

IEEE/EMC Society Write up for Vincent J. Mancino

Rather than talk about my exploits as an EMC Engineer, I would like to talk about how my EMC background personally helped me. Upon graduation from Rutgers in 1951 with a BSEE, I joined RCA in Camden NJ as an Engineering Trainee. I was assigned to the EMC Group, which was responsible for EMC Consulting and Assurance Measurements, and EMC Suppression Parts, under the tutelage of Mr. Samuel Burruano. I was an EMC engineer at RCA Camden until 1960 during which time I received a Masters degree from Drexel, presented a paper at the Fifth EMC Conference, served on several EMC committees and was Chairman of the IEEE Sub-committee on Transmitters 27.4 for several years.

Following my tenure at RCA Camden NJ I went to Cornell-Dubilier Electronics in New Bedford MA and became Chief Engineer of their Filter Division responsible for EMC Suppression Parts and EMC Consulting and Assurance. I went back to RCA in 1962 as a Senior Engineer in a Group at RCA Burlington MA responsible for the conceptual design and development of computer controlled Automated Test Equipment. I later transferred to the RCA Astro Electronics Division in Hightstown NJ as a Senior Engineer responsible for the Reliability of a Weather Satellite for the US Air Force. Then an event occurred that altered my career.

RCA Astro designed, developed, and built Weather Satellites, Communications Satellites, and Satellites and subsystems for Scientific Expeditions. Very little consideration was given to EMC design principles at that time. At this point in time the weather satellites only took pictures of cloud coverage during daylight hours. When directly overhead the satellite transmitted the data directly to a ground station in the local area, but when the satellite was beyond the horizon it would record the data on a tape recorder, and then transmit it to earth from the tape recorder with a more powerful data transmitter. RCA Astro had built a weather satellite for the U.S. Air Force, and it was undergoing the final simulation tests. This required the recording of weather data on the tape recorder and then playback to the transmitter, which would simulate transmission to an earth ground station. Well each time the data transmitter was turned on, the tape recorder output was turned to unintelligible gibberish. RCA Astro had a high-powered team managerial team frantically trying to solve the problem because there were schedule constraints, but they were not making any progress.

And then someone remembered that I had previous EMC expertise. With the help of a mechanical design engineer assigned to me at my insistence, we designed an add-on external box with compartments which could be attached to the tape recorder. This was feasible because the tape recorder was located within a sealed housing. All wiring entering or exiting the tape recorder had to pass through this box. This permitted and required signal lines to be isolated from the command and control lines, and then both groups to be isolated from the power lines. It also required miniature RF suppression feed-through capacitors to be mounted inside the box on the outside wall away from the wall mating with the tape recorder. All tape recorder external wiring had to pass through the filtering devices inside this add-on box. This worked and the successful test was both dramatic and emotional.

The rules and principles that I laid down on this weather satellite became standard operating procedures for many years on all RCA Astro built weather satellites, as well as other satellites. After this assignment was completed I went back to my regular job of being a Reliability Engineer, but now I became the go-to guy every time there was an EMC problem. Two weeks later I received a Commendation Letter for my efforts, and several months later in February 1967 RCA Astro awarded me "An Engineering Excellence Achievement Award". I believe that this event helped me survive a brutal reduction in force in 1968 and was influential in my eventually become a Manager responsible Parts Engineering, Materials Engineering, Reliability Analyses and Predictions, Failure Analyses, and yes last but not least EMC.

Vincent Mancino

Revised By
Mancino
1/15/08

The knowledge of having an EMC background can help all of you, in particular what I am going to talk about is how it helped me in my career. When I first started back in 1951, for the first few years all I did was make EMC measurements. And then, one day, my boss quit for greener pastures and there was just a younger engineer and myself there at a large Engineering Design and Development Organization. I really knew nothing about EMC principles. I knew about measurements but I didn't know about principles. I had joined the IRE at the time as a student in college. I became active in the IRE and I looked to those people to help me gain knowledge in EMC. I was really helped. It was very challenging to me. It was invigorating and frustrating, but I learned many things.

After I learned, a company in Massachusetts made me an offer I couldn't refuse. So I left RCA and went to Massachusetts. I was there for awhile and since it was not my cup of tea I left. I eventually came back to RCA at the RCA Space Center in Hightstown, NJ. It was called the RCA Astro-Electronic Division. They didn't pay any attention to EMC, and I didn't work as an EMC engineer. I had gotten out of EMC, but I was sucked back in by an event that changed my career, and really helped me.

I was working as a Reliability Engineer on a weather satellite for about three years. At that time the weather satellites were relatively simple. Later generations were designed to give you the five day weather forecast, but in those days they primarily were built to give hurricane warnings. But they kept on being improved to give you more and more data. Anyway, they built this weather satellite for the U.S. Air Force, but before they could ship the satellite it had to pass ground simulation tests. Now, you have to understand that the way these satellites work, when it is overhead, what it does is it transmits the data directly to the Earth. But when it goes over the horizon, at that point the data is put on a tape recorder and the tape recorder then feeds it to a transmitter that transmits it to the next ground station. During these final simulation tests, they turned on both the transmitter and the tape recorder. The transmitter, low and behold, kills the tape recorder. Nothing intelligibly came out of the tape recorder. There was a panic because that satellite had to be shipped in several weeks. If they didn't ship it there would be a lot of penalties monetarily and they might lose their turn on the launching pad. So, they had a team of managers, including the Chief Engineer of the Division, trying to solve the problem. But they weren't using EMC principles. They kept turning the antenna of the transmitter

around and kept trying to operate the tape recorder in a different way. None of these things worked.

Then, someone remembered that several years ago I had worked in EMC. I was told to put a "bunny-suit" on and go in the clean area and see what I could do about this satellite. Of course they didn't pay any attention to me at the time because I was just an engineer, and they were all high level managers. So after they got tired they all walked out. There was one manager there, the manager of the design review team (because at RCA Astro before you could release a design for space it had to undergo a design review process). He asked me, "Can you really solve this problem?"

I said, "Gee...I haven't done this work for three years I don't know whether or not I can solve it. But if you want me to try, I need several things. First of all, I need priority in purchasing I don't want to go through any red tape to buy anything I need. Second I need priority in the model shop, I want to be able to build a fixture over night and try it right away. Third I need a mechanical engineer assigned to me so that whatever we come up with we can implement as a final design.

He said, "You got it."

This tape recorder was actually a sealed unit because it had to be vacuum protected. That made it easy for me. We couldn't change the tape recorder, so, what we did is we designed an add-on box.

This add-on box had three compartments; one compartment was for signal wires separated from the other two compartments. The second compartment was for command and control wires. The third compartment was for power signals. Each of the compartmental wires had to go through a bulkhead that was within this add-on unit. There were filters mounted on the bulkhead and the filters were of different strength depending on whether it was a signal wire, or a command and control wire, or a power wire. Then the big day came. We turned on both the tape recorder and the data transmitter and it worked (readable data was coming from the tape recorder).

Somebody said, "Oh, I bet someone forgot to turn the transmitter on."

The transmitter was turned on...and it worked.

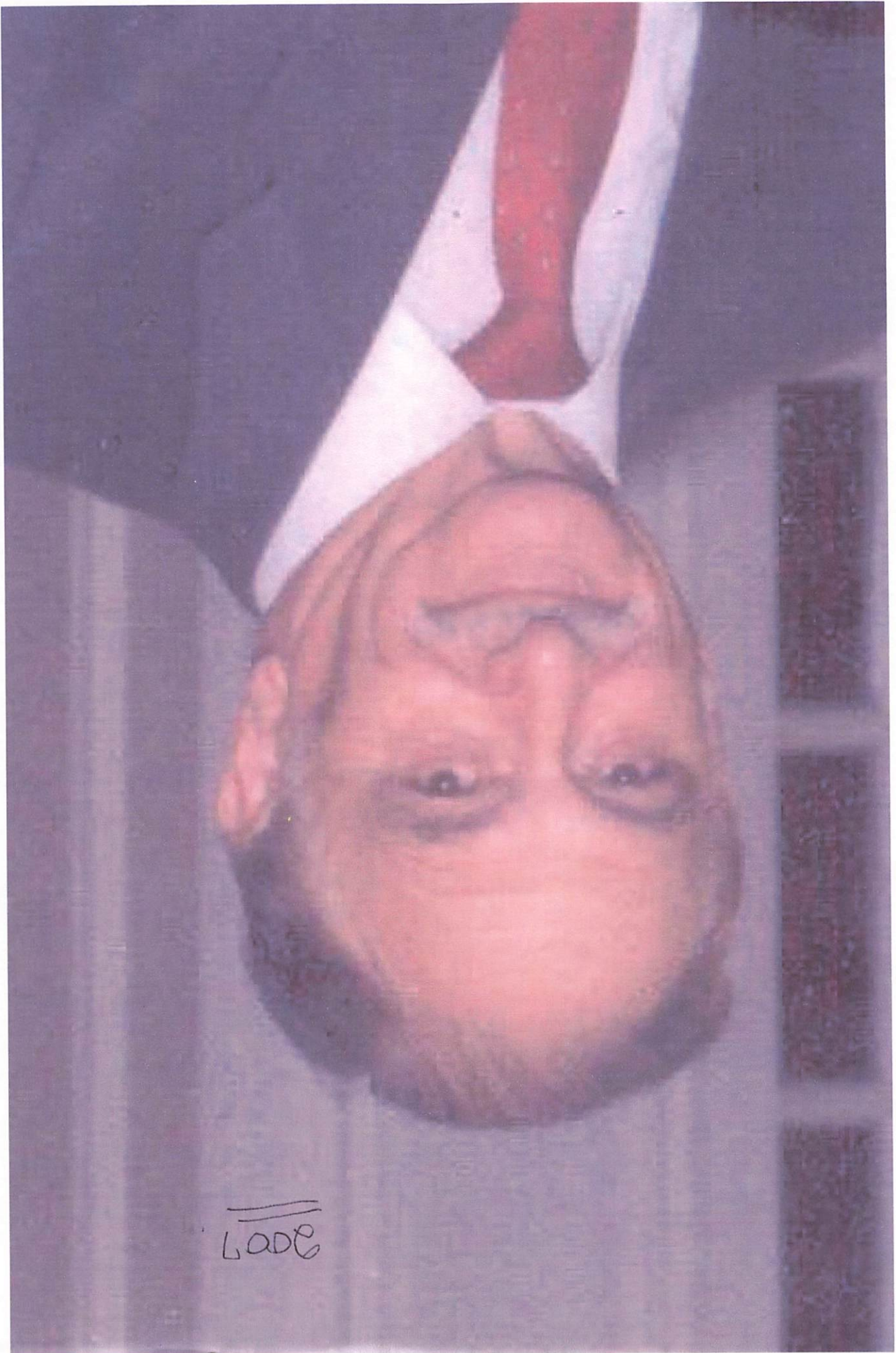
Following that, I became the go-to guy. Whenever there was an EMC problem they came to me. Whenever there was a proposal, they put my name in the proposal. I came up with a set of ground rules for EMC principles that that division had to follow. I got the blessing of the chief engineer that they had to be followed. Twenty years later, when I left RCA to retire, they were still following those EMC principles. This really helped me because several weeks after this event I went back to work as a Reliability Engineer; that was my job. Two weeks later I got a commendation letter. Several months

later I got a call from the chief engineer's office. I was invited to a dinner and I was to bring my wife. I was presented with an engineering excellence achievement award.

This helped me in other ways. There was a brutal layoff later on and since I had received this engineering excellence award they couldn't lay me off, so I survived. What happened later on, I believe happened because of the recognition I received from this event. I became a group manager where I had responsibility for parts engineering, both passive parts and active parts, and for materials engineering. I was also responsible for reliability analyses and predictions, and for the failure analysis lab. And, yes, last but not least I was also responsible for EMC.



Measuring EMI at RCA, circa 1955



LAD

79002