BAMS – The Antennas’ Doctor

Broadcasting Antenna Monitoring System – BAMS

BE AWARE OF YOUR ANTENNA’S HEALTH AND PERFORMANCE WHEREVER YOU ARE THROUGH A SYSTEM EMBEDDED IN THE ANTENNA

- Broadcasting Antenna Systems detection and localization of transient and permanent faults or performance deviations
- Real time measurement of the direct and reflected power of each single panel antenna via directional coupler equipped with apposite sensing
- Frequency and channel selective power meter measurements
- Measurement of environmental parameters (temperature, relative humidity, wind speed) for the analysis of performance deviation due to the environment
- Water infiltration detection
- Air quality check (pressure and dew point) for each panel in pressurized antennas
- IP65 directional coupler with built-in RF/AMBIENT/pneumatic sensing and RS485 serial interface
- Single line to connect up to 127 couplers up to 1500 meters
- Data acquisition software with performance logging and relevant statistical analysis
- Full remote control via internet, LAN, modem, etc.
UNEXPECTED BLACK-OUT: WHAT DO YOU PREFER?

**Image**
- A CALL FROM THE CUSTOMER AFTER THE BLACKOUT?
- ... OR A CALL FROM BAMS BEFORE THE BLACKOUT?

**Strategy**
- RUN-TO-FAILURE STRATEGY (reactive maintenance)
- ... OR MONITOR-AND-CORRECT STRATEGY (proactive maintenance)?

**Cost-1**
- URGENT & UNEXPECTED SERVICE (expensive)
- ... OR PLANNED & SCHEDULED SERVICE (cheaper)?

**Cost-2**
- TO REPLACE DAMAGED COMPONENTS (no insight, no prevention)
- ... OR TO INCREASE LIFETIME OF EXISTING COMPONENTS? (with insight, you can prevent damage)?

**Time**
- TO SEARCH FOR WHAT/WHERE IS THE FAILURE
- ... OR TO KNOW WHAT/WHERE IS THE FAILURE?

**Awareness**
- BEFORE: SEE THE EFFECTS -- AFTER: IMAGINE AND SEARCH FOR CAUSES
- ... OR BEFORE: SEE THE CAUSES -- THEN: IMAGINE & PREVENT THE EFFECTS?

**Efficiency**
- PERFORM ONE SERVICE OPERATION PER MISSION
- ... OR GROUP MORE SERVICE OPERATIONS IN A SINGLE MISSION? (foresight and knowledge = ability to plan)

**MTTR**
- HIGH MTTR (mean time to repair)
- ... OR LOW MTTR?

**Knowledge**
- KNOW ONLY THE OVERALL EMITTED POWER
- ... OR KNOW WHAT’S HAPPENING ON EACH INDIVIDUAL CHANNEL?

**IF YOU SELECTED THE SECOND OPTION AT LEAST ONCE**

**THEN YOU NEED BAMS!**
BAMS Components – 1. Smart Sensors (one per flange)

- **Four Models**: UHF, VHF, DAB, FM
- **Insertion loss**: < 0.05 dB
- **SWR**: < 1.05 UHF model  
  < 1.03 the other models
- **Impedance**: 50 Ω
- **Directivity**: > 30 dB
- **Max working power**: Depending on RF IN/OUT connectors
- **RF IN/OUT connectors**: DIN 7/16” (male-male or female-female or mix), EIA 7/8”, 1-5/8” or EIA 3-1/8”
- **Power measurements**: Forward and Reflected Power (RMS), channel selective for UHF and VHF versions
- **Power measurement accuracy**: ± 0.5 dB
- **Power measurement dynamic range**: 30 dB
- **RF line pneumatic measures**: Temperature, pressure, relative humidity, dew point
- **Communication standard**: Serial RS485 half-duplex
- **Power supply and serial connector**: Two identical IP67 connectors for easy paralleling
- **Operating temperature**: -67 to + 158 °F (-40 to + 70 °C)
- **Dimensions and weight**: Depending on RF IN/OUT connectors
- **Mounting**: Self-supported
BAMS Components – 2. Data Manager (one per station)

Max No of directional coupler simultaneously controlled: Up to 127
Max distance from coupler to data logger: Up to 4920 ft (1500 m)
Main software features:
- real time antenna system monitoring
- problems and failures localization
- assessment of site faults prior to dispatching personnel to site
- programmable alarms and thresholds
- data storage and long-term performance analysis
- fast transient registration
- analysis of failures or performance deviations caused by atmospheric phenomena
- dew point and pressure monitor in pressurized antennas
- moisture/water detection

Remote control: Ethernet port with the following protocols HTTP, TCP/IP, SNMP, TFTP, FTP, Telnet, DHCP others on request
Power supply: 110-240 VAC 50/60 Hz (UPS embedded)
Power consumption: < 60 VA
Operating temperature: +14 to + 122 °F (-10 to + 50 °C)
Mounting: Wall, floor, 19” and ETSI N3 racks
Dimensions for 19” rack version: 19” (482 mm) W, 1-3/4”H (44 mm) (1 U), 9-7/8” (250 mm) D
Weight: About 6.6 lbs (3 kg)
## Directional Coupler Performance

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>Frequency range</strong></td>
<td>UHF, 470 – 870 MHz</td>
</tr>
<tr>
<td><strong>Insertion loss</strong></td>
<td>&lt; 0.05dB</td>
</tr>
<tr>
<td><strong>SWR</strong></td>
<td>&lt; 1.04</td>
</tr>
<tr>
<td><strong>directivity</strong></td>
<td>&gt; 30 dB</td>
</tr>
<tr>
<td><strong>Impedance</strong></td>
<td>50 Ω</td>
</tr>
<tr>
<td><strong>Max working power</strong></td>
<td>2000 W rms</td>
</tr>
<tr>
<td><strong>Measures</strong></td>
<td>channel selective forward and reflected power (rms)</td>
</tr>
<tr>
<td><strong>Power measures accuracy</strong></td>
<td>± 0.5 dB</td>
</tr>
<tr>
<td><strong>Minimum forward power measurable</strong></td>
<td>2 W</td>
</tr>
<tr>
<td><strong>Power measure dynamic range</strong></td>
<td>30 dB</td>
</tr>
<tr>
<td><strong>RF line internal ambient measures</strong></td>
<td>temperature, pressure, relative humidity, dew point</td>
</tr>
<tr>
<td><strong>RF IN/OUT connectors</strong></td>
<td>flange EIA 7/8&quot;</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>12 Vdc</td>
</tr>
<tr>
<td><strong>Communication standard</strong></td>
<td>serial RS485 half-duplex</td>
</tr>
<tr>
<td><strong>Power supply and serial connector</strong></td>
<td>No 2 identical IP67 connectors for easy directional coupler paralleling</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>-40 to + 70 °C (-67 to + 158 °F)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>about 0.6 kg (1.3 lb)</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>70 x 96 x 162 mm (2.7 x 3.8 x 6.4 in)</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>self-sustaining by RF connector</td>
</tr>
</tbody>
</table>
BAMS allows detection and localization of transient or permanent faults and performance deviation of antenna systems by directional couplers equipped with a wide range of sensors (RF, ambient and pneumatic), communication port (RS485), internal firmware, allowing operations such as autocalibration, equalization, and A/D conversion.

Two connectors allow the Couplers to be chain connected each other. Each connector is used for both power (12V) and signals (one balanced half-duplex RS485). The first coupler is connected to the data manager, while the last has only one connector engaged. Up to 127 couplers can be connected in parallel at a distance from the PC up to 1500 meters.

The management software, a web application, is designed for use in public (Internet) or private LAN and for the management of a modem or any other device used for "remote access". As example of this software possibilities:

- real time monitoring of the antenna operations
- faults detection and localization
- analysis of "coincidences": ambient/environmental cause generating each fault and/or performance deviations
- storing and management database of historical events and data allowing the analysis of the most significant long-term deviation of performance for "aging" of the antenna components.
BAMS – Additional Features

SELECTIVE MONITORING of Each INDIVIDUAL CHANNEL

EASY INSTALLATION by FEW & SHORT CABLES (Single cable for signal and power connection)

SINGLE SENSOR covering 30 dB POWER RANGE (i.e. EIA 7/8 version covers 2 W - 2 kW)

CORRELATION between ENVIRONMENTAL conditions and antenna PERFORMANCE

NO JUNCTION BOX required

SLA (SERVICE LEVEL AGREEMENT) - measure and show your customer you really fulfilled it for each channel

PRESSURE MAP inside antenna allows one to EASILY LOCALIZE AIR LEAKAGES (pressure monitoring embedded in SMART sensors)

HARDENIZED by DIGITAL connection

WEATHER & PERFORMANCE DEVIATION - link antenna status to environmental conditions (temperature, relative humidity and wind)

TRANSIENT & PERMANENT Monitoring