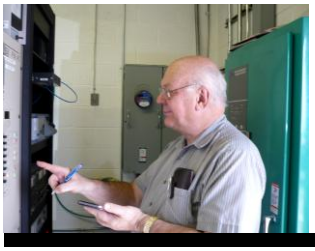

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Tech From The Trenches

Mystery VSWR Knocks Station Off

By John Price

[March 2010] Few things are more frustrating than a transmitter that refuses to load into the antenna. Many issues can be in play, but when the transmitter just stops for no apparent reason, it can be pull-out-the hair time. Here is a story of how thinking outside the box solved the problem.

WBZU was off the air. The station had gone off the air without any warning.

Of course, truth be told, stations drop off the air all the time. Causes can include everything from a failed tube to power failure, and all sorts of things in-between. The ever-present potential for lost air-time is what motivates many companies to keep the engineers around, which is good. But this one turned out to be a real puzzler.

ONE TRANSMITTER, NO RF

WBZU (910 kHz) in Scranton, PA has been in the Entercom family since early 2000. It is part of a four-station (three AM and one FM) cluster that provides news and talk programming for the citizens of the Scranton-Wilkes Barre-West Hazleton area.

In early 2007, the station moved its transmitter, a nearly 3 year old, 1 kW BE solid state AM1A, from its longtime transmitting site to the Scranton Times building, where it began diplexed operation with WEJL (630 kHz) on a single roof-mounted tower. For well over two years, everything worked quite well.

Then, without any warning, the station had gone off the air. No work had recently been done at the roof-top site. Tests showed that the transmitter would work just fine into a 50 Ohm dummy load, but when connected to the Kintronics diplexer and tower it would not generate more than a handful of Watts before going into VSWR foldback and shutting down.

It should be noted that operations of WEJL were unaffected. Cycling WEJL off and back on made no difference to WBZU.

DETECTIVE TIME

Entercom engineers first thought the problem was a bad capacitor in the diplexer, but after sending it off to Kintronics for high voltage testing - where it was found to be good - it was decided to bring in outside help.

Multiple tests were performed with the assistance of local consultant Dale Gehman. All but one of the diplexers' capacitors was substituted - but nothing suspicious was found. Scranton engineers even built a

custom dummy load to mimic the load presented by the tower, which the transmitter found to be acceptable.

But a dummy load is not a proper antenna if you want to broadcast any kind of signal!

IF NOT THE TRANSMITTER, HOW ABOUT THE TOWER?

This led the engineers to believe something had changed with the tower. A side note: Christmas lights are a permanent fixture on this tower, and are connected up and turned on for the winter holidays. A crew was brought in to visually inspect the tower, but it and the lights (not connected at the time) all appeared to be fine and were deemed not contributing to the problem with WBZU.

After more than a few days with little progress, it was decided to bring in a consultant with a high-power network analyzer. Steve Lockwood of Hatfield and Dawson agreed to fly from Seattle to Scranton and work on the problem.

Over the course of a few days before the Thanksgiving holiday, Steve and the Scranton engineering staff performed more tests. However, nothing remarkably wrong was found that would cause the transmitter not to work. BE was contacted and sent a replacement VSWR protection circuit board. Changing that board made no difference.

TAPPING INTO THE CORPORATE TECH RESOURCES

During this time, members of the Entercom engineering group were kept up to date on the WBZU mystery of via e-mails sent by Regional Engineer John Kennedy. Suggestions and ideas came from around the country. (I suggested that if the transmitter had been "4-400's modulated by 4-400's" this would not have been a problem!)

It was debated whether it would be a good idea to arrange to have a loaner solid-state transmitter shipped in to substitute for the AM1A. But it would turn out that it was not needed.

While on his way back to Seattle to be with his family for the Thanksgiving holiday, Steve called me with an update. We talked about the growing frustration that everything appeared to be OK, but the transmitter still would not work into the antenna system. Then, on what may have been a hunch, Steve asked me about any other AM stations that might be in the vicinity of the Times Building.

I did a quick search of stations within a few kilometers of the WBZU site and came up with a few hits. I said "Steve, there's a station, WICK on 1400 kHz only 1 km away." Steve replied "that shouldn't cause any problems. The filtering of the diplexer should see to that." We talked a little more and then he hung up.

THE CAUSE IS DISCOVERED!

Over the Thanksgiving break, Steve must have thought more about a possible problem related to WICK. He called the Scranton crew and asked if WICK was operating within specifications: a report came back that they were. Steve then asked to see if WICK would voluntarily drop their carrier to see if that would make any difference.

On November 25th, WICK temporarily shut off their transmitter. Just to be safe, WEJL also went off air. Gingerly, an Entercom engineer hit the "ON" switch on the AM1A - and after 15 days of being off air, the WBZU transmitter *worked normally into the diplexer and antenna!*

It appears there had been enough energy from WICK at the output of the WBZU transmitter to activate the standing wave circuitry in the AM1A. Everyone was filled with joy and relief!

SOLVING THE PROBLEM ONCE AND FOR ALL

After Thanksgiving, Steve hustled back to Scranton and, with parts on hand, constructed a 1400 kHz filter. He installed it between the AM1A output terminals and input to the diplexer. Problem solved!

Things are back to normal now. WBZU is on the air. The Christmas lights were connected up and lighted the Scranton skyline during the holidays. However, it remains a mystery as to why the AM1A transmitter decided to quit after working normally, for the most part, for nearly three years.

Oh, by the way: WBZU just had a birthday. WBZU signed on the air way back on January 12, 1925 as WGBI. The little station on 910 kHz now is 85 years young. That is a long time.

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Return to The BDR Menu