A Brief History of the Technology Birth of the Santa Rosa Tech Center

by Byron Anderson and Joe Christiano

Here is some early history. We got the Thin Film technology from Western Electric, and we also got Weldon Jackson from Bell Labs at the time. It was the early days of tantalum nitride for resistors and gold for conductors.

Weldon was the source of knowledge for using the technology in high-frequency circuits. He reported to the Microwave Division's R/D manager, Paul Ely. Weldon worked with Tom Wirrick and Joe Christiano who were busy designing processes and process equipment, especially deposition equipment. They worked for Jim Ferrell who worked for the Mfg. Manager of the Microwave Division, John Doyle.

This was in the '66 to '68-time frame. The challenge was that very little process equipment of this type was available commercially since they were way ahead of the pack. Eventually, Pat Bohn joined them from Al Bagley's Santa Clara Division and set up a Process Equipment Group. Over time Tom Wirrick evolved into the Facilities designer/manager and Joe Christiano focused on the manufacturing processes as manager.

They started their work in 3L. Until Dave Packard came down for a tour one day and discovered that there was a hydrogen furnace under his office. He asked them to move it to 5L. This was a big deal and Tom rose to the occasion and got 5L outfitted. A large contribution he made was to design and install a deionizing, high-purity water system that made a huge difference to the integrity of the processes. It undoubtedly also prepared him for the big challenge later when he did a brilliant job of designing and managing the new Fountain Grove 1L facility that has evolved and today is a key reason for the success of Keysight.

Christiano was busy working on the material supply chain and deciding which substrate material to use: Saphire, Quartz, or Alumina. Saphire was chosen and Joe went to Adolf Miller in Providence, RI, and secured a reliable supply. Later when CATV was being pursued, Joe had to go out and rework the supply chain again.

On the R/D side of things, Pat Wang was involved. Art Fong was too, but Art was involved in all sorts of things, he reported to Bill Hewlett as a Senior Scientist/Engineer. Things were a bit chaotic at the time. Paul Ely was attempting to hire George Bodway to manage the new "Microelectronic Group." George had just gotten his PhD from CAL and his thesis was on S-Parameters. George turned him down based on too low a salary. He said he could make more money by laying carpets. Eventually, he joined Paul's team, and his S-Parameters made a huge contribution to the measurement world.

There is an old joke around that Paul and George "reinvented" accounting to meet their needs :>) One day Paul Ely came in Tom and Joe's space as usual roaring like a lion and informed them that they now worked for George Bodway, this would have been in the '67-'68-time frame.

(Editor Minck's Note: I was Marketing Mgr at the time, and there was no question that Paul was capitalizing equipment purchases, a no-no because Bill & Dave insisted on expensing all purchases.)

Meanwhile, Tom was getting the facilities all ready. Pat Bohn was working on equipment for Joe's Manufacturing so they could make things for Pat Wang who was being helped by Weldon Jackson. Meanwhile, Joe brought the concept of a prototype group to both aid the designers in this new technology and be able to make TF prototypes a lot faster than they could PC board prototypes. Joe brought that concept to HP from his ceramic tube base work at Litton.

Hal Hiner was HP's Microwave Lab's prototype circuit manager, and he reached out to get some metal and ceramic work done by IMAC, he met Joe who had earlier worked for Litton doing similar breadboard and prototype work. Hal talked Joe into coming to HP.

A bit later Tom Lauhon was named Microelectronics' Mfg. Manager and Dick Chang was put in charge of device manufacturing. Sandy Kakihana was the device R/D Manager. As George settled in, he and Paul spent time working on a way to make the technology more affordable by selling devices on the outside market to relieve some of the fixed costs. A Microelectronics Marketing organization was formed with Doug Spreng as manager reporting to George.

They also teamed with HPA and supplied devices for them to package and sell through the Instrument Sales Force. Later a Components Sales force was formed. There was a myriad of devices that Microelectronics sold: transistors, step recovery diodes, the 8671 switches, Dave Veteran's step attenuators, Doug Gray's transportation Doppler radar units that the Japanese Fast Trains used, Del Hansen's Gunn Impatt diode CARS Band(12.7 Ghz) amplifier, a variety of RF and Microwave amplifiers.

All these components require packaging technology. Jim Smith was a key player in packaging, and he partnered with HPA. The amplifiers got us connected with CATV. Wayne Grove was the CATV R/D manager. We had a number of small contracts initially. Then Anaconda was pioneering a 2-way system. We were able to help them, but our technology's cost structure was not consistent with where CATV was going. But the good news was that the quantities of products we thought we would need if successful got some major changes to happen that were major benefits to the Instrument World.

Joe had to redo the supply chain to secure a reliable supply of much larger sapphire substrates. He also had to work with Pat to expand the manufacturing processing equipment and Herb Hasemann, our masking guy, had to enlarge that process too. Herb later set up the masking process in Fountain Grove's1L. Jim Haynes did the work for bonding and assembly processes, and fixtures on the production line to meet the volume challenges. So, while we did not participate long-term in Cable TV, this work brought some important long-term benefits to the Instrument World from that adventure.