>
</tr>
<tr>
<td>Channel spacing</td>
<td>Air band VHF</td>
<td>25 kHz</td>
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<tr>
<td></td>
<td>Marine band VHF</td>
<td>25 kHz</td>
</tr>
<tr>
<td></td>
<td>Air band VHF, option 8.33 kHz:</td>
<td>8.33 kHz and 25 kHz</td>
</tr>
<tr>
<td>Operating channels</td>
<td>Air band VHF</td>
<td>760 (25 kHz); 2278 (8.33 kHz)</td>
</tr>
<tr>
<td></td>
<td>Marine band VHF</td>
<td>Channel 01 – 88 (incl. duplex channels) 5-8700</td>
</tr>
</tbody>
</table>
Radio-Controlled Lighting
Technical Services

Surveys | Trials | FAT | Installation | SAT | Training | Upgrades | Repairs
Facilities

Germany

Automated Testing

Manufacture

USA

R&D

Reception

Warehouse

Shipping & Receiving

Training room

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Thank You!

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