

WMIT-FM says goodbye to air-cooled transmitters by switching to a 100% liquid-cooled system



At a glance

WMIT-FM wanted stellar audio performance, reduced operating costs, easy installation and long product life expectancy from a new transmitter. The R&S®THR9 liquid-cooled FM transmitter met all those goals and, in addition, the station found a technology partner with a long-term vision and reputation for world-class customer service in Rohde & Schwarz.

Executive summary

- **Customer:** [WMIT-FM, Black Mountain, NC, USA](#)
- **Task:** Replace an aging air-cooled, vacuum tube transmitter with the best technology available in the FM transmitter market today
- **Solution/product:** R&S®THR9 liquid-cooled transmitter
- **Key advantages of this solution:** Energy costs cut by two-thirds, maximum robustness, low service costs, small footprint and excellent audio quality

The situation

For a station with 36,000 watts of effective radiated power, WMIT-FM has a surprisingly large coverage area encompassing a potential market of nearly five million. Broadcasting high-quality music to more listeners is certainly good from an operational and business perspective. But for 25 years, the station's impressive geographic reach also created engineering challenges in terms of providing the highest quality audio, excellent coverage and across-the-board operational efficiency.

When the time arrived for a transmitter upgrade in 2015, transmitter technology had made several leaps forward and Chief Engineer Joshua Pierce wanted to take advantage of all of them. In particular, he wanted to move from an air-cooled transmitter based on vacuum tubes to a liquid-cooled, solid-state design. Liquid cooled transmitters offer many advantages and Pierce wanted them all – not a partially liquid cooled system but one that includes all the subsystems possible. Goals included reducing operating costs and minimizing the transmitter's footprint – all while enhancing audio quality. Pierce found a perfect match in the R&S®THR9 liquid-cooled transmitter – and a perfect technology partner in Rohde & Schwarz.

Headquartered in Black Mountain, NC, WMIT operates at 106.9 MHz and engages listeners with a program of Contemporary Christian music and is operated by the non-profit Blue Ridge Broadcasting Corporation.

Market reach

About 90,000 people live in WMIT's home market of Asheville, NC. Another 350,000 live in the surrounding four-county area. But because WMIT's transmitter and antennas are sited on top of 6,600-foot Clingman's Peak, its signal can be received in portions of seven states. This includes the Tri-City area of Tennessee, Greenville-Spartanburg in South Carolina and Charlotte, NC, (where it provides city-grade coverage). WMIT's potential audience is nearly five million.

From a technician's perspective, the thoughtful design concept is also evident. "The GUI is very intuitive and the quality of manufacturing just blew me away", says Joshua Pierce and further "The fit and finish and attention to details shows Rohde & Schwarz is very customer oriented. After installing the R&S®THR9 liquid-cooled transmitter, I'm done with air-cooled."

Joshua Pierce has the responsibility for operating two stations for Blue Ridge Broadcasting. Budget constraints make him very familiar with the full range of technologies and products that broadcasters employ daily. He identified the important factors for a technology partner as: reliability and responsiveness; expert and timely technical support; parts availability; and product life expectancy of at least 15 to 20 years.

Joshua Pierce was drawn to the Rohde & Schwarz solution by his personal experience with R&S test and measurement (T&M) products and the company's worldwide reputation.

"Rohde & Schwarz has a long and successful history with liquid-cooled transmitters," he says, "and our experience with its T&M products was very reassuring. Rohde & Schwarz has a long-term vision and is a company you can trust."

Rohde & Schwarz is the first to use liquid cooling for band II high-power transmitters. The concept offers numerous advantages over air-cooled transmitter systems that often require significant construction work and infrastructure changes. Liquid cooling simplifies maintenance over time, minimizes space requirements and ensures low-noise operation.

The cooling system achieves full redundancy by employing multiple design strategies. Two pump modules operate in active standby to ensure high system availability. The heat exchangers are equipped with ultramodern fans that are highly efficient and have extremely low-noise blades. Separate AC supply lines for each pump module and each fan on the heat exchanger as well as lightning and over-voltage protection circuits provide optimal protection for the system.



Chief Engineer Joshua Pierce.





The GUI is very intuitive.



Easy installation

There were also some practical reasons for choosing the R&S®THR9 from an engineer with a very “hands on” approach to operations. “Installation was so easy that I handled it all myself,” he says. “All the parts were properly packed and labeled – and delivered on time.” Thoughtful engineering and attention to detail was also in evidence when it came time to install the transmitter’s cabinet: Because it is less than 7-feet high, it fits easily through the door. The pump for the liquid coolant is inside the cabinet, and the self-contained 20 kW unit fits in a single standard rack and accepting native input of 3-phase 208 V.

The R&S®THR9 also met Joshua Pierce’s operating criteria. The R&S®TCE900 exciter provided excellent audio quality without colorization. “What came in when out, without adding or subtracting any artifacts,” he says. “The audio was transparent and remained true to the original.”

Benefits of liquid-cooling

As expected, the liquid-cooled design provides many advantages. With the R&S®THR9 installed, the control room’s air conditioning requirements fell from 15 tons to 4 tons. This in part because the R&S®THR9 controls system wide cooling, including the pump and heat exchanger. “I’m impressed by the fact that the pump is not set and self-run but adjusts speed automatically to the temperature you set,” says Joshua Pierce. “You can even adjust the water temperature.”

Normal operation is virtually silent because all subsystems, including the power supplies in the amplifiers and the power combiner are liquid cooled. “When walking in the room,” Joshua Pierce says, “the only noise comes from the auxiliary equipment, and the transmitter delivers 78% efficiency right out of the box.” The transmitter has a fully redundant cooling system, which eliminates the possibility of a single point of failure.

Service that adds value

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

Sustainable product design

- | Environmental compatibility and eco-footprint
- | Energy efficiency and low emissions
- | Longevity and optimized total cost of ownership

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