

"RUSTY BOLT EFFECT"

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Ever had a case of interference that seems to come and go? Sometimes it seems weather related, sometimes wind, and sometimes it doesn't make any sense at all? Well look into what is called the "RUSTY BOLT EFFECT". Most of us have towers, antennas, fences, TV antennas, gutters, or anything else made of metal that has been around awhile. Since Mother Nature likes to change things with time, (RUST) she has developed a method of manufacturing diodes that could compete with commercial manufactures. Diodes are very efficient generators of signals and produce non-linear current flow which is rich in harmonics and spurious signals. This type of rectification may contribute to mixing of ham radio signals, commercial signals, and just plain noise, can mix together and form signals that we call Intermodulation distortion. The most annoying type of signals form as a result of signals not usually related to amateur radio transmissions. These signals are usually from things like commercial AM transmitters, digital paging systems, digital transmitters (becoming wide spread), and other signals sources in close proximity to towers, power lines, or metal buildings.

In general any conducting surface (plumbing, electrical, fences, towers, guy lines, multiple piece antennas, or any place where two metals meet, can cause a rectifying joint and produce a natural signal/noise generator. Don't forget items that have diodes in them by design, when looking for an interference source. How about things like, rotators, controllers, power supplies, alarm systems, etc. (You do have things like these around don't you?)

WHAT TO LOOK FOR!!

Guy Wires that help keep us safe can cause a problem. The connections on the tower of guy line cables are usually of two different types of metals and are a perfect source for one of nature's diodes. Guy lines are usually broken up by insulators which help reduce the effect of resonant lengths which reduce harmonics and signal radiation. The insulators can however break and form connections which then becomes a diode. The connections to the tower legs are usually just wrapped around the leg and not bounded, what a great diode this makes. The worse scenario for this type of problem is a continuous guys lines with no grounds on the ends, or bounding to the tower. Where is the ground on your guy lines?

Towers that hold our antennas (this also goes for jointed masts) usually have joints in them where legs are bolted together. The best installation probably has bolts that are different metal than the tower itself making a natural diode after nature has had time do some work. The best supports have a bonded straps over joints to help reduce this effect.

Antennas usually are made of multiple pieces of metal and joints of telescoping metals. Well what do you know, a tunable diode noise source. Most antenna manufacturers will include a conducting grease to help eliminate the effects of corrosion. The joints of commercial antennas are usually moisture proof to help reduce this effect even more. Now you know what that funny grease that came with antenna is for.

Stranded wire we call copperweld, is used in some antennas construction, and by some for ground connections, is a good source for natural diodes as the aging effects go to work. The copper around steel used in most of these types of wires tend to corrode with time. (Look at your copper wire is it green?) The steels rusts and the copper turns to copper oxide. The first commercial diodes were made from copper oxide! Now you know why solid conductor wire is used for grounding in most properly installed antenna systems. Another good example is your telephone ground. I would bet that your telephone entrance box on the side of your house has a solid conductor grounding wire.

Metal roofing, Gutters, Duct work, Metal window frames are good sources for diodes. (metal barns/storage sheds anyone?) The metal used in manufacturing of these devices are usually just laid over each other and can form great diodes. The screws used to assemble these types of structures are also generally of different metal than the metal they are holding. The same goes for those very attractive and functional gutters we all have around our house. Your gutters aren't, say 40 meters long are they?

Elevator Shafts are great vertical antennas of various lengths, usually about the proper length for receiving broadcast radio stations. Do you have a repeater system mounted on top of natural antenna source? The joints in the lengths of these vertical beams are bimetallic!

This could go on forever but here are a few other things you might not think of; Metal pipes touching each other, pipe joints, power line guys, loose hardware on power poles, metal fences, wire fences, and yes even bed springs.

73's de K5MJD