

# Repeaters with “Bursty” Noise

Always test repeaters in FM! Your ear can determine a lot of things. On digital, the range goes down and people that get into the repeater fine don't notice it.

About 90% of the time when people complain about bursty noise, it's the antenna system. If you're running a duplexer and there IS ANY kind of bad connection, that bad connection will act like a diode. You get the diode effect whenever two dissimilar metals are in contact! What often happens is that as antennas are blown about they develop bad connections between sections. Really good repeater antennas have everything welded, don't use a bunch of different metals (like solder, brass, and copper), and pretty much don't bend in the wind. (And they cost \$600 – \$1,200.)

So see if you still have the problem into a dummy load. This is basic troubleshooting. If not, it's your antenna system.

Keep in mind these bad connections can be anywhere. It can be caused by coax, coax connectors, or you may have a bad filter/duplexer. In this last case, the dummy load comes in handy again by testing with it placed at the output of the duplexer instead of the output of the transmitter.

More power makes this worse. Sometimes you'll have some arcing at 100 watts and none at 25.

When I last had this problem, it took me months to solve it. I had gone through everything in the rack. Bonded all the metal together. Checked and verified all coax cables, duplexer, etc. Tried different antennas. It was still there.

I finally ended up figuring out how to DF the source of the noise. The antenna was on the roof of this big building that was full of bolts holding things together. I fixed a Verizon antenna that had a loose N connector and aming bolts (really

Verizon?). That wasn't it. I went around tightening down everything I could. About 100 bolts later, the noise went away.

So the point is this can also be caused by a nearby antenna, the tower, etc. Had this problem on one repeater that was on its own tower. We moved the antenna to the broadcast tower (and much closer to the broadcast antennas) and the problem went away.

You will also find that the problems at 2 meters are much, much worse than at UHF. Because of the proliferation of computers and networks, two meters has just plain gotten real noisy. In the incident on the roof of the building, we couldn't even operate a 2 meter repeater because of all the interactions with the hundreds of miles of CAT cable and thousands of computers and network devices. Unless you are truly miles away from civilization, my preference is to run a repeater on UHF.

This is from Martin, GW3XJQ

"I must have spent years tracking down the 'rusty bolt effect' causing intermittent 'crackling audio', so annoying and would disappear for weeks and then return for no apparent reason. But of course, there is always a reason and always a solution to a problem.

"I bonded everything in sight and to ground with copper tape and rods, heavy conductor and thought it was fixed, until one day it came back! This was on a UHF FM repeater and the effect can be demonstrated by simply scratching a screwdriver blade against any metal associated with the repeater, even when I resolved the problem. As you say Chris, electrical and RF connections must be perfect and using only top quality connectors, cables and testing for continuity and insulation resistance using professional test equipment.

"The only effective solution in the end, was to opt for

separate aerials for transmit and receive frequencies and with vertical separation on the tower. With a duplex system and one aerial, the noise would always return. It was all down to the fact that the building housing the repeater was constructed using steel reinforced concrete and which was deteriorating with the effects of time and weather and 'blowing' of some concrete panels. It was impossible to electrically bond all the structural steel.

"The repeater is now Yaesu Fusion AMS, plus WiRES X and all is well. Hopefully, this discussion will help others with similar problems."