

## **Television -The First TVX Station – WTVZ, Channel 33 – Hampton Roads**

The lease on our house in Denbigh had expired that summer and we rented an apartment a short distance away to await my “retirement” from the Navy and make plans for the future. I had sent out my resume to a number of companies, but only had three firm offers. First, I had met Ross Perot (Electronics Data Systems - EDS) and various State of Texas officials during the commissioning of the USS Texas, sent Mr. Perot a resume, and received a rather strange call from someone at EDS who gave me the impression that he had been directed to hire me but did not know exactly what he was going to do with me. Second, I had a Navy friend who had just quit the Navy (or the Navy quit him – he failed to get picked up for LCDR) and was working in sales for Texas Instruments (TI). So, with his help, I got an interview and a job offer from TI. They seemed to know what I would be doing. Third, the owner of the Norfolk radio station that I had worked for previously was part of a group that had received a construction permit for a new TV station in Norfolk and had offered me the job of the initial Chief Engineer/Director of Engineering.

I went out to Texas to visit with my prospective boss at TI and accepted the job. We were in the process of packing up the apartment for the move when the Norfolk Radio Station owner, let’s call him Mr. L., let me in on the future plans of his group, which included the building of at least two more TV stations. Further, as an incentive to join the group, I would receive 5% of the common stock in any station that I built. Now, I can do the math; that could be as much as a million dollars, assuming that I survived. Building three stations is no small task. So, I accepted that job and flew back out to Houston to tell TI, face to face, that I had to withdraw my acceptance of their offer. They understood, but I still felt bad about the situation. Obviously, we did not move to Texas.

I was the first employee of Television Corporation of Virginia as the Director of Engineering. Several months later there followed a General Manager, Mr. M., and a Sales Manager, Mr. T. Mr. M came from a Washington, D.C., TV station where he had served as Program Manager, and Mr. T came from a local TV station where he was the sales manager. Mr. L and I met with the Manager and Chief Engineer of the local public broadcast TV station and worked out a deal where we would put the transmitter, transmission line and antenna for the new station in/on their building and tower (1,026’ tall) South West of Portsmouth, near Driver, Virginia. (36° 48.53’N, 76° 30.16’W) This required replacing some of the cables (guy wires) for the tower in order to accommodate the weight of our transmission line and antenna. We also leased space in a downtown Norfolk building for a studio. It was on the East side of Bush Street, between Freemason and Charlotte. I believe it was on the second or third floor and was not an ideal location. In later years we moved to 900 Granby Street. We purchased most of our equipment from or through Philips Corporation and that decision was heavily influenced by their ability to offer financing for that equipment. The two major TV Transmitter manufacturers in the U.S. at that time were RCA and Harris. The Philips brand (Pye TV), based in Cambridge, England, was a major source for the rest of the world and was attempting to break into the U.S. market.

The Federal Communications Commission (FCC) allocates a number of television station frequencies for each market (City) so as they will not interfere with one another. The television broadcast spectrum is divided into two segments, Very High Frequency (VHF) and Ultra High Frequency (UHF). At that time

most medium to large markets had three TV stations representing the three major networks, ABC, NBC and CBS, plus a Public Broadcasting Station (PBS). They were usually on VHF frequencies, channels 2 – 13, that tended to give better coverage, i.e., a clearer picture. There were also frequency allocations for additional stations, “Independents”, and these were likely in the UHF spectrum. Some large cities, such as Los Angeles, already had several Independents. The 1970s/1980s were a period where at least one, if not more, Independent/s was/were going on the air in most medium sized cities. Television Corporation of Virginia’s Station, WTVZ, Channel 33, went on the air on September 24, 1979, as the second Independent in the Norfolk, Portsmouth, Virginia Beach and Newport News market.

A brief description of the mechanics of television broadcasting during that period and, to some extent, true even today, may be interesting. There was a “Studio” usually located in a central downtown area that “originates” composite programming (by that I mean programs and commercials) in a room usually referred to as “Master Control”. This programming was (currently it is mostly digital) a compilation of several sources such as film, tape, remote “feeds”, and, sometimes, live programming. Large tape machines, called “Quads” were used for commercials and a great deal of the programs. A number of stations, including the initial TVX stations, were using a smaller tape format for commercials. In any event, the Master Control operator, along with several assistants, put together all of these inputs destined for the viewer. The “Studio”, as I am using the term, consists of Offices, Master Control and a production studio. However, the “transmitter site” was usually located several dozen miles from the studio, primarily because it is difficult if not impossible to locate a tall tower in built up areas. So, the programming is sent, via a microwave link, from the studio to the transmitter site. Upon arrival at the transmitter site it is fed into an “exciter” which is simply a very low power transmitter. The preferred method for building this very low UHF power into high power levels is a “klystron” amplifier (or tube). These usually come in 55 kilowatt (KW) to 60 KW segments. So, you can use one, two or four segments to build a “transmitter” output of 60, 120 or 240 KW. A klystron requires tremendous amounts of electrical power – the tube itself may operate at 6 Amperes (AMPS) and 15,000 Volts – an input power of 90,000 Watts. This efficiency (about 50% when thinking of peak output power) generates a large amount of waste heat. Four to five klystrons, with supporting equipment, would eat up the appreciable part of a half million watts. The electrical (power) bill can be frightening.

These output powers are related to the visual signal – there is also an aural (audio) amplifier of much lower power, ten to twenty percent of the visual. These two “signals”, the visual and the aural, are then combined in a “duplexer” and then sent via a transmission line up the tower and to the antenna on top. Even the simplest duplexer is the size of an automobile with larger installations taking up a large room. At these power levels, the transmission line usually consists of fixed copper “coaxial” line, in either 4”, 6” or 9” diameters (roughly). Co-axial means that there is an inner conductor (tube) surrounded by a larger outer tube. They come in twenty foot lengths, connected by bolt flanges, which would mean a hundred sections “hung” on a 2,000’ tower. The line is “hung” rather than attached since the heating expansion coefficient of copper differs from that of the steel tower. Between the heat of the day and the cool of the night you can observe the bottom of the line moving several feet in relationship to the bottom of the tower. As a result you need to plan on sufficient horizontal run to the transmitter

building to absorb this movement. It is also possible to utilize either rectangular or circular waveguide, especially at the higher frequencies.

Since the antenna is not radiating power equally in all directions (no sense sending a signal straight up or down), it will have a “gain” to reach an Effective Radiated Power, ERP, that may be near the maximum of five “MegaWatts”, 5 million watts. These high ERP levels applied only to UHF stations, not VHF. There are those that think that birds may drop out of the sky in the vicinity of a TV tower, but birds are usually smart enough, if they start feeling warm, to stay away. I do not recall seeing too many bird droppings near the antennas of TV stations. A rancher once accused a TV station of causing his cows to stop giving milk, but I don’t really think such was the case. It was likely chocolate milk.

The Pye-TV transmitter is built in England and, for the “small” 55KW unit that Channel 33 ordered, consisted of four cabinets, each about the size of a small closet. There is a power, control, visual and aural cabinet, with the visual and aural cabinet each having a single klystron. There was also a large “cooling tower” that reclaimed the cooling water used on the amplifier tubes. I reluctantly (yeh – right!) had to go over to England, by first class airfare, with my Wife, to do the final acceptance tests. The tests took several weeks for some reason that is not quite clear. Maybe it had something to do with the week we spent prowling around England. Then it took several more weeks for the equipment to make it across the Atlantic. We had sectioned off a portion of the PBS transmitter site building with a concrete block wall for our installation. When the transmitter arrived at the site in an “eighteen wheeler”, I rented a fork lift to move the various components off the truck and to a point where we could handle them on the ground. The transformer that boosted the 480 volt electrical service up to 15,000 volts was especially heavy. I had two “Tech Reps” that arrived from PYE and the three of us put the transmitter together in about a week. Meanwhile the tower crew had changed out the guywires and installed the transmission line and antenna from Andrew Corporation. Even with the new guy wires the PBS station tower could not take the weight of the 6” transmission line that would normally be required for 55KW. In order to make this work we installed 4” line and pressurized it with a dielectric gas (probably sulphur hexafluoride - SFG) that had increased dielectric strength and heat transfer characteristics. This did not work out so well, as we shall see. Then we actually got the station on the air for “equipment tests”, did the testing and applied to the FCC to begin broadcasting. Meanwhile my “Assistant Chief” and our prospective Master Control operators finished getting the Studio put together and figuring out how to make it all work. Then on September 24, 1979, we were “on the air”. During most of the construction time I had an office at the WTVZ (to be) studio and helped with getting things put together there. Harlene and I also bought a house in the Churchland of area Chesapeake and we had a nephew and a god-child, both young adults, living with us along with two Doberman Pinschers.

Some months later we experienced a small fire at the transmitter site inside the transmission line where it left the top of the room and went out the roof. Combustion products (smoke, etc.) had progressed (contaminated) a significant way up the transmission line. The power levels that we have previously addressed are “peak” power, an indication of voltage stress – on insulators, for instance. In the days of “analog” television, as opposed to today’s “digital” television, this peak power only exists during the transmission (for a very small fraction of a second) of the synchronization or “synch” pulse that is used to tell the television receiver when to start drawing a horizontal line across the screen. The power level

during “black” is much lower and the level during “White” is even lower, almost zero, but not quite. This gives rise to the concept of “average” power, and reflects the heating limitations within the transmission line. The SFG gas that we put into our 4” line was supposed to help provide a higher dielectric (voltage) strength and also help conduct heat to the outer conductor, but it evidently did not work as well as advertised. The entire staff was summoned to the transmitter site to help clean out the inside of the line after the engineers had disassembled it. It was a dirty job. Moreover the sales staff, pushed into service, could see their commissions go out the window since we were off the air. After a day or two we got it cleaned, reassembled and back together. I also purged the SFG gas out of the transmission lines, replaced it with nitrogen and took steps to ensure we stayed comfortably below both the average and peak power limits. This was probably the worst station outage, but there were others. I lived fairly close to the transmitter site and made many high speed runs in my “bug” when the studio could not get the transmitter back on line after, for instance, a lightning storm. At some point, several years later, the studio was moved to a new location on Granby Street in downtown Norfolk where it took up all of the first floor. By this time designing studio layouts was becoming routine.

Then, in 1980, the group created Television Corporation of North Carolina (TCNC) which purchased WGNN in Winston-Salem, North Carolina.

WTVZ was sold to Sullivan Broadcasting in 1989.

## **The Second TVX Station – WJTM, Channel 45 – Winston-Salem**

WGNN came on the air about the same time as WTVZ (September 1979) with facilities, including the Studio, transmitter and antenna, located in/on top of an office building (the Wachovia Bldg.) in downtown Winston-Salem. Upon purchase, we changed the call sign to WJTM, an amalgamation of the initials of Mr. T and Mr. M. – Egos on parade. The first order of business was to replace both the studio and the transmitter site, neither of which fit our view of what the station should, or could, be. In essence we were building a new TV station. We located a defunct “Disco” facility, 3500 Myer Lee Drive, close to the main drag east of Winston-Salem and converted it into a TV studio. I remember taking down floor to ceiling mirrors and nailing wooden studs for new offices. I inherited the original station General Manager’s Chrysler station wagon as my first “company car”. That car got a real workout during the next few years.

The new transmitter site would be located on top of Sauratown Mountain, twenty-one miles North-West of Winston-Salem as the crow flies, but, nearly twice as far by road (36° 22.62’N, 80° 22.13’W), and it presented several challenges. First, it was my first building design – these were to be fairly simple, concrete block buildings, built on a raised slab with a porch (including loading dock) facing away from the tower base. Despite the distance from Winston-Salem the mountain was 2,400’ in height and should give us great coverage from a new 769’ tower. The anchor points (3) were in difficult terrain and I wound up having to sight in and align the steel in the holes we dug and blasted prior to pouring the concrete. The concrete had to be pumped in and came very close to overtaxing the capabilities of the pumper trucks. The General Contractor’s name was Alvis Hole and he signed paperwork as “A. Hole”. I did not make this up! The concrete contractor was a bother of the “General Contractor”. When I paid the General for the concrete he did not pay his brother and the Brother sued WJTM and won. What a world! Another lesson learned. After that I insisted on releases from the subcontractors before I paid anyone. The general (building) contractor was so slow that I wound up having to install the transmitter before the roof was on. Of course, then it started to rain and I was working under plastic. At this point I was doing the transmitter installation by myself with an apprentice worker, i.e., no “Tech Reps”. Fund coordination with Virginia Beach was slow also and I wound up paying the electrical contractor out of my own pocket. Some things did go well - the tower company (Stainless) installed the new tower, the transmission line and antenna. It was not a particularly tall tower due to the mountain height. In later years we discovered that Sauratown Mountain had some really severe lightning storms and we would actually get “Saint Elmo’s Fire” inside the building. Lightning and delicate electronic equipment do not mix well. Just to make things interesting, one of the klystron trolleys tipped over on me and, before they could pull it off, I had several cracked ribs. The trolleys have large magnetic coils in them and weigh over a ton. It only hurt when I laughed. One of the other lessons learned was that rain will drive water right through concrete block buildings unless the outside is heavily and completely sealed. High humidity and high voltage do not mix well either. On the light side, I can still visualize one of the electricians nailing a big field rat at twenty feet or more by throwing a screwdriver at it.

The big day finally arrived with the Wachovia facility signing off the previous night and the new studio and transmitter site signing on the following morning. Now the old equipment had to be removed from the Wachovia building. Not much problem with the studio facilities – we simply moved it all down in the

elevators and to the new studio. However, the antenna, transmitter and the associated heavy power transformer was another question. I had brought my Assistant Engineer at WTVZ down to Winston-Salem to help in this project and he supervised moving the transmitter down in the elevators, a piece at a time, and hiring a heavy lift helicopter to remove the antenna and transformer. I am not sure where I was at the time, possibly up on Sauratown Mountain. The Transformer was full of dielectric oil, but the weight as listed on the plate fastened to it was evidently the empty weight. When the helicopter tried to lift the transformer, it would not budge. Then the Engineer opened the drain cocks and let the oil drain out onto the roof, where-upon the helicopter successfully lifted the transformer off the roof. Unfortunately the oil damaged the roof and, of course, the station was liable for the damage. The Transmitter was placed into temporary storage and we used it at the new Richmond station the next year.

WJTM's call sign was changed to WNRW to honor an employee who was killed in the station lobby by a deranged gunman.

WNRW was sold to Act III Broadcasting in 1988.

### **The Third TVX Station – WRLH, Channel 35 – Richmond**

As we began to start on the Richmond station we established a “corporate” office in Virginia Beach with Mr. M, Mr. T and I moving out of the WTVZ studio. WTVZ now had a new General Manager, Sales Manager and Chief Engineer. Mr. L also joined us. We went through a couple of “Finance Officer” candidates finally settling on “Mr. K”. So now we had the five “corporate officers” under the same roof with the appropriate support staff. At some point we formed “TVX Broadcast Group” (TVX) and pulled ownership of the three stations into that company. Stock in the station companies, such as TCV and TCNC, was exchanged for stock in TVX. I might have the timing a bit off (I was busy building stations), but I believe that TVX did not come into being until at least 1982. Mr. L was Chairman of the Board, Mr. M was President, I was Engineering Vice President, Mr. T was Sales Vice President and Mr. K was the Finance Vice President. We had started a trend where the group would obtain control of an FCC Construction Permit, we would locate a likely studio site and I, in conjunction with our consulting engineer, would locate a suitable transmitter site. From there on out it would be my ball game until sign on, doing the design and ordering the equipment. I would also set up local operating and payroll checking accounts. About six months in I would hire the Chief Engineer for the station and start work on the studio and transmitter site building. After returning from the equipment acceptance work in England, I would set up living accommodations (an apartment) in the city and the Chief Engineer and I would ramp up the Engineering Department as the anticipated sign on date approached. Also about six months from sign on, Mr. M and Mr. T would hire the prospective station General Manager and he would start to ramp up other station personnel. About a week before sign on, I would bring in some experienced Master Control operators, we would start broadcasting and, when things settled down, my master control team would fade away into the sunset, leaving the General Manager with “his” new station. Then the process would start all over again.

The call sign for Richmond (WRLH) was another amalgamation of individuals’ initials. “R” for Richmond, “L” for Mr. L and “H” for Harvey Hudson who was instrumental in obtaining the construction permit. As I remember it, Harvey found a really good contractor for me. I was a little gun-shy after Winston-Salem. The studio site selected for Richmond was at 1925 Westmoreland Street, the South end of the building. It was a big new open space, constructed of “tilt up” concrete walls. All I had to do was a design, install the framework, put up the walls and we were ready for the ceiling crew, electricians, HVAC and plumbing. This was my third studio layout and it went smoothly. The transmitter site was another matter.

The transmitter site was located on a parcel of land South East of the intersection of U.S. 60 and State Highway 288. (37° 30.36’N, 77° 41.98’W) The actual tower site was about a half mile south of a North “bulge” in U.S. 60 and we had to build a road over that half mile in rather unstable ground. This was a relatively low lying area and there was a creek on the property (We caught “Craw-dads” in it when we weren’t fighting problems). One of the dump trucks bringing in gravel became hopelessly bogged down and had to be unloaded with a big mechanical shovel before we could get it out. I was driving a station wagon that had originally been at the station in Winston-Salem and it routinely became stuck. We finally bit the bullet and had dozens of truckloads of large stone (Rip-Rap) brought in to stabilize the road. Another lesson learned – Do a watershed analysis on prospective transmitter sites. I had a good

general contractor (as opposed to Winston-Salem) and the building, tower foundations and anchors went in without problem once the road was in good shape. The tower crew, from Stainless again, installed the new 1,239' tower without incident (My first new 1,000' plus tower). The transmitter itself was another matter. This was the unit that we removed from the Wachovia Building in Winston-Salem – WGNN's original transmitter; I think it was a CCA unit. The exciter was sent back to CCA to be set up for channel 35 (WGNN was channel 45), the individual cabinets and other parts were trucked up to Richmond and we were ready to install. I got to play with a fork lift yet again. The building was my normal design – a covered loading dock, the main equipment room and then the power transformer out back - all under a flat roof. The duplexer was suspended from the ceiling in front of the transmitter main cabinet as it had been in Winston-Salem and the tower was on left side (East) of the building. As it turned out having the back of the klystron cabinets that close to a concrete block wall was problematic as it was difficult to control the humidity. High voltage does not like high humidity. I had trouble from the start; some of it may have been to do with my unfamiliarity with CCA products. First, the exciter had several intermittent problems that I eventually traced back to cracked surface mount capacitors. Secondly, I had to retune the klystron cavities from scratch – the channel 35 frequency was about sixty megahertz lower than where they were previously set. The Norfolk and new Winston-Salem transmitters had been completely set up in England and I only had to do a bit of touch-up. I guess I was spoiled. Then lastly, the unit had an interlock system with numerous diodes that continually shorted out during electrical storms. I also think that one of the klystron tubes did not survive the trip from Winston Salem. These tubes ran in excess of \$25,000. It was not my favorite transmitter. Then, just to add insult to injury, the day we were to sign the station on the air, Richmond had the mother of all ice storms and we were unable to get out to the site. This was the only sign on date that ever slipped on me. I was always proud that I was "on budget and on time". In any event we finally did get on the air on February 20, 1982, my third station. My "sign-on" crews from Norfolk (the adjacent market) did a great job at the studio. A few days later we "faded into the sunset". Actually I suppose we had to fade into the sunrise – East. I think I had to make a number of emergency return visits because of the "diode" problem.

Just what is a "klystron" anyhow? It is simply a big amplifier appropriate for UHF television frequencies. For the purposes of this discussion, there are two types of klystron tubes; internal and external cavity. RCA and Harris transmitters used the internal cavity types and "dressing" them out was fairly simple. The external type (used by Pye-TV and others) was a bit more difficult. The tube itself is about six foot in length and has a massive copper "anode" at the top that is water cooled. By water cooled I mean that it sits in a "boiler" that gives off steam that has to be routed through a condenser to reclaim the water. The bottom of the tube consists of several ceramic insulators that accommodate the four "external" tuning cavities. This bottom section is held together primarily by the vacuum inside the tube and that makes it very fragile. Cooling water is also circulated in the areas between the cavities. After the cavities and cooling lines are assembled to the tube, this composite assembly is lowered into a "trolley". The trolley has large magnetic coils in it that keep the beam of electrons that run from the bottom (Cathode) of the tube to the top (Plate or Anode) from scattering. This dressing out process is not for the inexperienced. The dressed out trolley likely weighs considerably over a ton. The low power signal from the exciter is introduced into the bottom (input) cavity and velocity modulates the beam of electrons. By the time they reach the top (output) cavity they are "bunched" and, as a result, provide an

output power in the region of sixty kilowatts (peak). The two central cavities are simply for tuning purposes. This type of tube was used at all TVX stations, with a minimum of two and a maximum of five. Two would be for a 55/60KW station and five for a 240KW station. Norfolk, Winston-Salem and Richmond were all 55/60KW stations. Eventually we worked up to 120KW transmitters and then to a 240KW station, which, at the time was the most powerful in the Nation. But, you have to walk before you can run.

WRLH was sold to Times Mirror in 1986.

## **The Forth TVX Station – WMKW, Channel 30 – Memphis**

Continuing with “our” system of deriving call signs, WMKW stood for “Memphis”, “Kemmons”, “Wilson”. Kemmons Wilson was, of course, the founder of the Holiday Inn chain of motels and was heavily involved in obtaining the initial construction permit for WMKW. One of his sons, Robert, was of immense help in the construction of the WMKW facilities. It was great – I gave him my plans for the transmitter site building and the studio interior build-out and they just happened. Of course, he was in the construction business. The studio was at 2876 Director’s Row, just north of the International Airport, but I do not remember much of it – I guess I had a really good prospective Chief Engineer and it went well. I think, at this time, I was trying to get out of the Studio projects, simply concentrating on the transmitter sites. They were certainly enough to keep one busy.

We made an agreement with the local Public TV Station to strengthen their tower guy cables and build our transmitter building two hundred feet north of their tower. Then our antenna would be side-mounted on their tower. The property was about thirteen miles east of the river or Memphis proper. (35° 09.27’N, 89° 49.33’W) The installation of the new guy-guy-wires (actually cables an inch or more in diameter) was a bit complicated and both the PBS Chief Engineer and I watched the process intently. I remember that he carried around a pistol, loaded with buckshot cartridges, for use with snakes on the property (or so he said).

I returned from the acceptance tests in Cambridge, England, the transmitter followed a few weeks later and my work started. At all of our transmitter site buildings we had 6” X 4”, tubular steel beams installed across the room some 12’ off the floor. The hollow concrete blocks in the walls were filled with concrete in order to bear the weight that would be placed on these beams. I believe the ceiling/Roof heights were 16’. Then 2” X 2” tubular cross members were laid across the larger beams with threaded rods used to hang the diplexer and any other items that need to be suspended above the floor. This arrangement worked out well, in that, with a chain hoist or “come-along”, we could lift the cabinets into place, dress out the klystrons, etc. Getting set up was always a drill, starting with a visit to the local hardware and electronics stores where I would set up accounts. Tool boxes had to be populated, work benches built, oxy-acetylene rigs obtained, etc. With the usual remote locations there was always something that needed to be picked up in town, and, my assistant, unfortunately for him, wound up being a “gopher” more than he would have liked. Never-the-less, he would be the person most familiar with the transmitter once I left.

WMKW, Channel 30, sign on occurred on April 18, 1983. During the switch from analog to digital television it appears that the PBS station is now using the building that we built.

WMKW was sold to MT Communications in 1988.

## **The Fifth TVX Station – WCAV, Channel 30 – Nashville**

Not much remembered here. We determined the studio and transmitter site locations, ordered the equipment, I went to England for the acceptance tests, everything was assembled, including the Stainless tower and the station signed on the air on February 18, 1984. At some point, a year or two later, we moved the original Raleigh-Durham 55KW transmitter (see next chapter) to Nashville to increase the transmitter facilities to 110KW. I remember myself and the station prospective Chief Engineer “renting” two horses in order to get up to the vicinity of the future transmitter site. I picked up some chiggers and/or ticks during that ride. A road had to be built, an extension of Trail Hollow Lane, that was close to a mile long. We had to do some blasting. This site was immediately West of Interstate 24, seven miles north of downtown Nashville. (36° 15.83’N, 86° 47.65’W) The new Stainless tower was 1,289’ tall. Current satellite pictures show a candelabra on top of the tower, so it may have been modified or replaced. I believe that the Nashville “Chief” was originally the Assistant Chief from Memphis, so he had a leg up on what needed to be accomplished. I also think I had a new “company” car, a Chevy Blazer. The old Chrysler finally had enough. The current studio is listed as 631 Mainstream Drive, but I do not recognize that address.

The tower design process starts out with a soil load bearing analysis, usually conducted by a local company taking “core” samples down to a specified depth at the proposed tower base and each anchor point. The positioning was accomplished (staked out) by a surveying company as they had to be very accurate. In our case the anchor points may be three, six or nine, depending on the tower height. The design may vary depending on the type of ground. In the case of most anchor points it was simply a matter of digging a big hole and pouring enough concrete (with the weight of the ground moved back on top of it) to safely exceed the maximum uplift from the several guy cables attached to it, usually about three. In one case (San Antonio) we were dealing with rock and we simply used a large boring machine to drill a hole (about six feet in diameter as I recall – we were worried that a cow might fall into it).

Stainless would then design, fabricate and ship the anchor shafts and base plate to the site and we usually would have a local contractor fabricate the reinforcing “cages”, align the shafts and pour the concrete. By the time you were done about all you would see above the ground were the tops of the shafts that would ultimately be attached to the guy cables. In Winston-Salem I had to supervise and align the shafts myself. Of course it usually rained about that time and filled your hole with water – not good. All of this had to be accomplished at least several weeks before the arrival of the tower erection crew in order for the concrete to cure properly. Core samples were taken of the concrete as it was poured and those samples were sent to a laboratory to ensure that strength was within tolerance. Most of the tower sites were some distance from town and it was important to determine the condition of the mix as it was poured on site.

These towers were generally of triangular construction with six foot faces and a ladder running up the inside. The legs were constructed of solid steel about six inches in diameter. The crew would assemble a section, I think they were about twenty-five feet in length, and then “stack” the tower. Guy wires were attached, in three directions 120 degrees apart, at about 200’ intervals. At first, some ten sections were bolted together horizontally on the ground, a large crane was brought to the site with a reach of

over a hundred feet, the 200' of tower was hoisted up, rotated up vertically and "stuck" on the tower base pivot. Then the initial or temporary guy wires were attached and the crane left the site. A 120' "jin pole" would then be attached that stuck above the first level of guy wires and a new section would be hoisted up the side, rotated over the top section and bolted down. The jin pole would be moved up onto the newly bolted down section and a new section brought up. This process continues, with additional guy wires being attached at approximately 200' intervals until you get to the "top". At that point the antenna is brought up, just like a new section of tower, and rotated/bolted into place. The last major task was to "hang" and assemble the transmission line and connect it to the antenna. Finally, a number of other items, such as the tower obstruction lighting system and microwave antenna, are installed. The "steel" tower was galvanized steel so it did not necessarily need to be painted for corrosion purposes, but it might need to be painted for purposes of aircraft safety. At the time, if you used a "strobe" obstruction lighting system, the tower did not have to be painted, but if you used the traditional incandescent lighting, you needed a paint job every few years. This is accomplished by tower workers with "mitts" applying paint from buckets by immersing the mitts in the paint and then wiping it on the tower. The paint job is in alternating white and orange stripes, as I recall, at about 100' intervals. This is a very simplified explanation. There is a great four part series of narrative slides on the Stainless web site that covers the erection of a representative tower in more detail. Stainless was always a pleasure to work with. (Jess Rodriguiz?)

I am becoming confused as to what stations were 110/120 KW from the start and which station (WCAY?) we moved the original Raleigh-Durham transmitter to.

WCAY was sold to MT Communications in 1988.

## **The Sixth TVX Station – WLFL, Channel 22 – Raleigh-Durham**

WLFL originally signed on the air on December 18, 1981, however was purchased by TVX in 1985. The “LFL” part of the call sign stood for “Light For Living” and they originally aired some religious programming in addition to the normal “independent” offerings. They had a studio and production facilities at 1205 Front Street, Raleigh, however both the Master Control operation and the transmitter/antenna site were in Apex, twelve miles West of Raleigh. (35° 43.87’N, 78° 50.27’W) TVX proceeded to dramatically upgrade the transmitter power and the antenna height, moving master control to the studio. We replaced the General Manager, moving the manager (Chuck) from our station in Winston-Salem to Raleigh-Durham. Chuck and I rented an apartment in Raleigh and started to make changes.

There were two reasons for moving the master control operation back to the studio. (1) The new transmitter would be well over four times the size of the old installation and we simply needed the room in the Apex building and (2) having part of the TV station twelve miles apart from the rest of the station was simply very cumbersome and required running back and forth several times a day.

A microwave link was installed from the Front Street Studio to the Apex site and the beginnings of a new master control set up at Front Street. Then, one afternoon we started the move, pulling equipment out of the Apex building. We had a small, unanticipated, problem in that the Quad tape machines would not fit through the interior door out of the master control room. As it happened, a crew had been on site, clearing trees and installing the anchors and base for the new tower and they had stored their tools inside the building for the night, including a large chain saw. Well, my moving crew appeared to be stymied and, when I came in, I grabbed the chain saw and quickly “enlarged” the doorway. All I lacked was the white mask (The Texas Chain Saw Massacre movie). To me it was not a big deal as all of the interior walls were to be taken out in any event, but, I think more than a few people, including Chuck, thought I had lost it as I was a bit angry. There were very few people that argued with me after that.

In any event, with sign-on the following morning, we were originating our broadcast from the studio site with a microwave feed to the Apex site. The Apex building had a lot of interior clearing/modification work to be accomplished prior to installing a new transmitter including removing a concrete second story area that was primarily used for storage. In the meanwhile the Stainless tower crew arrived and began to assemble and stack the new tower. This was quite an operation because it was in very close proximity to the old tower that was still in use. The new tower was 1,579’ tall, my biggest one to date, with a total of nine anchor sites. The old tower was less than 1,000’ and, as the new tower rose beside the old antenna, we had to reduce the power to avoid “cooking” the tower crew. And, as in Memphis, we would be working around the guy wires on the other tower.

This new transmitter and tower was a major increase in capability and embarked on several new technologies. First, the klystrons were now rated at 60KW, rather than 55KW, and we were using four visual units for 240KW, making this the most powerful TV transmitter installation in the country at that time. This gave us an unprecedented 5,000KW ERP omnidirectional pattern at the maximum allowed Height Above Average Terrain (HAAT) of 2,000’. Secondly, in order to increase the amount of power

that actually reached the antenna (efficiency), we utilized “circular” waveguide instead of coaxial line. There may have also been a concern about 9” Coaxial line (the largest available) handling the power level. The combining units took up the whole back of the building and were mounted on racks that stood on the floor instead of being hung from beams above. Each 60KW unit had to be combined into 120KW in a waveguide combiner and then the two 120KW outputs combined into 240KW. Of course there was also a diplexer unit to add in the aural (audio) signal. The size of the waveguide (and combiners/diplexer) varies inversely with the frequency, and since this was channel 22, a low frequency, all of these items were very large. Each 60KW unit was comprised of three cabinets. With four of these, plus the aural unit and phasing and system cabinets, we had a total of seventeen cabinets. This, in addition to the five cooling/condensing towers outside in the back. It was BIG!

The installation went fairly smoothly, however there were a few hic-ups. My helper did all of the high voltage wiring in the top of all the control cabinets and, seeing that two points were connected by a fairly good sized wire, decided to make a connection to the closest point instead of, as shown on the wiring diagram, the furthest point. PYE TVT was not about to let one of their crowning achievements go on the air without some involvement on site by their “tech reps” so I think we had two of them with us. We all noticed that a certain current reading (body current) was higher than it should have been on all five units and we went to much trouble trying to find out why, including having some specialized test equipment sent over from Cambridge. After being stymied for a week, one night I hung a test multimeter up in the high voltage area. This meter would normally not be used for high voltage, but I reasoned that everything is relative and BOTH of the test leads would be at 15,000 Volts, so I shouldn’t have a problem as long as I did not get too near it while taking the reading. So, after gingerly turning on the unit I noticed that the multimeter read the proper amount. Ah Hah! - The meters on the cabinets were reading incorrectly. Why? Because the wire that my assistant had bypassed, even with its very low resistance, acted as a shunt for the main meter and without it, the meter read higher than it should. It took no more than an hour to move the wire in each unit and now all read properly. “Inspect what you expect”. By now I considered myself the PYE TVT “expert” in the U.S. and was I was embarrassed. Well, I guess anybody can make a mistake.

For testing, the transmitters output would be directed into a “dummy Load” rather than the antenna with the switching accomplished by rotatable “doors”, with spring “fingers” in the waveguide. We found out the hard way that, with these high power levels, the fingers were not 100% effective. The line going out to the new tower had not been connected, and a tower worker, during his lunch break, started feeling a bit warm because of the radio frequency (RF) radiation. It is not unlike being in a microwave oven. It is not good to microwave your tower crew!

About the time that the new tower stacking became taller than the old tower I became concerned about the obstruction lighting and had the tower crew connect up the strobe lights. The controller for these lights normally reduced the brilliance during the night, however the electricians had not connected it up. The result was that all of Raleigh-Durham got to see a light show one night with the strobes at their daytime intensity. I think we made the newspapers. I know at least one local farmer (surely not the same guy), was concerned about his cows.

Then one night in mid-1985 we turned off the old transmitter and, the next morning signed on the new facilities. Wow, what a difference. Now came the challenge of taking down the old tower and guy wires. As with Memphis, it was a nervous time.

It also bears mentioning that, sometime in 1985, TVX Broadcast Group “went public” trading on NASDAQ as TVXG. Also, I am not sure of the year, we established new, much larger, offices in Virginia Beach.

WLFL was part of the TVX “package” bought by Paramount in 1991.

### **The Seventh TVX Station – WNOL, Channel 38 – New Orleans**

WNOL was purchased in 1985 and we did not make any changes in the facilities.

The transmitter site was located in the middle of a swamp and had to be reached by boat – Three miles North of Chalmette. (29° 59'N 89° 59'W) I'm glad I did not have to build that one. They had an RCA Transmitter – I do not remember if it was 55KW or 110KW.

I spent some time inventorying the equipment to determine the asset valuation of the station.

WNOL was sold to Q West in 1989.

## **The Eighth TVX Station – KRRT, Channel 35 – Kerrville – San Antonio**

**Signed on December 6, 1985**

We installed a 1,553' Stainless tower midway between San Antonio and Kerrville, about three miles East of Lake Hills, Texas. (29° 36.63'N, 98° 53.55'W) There is a turnoff from the road through Lake Hills (about three miles Southeast of Lake Hills) that heads North East for about two miles to the site. You cross a creek bed about midway which flash floods during any rain. Another site that needed a watershed analysis. I think the dirt road existed up to the "knob" where we set the tower base. I remember meeting with the rancher down near the highway to sign to lease agreement. He ran cattle in this area. As previously mentioned, most of the guy anchor excavations were large holes bored into the rock (nine of them) and we were concerned that we would lose one of his cows before the shafts were set in place and the concrete poured. I think the building went up OK, but our tools disappeared one night and, of course, no one knew anything about it. We would stop at a Mexican "joint" near the outskirts of San Antonio for a "Breakfast Burrito" on the way up to the site in the mornings.

I think that the studio was near Ingram Park Mall (6301 N.W. Loop 410), but I have no memory of it. 1985 and 1986 were very busy years; I was building a new station every six months (Raleigh-Durham, San Antonio and Little Rock).

**KRRT** was part of the TVX "package" bought by Paramount in 1991.

### **The Ninth TVX Station – KJTM, Channel 38 – Pine Bluff-Little Rock**

KJTM was signed on June 17<sup>th</sup>, 1986

We installed a 1,899' Stainless tower, my tallest one ever, about midway between Little Rock and Pine Bluff, just West of Interstate 65, near Redfield. (34° 26.52'N, 92° 13.06'W) This was all a pine growth area. There were nine anchor sites – all just a big mass of concrete. Once again, the access road either existed or was easy to create with some gravel. (120KW?) (Studio?)

KJTM was sold to ??? in 1989?.

## **The Tenth Station – WNYB, Channel 49 – Buffalo**

### Tower Construction

Our Consulting Engineer, Lawrence Behr, and I, flew around the Buffalo area in a private plane and located a site twenty-two miles East of Buffalo, just North of Route 20A and South of Behr Road. (42° 46.89'N, 78° 27.43'W). After meeting with the owners and negotiating a lease agreement, I had several meetings with the adjacent owners to discuss their concerns on whether or not the proposed tower would have any impact on them. It was not an easy sell, but they finally agreed. We started the transmitter site and bought a "used" tower that was trucked to the site. I believe it was Stainless that sent a crew out to cleanup (sandblast) the old tower and the property owner had a concern about the residue "contaminating" his crops. There would be six anchor sites, plus the tower base and transmitter building. This installation needed a watershed analysis as there was an adjacent pond and, during rain, the area around the transmitter building and anchor sites turned into a muddy mess.

At about that time, the construction permit was sold. We could not sign it on because it would violate the FCC group ownership rules (12 Stations) at the time. We should have had a transmitter on order by that time, but I do not remember it. The station was actually signed on in September, 1987.

WNYB was sold prior to sign-on due to FCC restrictions.

## **The Eleventh Through Fifteenth TVX Stations – Taft/Gulf Broadcasting**

In April, 1987, TVX purchased:

WTAF, Channel 29, Philadelphia

WCIX, Channel 6, Miami

WDCA, Channel 20, Washington, D.C.

KTXA, Channel 21, Dallas-Fort Worth

KTXH, Channel 20, Houston

By that time several of the other stations had been/ will be sold. Richmond (1986) and, later (1988) Nashville, Memphis & Winston-Salem, plus New Orleans and Norfolk (1989).

WCIX may have been sold in 1989 with the other stations being part of the TVX “package” bought by Paramount in 1991.

The purchase of the Taft Stations was our undoing.

September, 1989, Salomon sells TVX position to Paramount.