

# A Simple Careless Act:



AN ARTICLE

BY

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I know that these article often center on the AM and FM industries but this TV re-pack failure is a lesson in third party oversight of jobs and proper inspection of the work being performed as well as insuring that the right parts are used.

## The Official Diagnosis:

May this never happen to you

The primary damage to this system appears to be caused by the failure of the bullet coupler joint between the output of the impedance transformation 50 to 75 ohm section and the ascending elbow toward the system gas barrier where the line exits the transmitter room.

This joint failed due to unknown reasons which may have included a wrong type of bullet, forceful/negligent assembly which damaged the transformer and/or bullet, or simple greasy fingers on the bullet or insulator. The cause will not be discernable due to the severe heating of the joint resulting in the incineration of the supporting Teflon insulator and related bullet. The heat and soot from the incineration of this insulator and bullet caused soot to permeate the line system downstream toward the gas barrier some 16 feet away. No further heating was observed in this direction though soot contamination was present on the input face of the gas barrier.

The gas barrier was removed for cleaning and the spring tension of the output of the barrier was observed to be insufficient for continued proper operation and the recommendation to replace the gas barrier was made while repairing the old unit for later re-use.



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With the output of the transformer destroyed, multiple cascaded 1/4 wave failures melted, annealed and burned 6 locations traveling 65 feet upstream toward the transmitters and the coaxial switch. Having lost the load from these multiple burn throughs in the line, the coaxial switch exploded internally with sufficient force to expel a large quantity of soot out of the unused portal.



Having lost the coaxial switch, the in line tuner attached to the output of the final hybrid melted sufficiently to leave a pile of molten Aluminum on the floor and destroy the R.F. monitoring coax cables along with the switch operation cable that were attached to it.

Soot permeated upstream in to the final system Hybrid, and with the continuous fire from a lack of shut

down by the three transmitters, huge quantities of soot were generated that permeated both final hybrids, all three mask filters and all of the plumbing associated with this system stopping only after coating the inside of the 3 way power blocks on the outputs of all 3 transmitters. At this time with soot in all of the combining system, the transmitters shut down.

## What you call it:

No matter what you call it, third party oversight, quality control, or another dozen acronyms, experienced installation personnel are critical. For the people who install this equipment, the knowledge to use the right parts, and insure that they fit correctly without the bigger hammer, or just as bad, forcing something to fit, where it clearly does not want to, these are signs that there is going to be trouble.

This installation suffered a catastrophic failure of the entire plumbing system inside of the room due to one simple bullet failure coupled with a software failure of the transmitter controller. Cascade failures, seemingly simple and retained close to home quickly spread to destroy an entire plant.



## The Right Parts:

There is no substitute for the right parts. This is not confined to astronauts. The right parts are designed to fit properly in a mechanical way which by default will operate properly electrically. Parts that are forced to fit, shoved out of level or alignment, bolted up with excess strain on flanges, or a host of other physical maladies can and will eventually cause a failure.

Parts that are designed to look pretty on AutoCAD may indeed look pretty when installed but the actual work of installing them between 2 fixed, rigid, and immovable objects is cause for not only concern but IF you actually do get the parts to fit without damaging them, you can pretty much forget ever taking them apart for service, maintenance or heaven

forbid, a repair. This is the situation with this installation. Filters and plumbing were situated in such a way that only with complete disassembly of entire sub-systems would allow for the removal of some components. The entire concept of the "service loop" escaped the designer who should be forced to work in the field before ever being allowed to design another facility layout.



## Cleanliness is next to...:

There is no substitute for clean parts. The notion that a part is clean because it is brand new is garbage and will burn your new system in short order. The factory builds and delivers these shiny and often patina covered parts. Manufacturers do not clean them. Copper tarnishes. Silver oxidizes to a patina. Aluminum oxidizes. Pick a metal that lives inside of your new system and unless it is inside of a pressurized envelope that Does NOT contain oxygen, it is going to go South on you. I will give away a trade secret. Alcohol is a crappy cleaner. There I said it and have ruined and enraged vast numbers of



you who think that it is still 1937. Sorry Charlie but there are better products. Alcohol just pushes dirt around where Brake Kleen which is 100% nasty chemical actually cleans the surfaces and pulls all of the moisture out of the surface, including your fingers. Alcohol has water in it. It takes forever to evaporate and leaves moisture behind. It is just not a good choice.

The brand or generic offering of Non Chlorinated Brake Kleen with terry cloth rags actually suck carbon and dirt in to the rag instead of just liquefying it and pushing it around.

This 100% nasty chemical is very aggressive on plastics and is not good for you but if you want something dry, degreased, devoid of finger mung, and stripped of moisture and dirt, this is the chemical for you along with the prudent use of Scotchbrite pads.



Just because you have done "it" this way for decades does not mean that it is right, proper or better than some other way. I know I tout this about grounding and it not being 1935 but you need to listen up and be observant about new and better ways of doing some things. Oh, did I offend your sensibilities (or lack of them)

All too often have I seen new installations go up in flames due to improper cleaning techniques or greasy fingers on insulators. Antenna eggs, Melamine insulators, internal Teflon parts and a host of other items must be cleaned before installing them. The wearing of cheap cotton gloves is nice. Force fitting mechanical parts often damages bullets and as they say in some states, wallers out the inners.

If you as the Engineer for the station do not feel comfortable supervising a new installation, there is no harm in asking for a specialist. Yes, I know that no one wants to dump their hand and admit that aspects of an installation are beyond their scope of comfort or expertise but is this risk worth taking?

Asking your consultant or designer for a recommendation for a third party to oversee the work, materials, techniques and final acceptance testing can give your employer a better measure of comfort in that you really want them to get their monies worth from a new installation. This risk on your part is great and the wrong choice in the name of vanity or security may cost you your job.



While every situation is different and there is no clear choice in every project, calling for help is the smart thing to do. Burning your house down to save face rarely works out.

Unless you really enjoy sitting for endless depositions and crave sitting in the witness box, get help for things that you are not sure of. You are not admitting defeat, you are willing to learn.