Chapter 3

RCA Labs

I had several job offers while at MSU. This was in 1954, when the Russians were threatening in science and had put up a satellite. Every company in the United States seemed to want to have a physics major working for them. As I mentioned, I had been hired the summer before by a technical company in Minneapolis/St. Paul to work for them in the hope that I would join them after graduation. Again, as I mentioned, it was a great summer. I stayed at the university's AXE fraternity house, went to some dances and parties along with the other fraternity brothers who were living there for the summer and generally had a great time.

I accepted the job offer from RCA Laboratories. I had several offers and the starting pay was similar. The idea of being part of the staff of a large research laboratory working on television and living in a town near Princeton University made this the best offer. How lucky I chose it.

I packed my few things in my Plymouth. I stopped at home in Ithaca, picked up a few more things, said goodbye to my parents, and drove off to Princeton, New Jersey, where RCA Labs was located. I drove along the Pennsylvania Turnpike to Princeton, New Jersey.

RCA Laboratories

RCA, the Radio Corporation of America, had recruited me to RCA Labs, the research and development facility near Princeton. RCA labs was supported mainly by patent license fees from any American manufacturers who made radio or television sets.

RCA had been established during World War I when the United States Navy wanted to buy inter-ship radios and discovered that the various United States patents were distributed among American manufacturers and that the only place the Navy could obtain radios was Germany. The US government quickly passed a law that confiscated all radio patents and put them in a holding patent pool where any manufacturer could obtain access to them and build a radio. The holding patent pool then provided technical support to the manufacturer and was supported by a patent fee from the manufacturer. RCA Labs thus had a great deal of freedom since it did not develop products of its own, but in principle supported the entire industry.

The RCA Laboratories employed some 1,400 people. There was a research staff, a very large patent department and associated technical support. Each year RCA hired some dozen or so new college graduates and assigned them to the various departments in the labs. Each assignment was for four months and after completing three assignments the employee was assigned to a permanent department.

This was like a technical graduate school. Each department involved different technology and had the full-time technical people explain to the newcomers, what the group was trying to do. My first assignment was in semiconductors, my second was in crystal growth, my third was in photodetectors for vacuum tubes. It was kind of a combination of all three areas.

This third group was the television photo-detection tube group. I will go into some detail as to what a Vidiocon tube is, because this project had a major impact on my life. I will write more about the vidicon in the next chapter.

In a vidicon, the photosensitive light-detecting material in this tube is a semiconductor crystal slice that changed its electrical conductivity when light hit it. If the resistivity of the material was too high, it would not work, and if the resistivity is too low, it would not work. One of the staff members in this group suggested that I might try to experiment with a thin slice of germanium, which could possibly be made to contain the exact same trace amounts of positive and negative impurity atoms. This vidicon device is shown in the drawing on the cover. The crystal is #31 in the patent drawing on the cover.

The Laboratories had its own crystal growing and crystal-slicing facility. I estimated what I thought might be all reasonable amounts of each impurities in the germanium through the crystal. One of the dopant material was rejected and the other was sucked into the crystallizing material as it hardened.

My hope was that somewhere down the length of the resultant crystal boule, the concentrations would be balanced and the material would make a good detector for the vidicon huge.

I had the facility grow a boule of germanium and cut a series of slices from the center section of the 1-inch-diameter crystal boule. We mounted one of these slices in the vidicon pickup tube and started the test.

In this Vidicon pickup tube, the sensitive detector wafer was cooled to liquid nitrogen temperature. It took a few minutes to reach the low temperature. About this time, the division supervisor, a Dr. George Morton walked in carrying a mug of coffee. The thermal image of the hot coffee cup stood out clearly in the display. (And we had a major technical success on our hands)

My choice of a particular slice of the boule was just a guess, unexpected by any of us, the dopants unexpectedly and automatically compensated each other during growth and the entire crystal was valuable as a source of detectors.

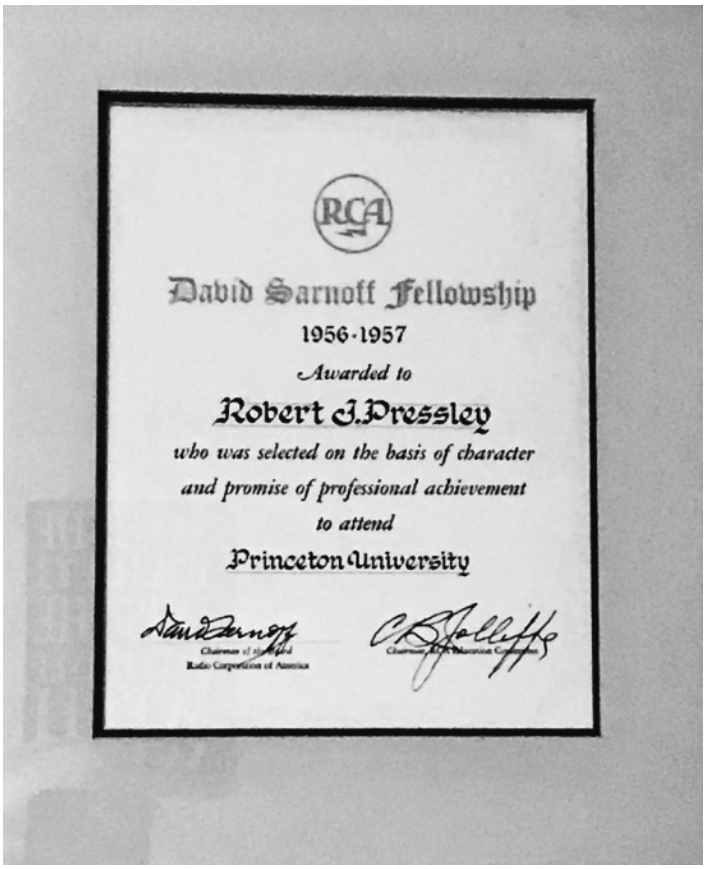
The RCA patent department immediately filed a patent on this new improved infrared sensitive photo device. The government also immediately classified the patent. I thought this was a nice result and moved on to my next assignment.

Each year, the RCA Corporation awarded two outstanding achievement awards, which provided two full years of study at any graduate school of the person's choice

I was awarded the 1957 David Sarnoff Fellowship
All Expenses Paid to Princeton Graduate School
For 2 years

I had no idea how significant this technical result would be in my academic career, my business career, as well as my future marriage.

Princeton University offered some part-time graduate courses for engineers and scientists in the neighborhood, sort of a positive town-gown activity. I had taken one course and was somewhat familiar with the Princeton University graduate physics department.



In my innocence, I saw no reason to apply to any other graduate school than Princeton. I realized later that I had been accepted into a highly competitive graduate physics department because of the strong town-gown understanding between the University and RCA Labs. I was notified of my acceptance to the graduate physics program at Princeton University.

I was joining a group of physics graduate students that undoubtably had straight A's or better from very high-quality universities and had been selected from among many extremely qualified and dedicated candidates.

On to Princeton University

But first, back to life in Princeton before the Graduate College