



MORGAN SYSTEMS

Technical Bulletin

The Infamous ARC - The Hidden Interference Generator

It's one of the most pervasive and common sources of telecommunication interference. In fact, it's so common that you can find it in nearly every radio transmitting facility in the world if you care to look. But despite the widespread nature of this "hidden" interference generator it is rarely covered or even mentioned in interference-related technical publications and how-to guides. Even more unusual - it's the only interference case that is tracked down by visual sight, not test equipment.

An arc is an electrical discharge caused by the transfer of energy across a gap of insulating material, commonly air, when the insulator voltage breakdown is reached. Current can be high or low, and an arc is described by any discharge jumping only a single millimeter to a bolt of lightning 3,000 feet long. Arc discharges cause the radiation of a broad spectrum noise that can be heard from the audio spectrum all the way to microwave frequencies. For that reason it's one of the most insidious types of interference, causing interruption to just about any RF device in the vicinity.

A typical radio transmitting station in professional services, broadcast, or Amateur Radio contains hundreds, and sometimes thousands, of individual connected electrical joints. Typically among these are wire connections for control applications, coaxial cables, guy wires and related hardware, the joints between tower or pole sections, ground connections, etc. And each of these joints is a potential arc spot when oxidation or rust enters between the mating conductors. If sufficient RF voltage is induced into the joint during transmission in the near field of the station, current flow across the poor joint will likely occur, often resulting in destructive broad spectrum interference. Unfortunately, when interference occurs the station owner usually looks toward other areas to find the problem, inserting filters or other means to solve the problem. So how can we deal with the "hidden" threat?

First, use anti-oxidant compounds during station construction and as much non-ferrous hardware as possible. Stainless steel and brass make fine fasteners for radio use, and they don't rust. Make sure all connections in the station are tight, and if outdoors, covered with convenient weather protective means. Wire brushing of conductors before insertion is always helpful - and a cheap insurance policy. Use anti-oxidant compound between tower section joints,

weld or solder connections where possible, and use at least one insulator close to the tower when employing metallic guy wires.

If you have a station in service, conduct an "arc audit" Here's how. Put the station on the air and transmit as much power as you are able at different test frequencies, especially those that are causing known interference. Do the test on a pitch black night and have a helper turn the transmitter on and off, carrier (CW) or modulated by telephony. Go outside, use binoculars if available, climb up on the roof if helpful, but put yourself in a good viewing position of the antenna system and simply look visually for tiny bluish arcs. Record their positions and effect repairs with new hardware, bolt tightening, etc. Try the same test in the house with all of the lights off, as small arcs can occur just about anywhere in the near field of the antenna system. Run the test every so often to insure long term continuity. The test is easy, requires no special skills or tools, takes only minutes, and it's costless. But it may lead you to a happier life and an easy fix - and even the info about how to do it is free!

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