Oral History of William “Bill” Crooks

Interviewed by:
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Tom Gardner: Good afternoon. It's Thursday November 13th, 2008. We're here at the Computer History Museum in Mountain View, California to interview Bill Crooks. Bill is one of the pioneering engineers on the RAMAC disk drive. Tell us a little bit about yourself.

William Crooks: Well, I was born in 1924. I was born in New Mexico in a little town called Anthony. I was raised in the Midwest. Of course, this was during the Depression. I migrated to California with my family. I went to high school in Long Beach California. To make a long story short, my childhood wasn't very interesting. I went to Long Beach High School and graduated in 1943. I was inducted into the army immediately after graduation when I was 18. I spent three years in the army and was discharged on my 21st birthday; October 27th, 1945.

Gardner: College education after that?

Crooks: Yeah. After I was discharged, I enrolled at UCLA. I was taking mechanical engineering. I was having trouble- the GI Bill was very strict. They loaded me down. I had 18-19 units, all physics, chemistry, mathematics. I should have taken time off from the army because I enrolled in UCLA in November and I was discharged in October so I had no time off at all. I was still having nightmares, night sweats. I couldn't get them to reduce my workload. I wasn't doing too well in school. But anyway, I stayed at UCLA for two years and as they only had a two year curriculum at that time. I would have had to transfer to the University of California at Berkeley for my junior and senior year. I had lived in Tucson earlier and I figured what the heck, it was 500 miles to Cal from Long Beach and 500 miles to Tucson. So I applied to the University of Arizona. I was tired of the big classes at UCLA. They had classes 500 students in a lecture. You had a big hall. It was self-education with supervised quizzes is what it was at UCLA. It wasn't very informative. You never got to meet your professor. You worked with graduate students and this sort of thing. So I transferred to the University of Arizona where the classes were 20 to 25. And I really enjoyed my engineering work there and graduated in 1950 with a BS degree.

Gardner: In Mechanical engineering?

Crooks: Yes a BS ME. That was just at the start of the Korean War in the 1950s and jobs were very difficult to find. I had a friend in Arizona. He had a connection. His father had been an executive with General Motors and said that he could be instrumental in getting me a job. So he arranged for this friend and me to go back and be interviewed at General Motors. I accepted a position with General Motors at AC Spark Plug.

Gardner: Where was that?

Crooks: In Flint, Michigan. I was accepted as a Graduate Engineer in Training. They rotated me between all the different departments to get to know the business. While it was titled AC Spark Plug, they did more than that as they made instruments; gas gauges, speedometers, amp meters, air cleaners, etc. I could have gone anyplace with General Motors due to my contacts but I preferred that because I found it very interesting to have all this type of engineering that was required with all the different instruments. AC got a contract with Sperry Rand to build a 90 millimeter radar control antiaircraft gun that was being made

to be shipped to Korea. That’s where I got my servo engineering experience. I went to hydraulics school at GM Tech Hydraulic School> All of this gave me background that was of interest to IBM.

Gardner: Tell us about your World War II experience.

Crooks: When I was inducted, I was enrolled into the army specialized training program. You took a series of tests and if you got high scores in high school, they promised to send you to engineering school. So I joined the army or was drafted into the army and was sent to Arkansas State College, rah-rah, for one semester. Eisenhower decided that he needed a million men for the war in Europe. So they shut down all the ASTP schools and all the cadet schools. We were all transferred. I was transferred to the 99th Infantry Division in Paris, Texas. There we received training, preparing us to go to Europe. I was sent to Europe and landed at La Havre and went through a series of battles, Hedgerows. And then the Ardennes Forrest; I was in that battle. Then I was in the Battle of the Bulge.

Gardner: You landed in La Havre post D-Day?

Crooks: Yeah. Post D-Day.

Gardner: Were the troops still in Normandy?

Crooks: Yeah, supposedly we were going to go in and cleanup the Germans. Somebody said, “Well, we just left a few Germans here and there.” Well, they left a lot of Germans here and there. So, we encountered- our first real battle in the Ardennes Forrest. And then we were shipped to the German/Belgium border to protect the northern flank. This was the time- we didn’t know what to expect. But we had inklings that the Germans were doing something and the Belgium people were coming from in Germany and going west to the coast. And they kept saying, “The Bosch, the Bosch.” And we didn’t know. So we sent out patrols to see what the Germans were doing and they were building up. We knew they were doing something. They were bringing in tanks. They were bringing in a lot of equipment. We would send this information to headquarters. They didn’t accept it. They said, “Oh no. The Germans will never come through up there. It’s too wooded and it just isn’t desirable.” And they didn’t do anything until the Germans decided to breakthrough. They were trying to go and breakthrough to the coast. This was Hitler’s last hurrah. He sent all of his panzers, his crack troops to do it. I was wounded during the Battle of the Bulge.

Gardner: In the Battle of the Bulge, was your division in the center or the north?

Crooks: The north flank.

Gardner: They broke through below you?

Crooks: Yeah, they broke through below us. We held up at the north for a while but I was wounded in the early part of December of 1944. I was evacuated.

Gardner: Anything unusual about the firefight?

Crooks: Well, I was a BAR. I had a Browning automatic rifle. It was the only automatic weapon we had in our infantry division. When I was wounded, I was evacuated to Paris, France. I was then flown to England. I was in England I think for about three months. They decided that I couldn’t go back into combat. I wasn’t physically fit to go back into combat so they decided to send me back to the States. So I came back to the States and landed in April of 1945; sent to Brook General Hospital. In addition to my wound, my feet had been frozen. So I was sent to Brook General Hospital, which was a burn center and they treated frostbite just like a burn. So, I spent a couple of months there and was shipped Oak Knoll Hospital in San Francisco. The army didn’t discharge you right away. They wanted to make sure you were physically fit before they discharged you so I did various jobs in San Francisco Army Air Base. I was sent then to Dewitt General Hospital in Auburn California. And then I was discharged on my 21st birthday.

Gardner: Happy Birthday.

Crooks: Yeah, I really had the world by the tail.

Gardner: Do you remember what unit were you in for the 99th division?

Crooks: Oh yeah, we were part of the 3rd army, which was the 395th infantry regiment. Then we were in the 3rd battalion, Company I, 1st platoon, 1st squad and the lead BAR.

Gardner: Do you ever talk to any of your buddies from the 395th? You got the million dollar wound.

Crooks: That’s what I called it because I didn’t have to go back into combat. My outfit was wiped out after I left so there were no buddies. I have not had any contact with any of the 99th infantry division. None of them were left. That’s why I call it my million dollar wound because I got out before the rest of them were gone.

Gardner: Anything else you would like to add about that time period?

Crooks: No, that was three years of experience that I certainly wouldn’t want to go through again. That’s about it. I think my experience with General Motors, I enjoyed that. I enjoyed my last two years of college. I enjoyed my junior and senior year at the University of Arizona. The two years at AC Spark Plug was interesting; working on the special servo systems. Getting all the education. But my real break was being hired by IBM in April 1st, 1952.

Gardner: How did that happen?

Crooks: I had a lot of friends in Flint, Michigan that worked for IBM. They were in the IBM sales organization. My wife and I became socially involved with the IBMers. And they spoke so highly of IBM.

One asked, why don’t you apply to IBM and maybe go to Poughkeepsie or Endicott for engineering there?” So, one of them referred me to the lab manager in Endicott and I got a letter to come for interviews. I wrote back and said thank you very much but if I’m going to make a change, I want to go west. I’m as far east as I want to go. So, they wrote back and said, “We’re starting a lab in California.” They sent me an application and said mail it to a gentleman by the name of Rey Johnson, who is the new lab manager in San Jose. So I did that and I got an invitation to come for interviews. I was invited to come to San Jose for interviews and they paid all the expenses and were really great. I was interviewed by Rey Johnson, Hal Martin and Lou Stevens. They were hiring people who graduated from a western university. I got an offer to join IBM. One hundred dollars a week, $5200.00 a year. <Laughs> And that was a pay cut. I made more money with General Motors but I thought here’s the opportunity to go back to California. So, I accepted it and we moved to San Jose. It was the best move I ever made. April 1st, 1952 I reported.

Gardner: Were you the second engineer?

Crooks: Yes, I was the second engineer. The San Jose lab was going to be a 50 man R&D lab. That was their limit. I was the second one hired and everybody couldn’t figure out why does a mechanical engineer want to go work for IBM? But it was pointed out that they needed mechanical engineers because any time you move paper or build the frames and so on, they need MEs. So, I accepted the hundred dollar offer.

Gardner: Did you work directly for Rey initially?

Crooks: Yes. He was my initial manager. And I had my first desk in the vault because the backend of the building was previously occupied by bookbinders. There was glue on the floor and it had to be cleaned up. There wasn’t any room back there so they put me in the vault. The first thing I did was to make sure they couldn’t close that vault door. And from there I helped set up little cubicles for the engineers as they reported.

Gardner: At Notre Dame, were you working on the disk drives?

Crooks: Oh no. Not at that point.

Gardner: What did you do?

Crooks: Rey Johnson had his automobile shipped by rail to San Jose. They delivered it to the parking lot at 99 Notre Dame. My first assignment was - Rey said “I want you to go out to my car and in the trunk you’ll find some cardboard boxes that are filled with all sorts of parts for a project that I brought with me.” He said that will be your first project; to assemble that. It’s a printer. It’s a binary printer. It was called a Tape Actuated Binary Accounting Machine. And so my first project was to assemble the parts and do a plate model as printers were needed at that time. I forget the number but they had some big printers at IBM. But they were lacking in printing. So that was one of the projects that they wanted him to work on.

Gardner: Most people think of San Jose as disk drives but until the 1960s there were lots of different projects there.

Crooks: Oh yes. We did. In fact, Rey Johnson was very interested in magnetic storage. I don’t know where he- but this was his fetish. Rey was instrumental in researching magnetic recording. We reviewed the magnetic drum but that just wasn’t sufficient. It was low volume. They had magnetic cores, etc. But Rey had researched an article on magnetic recording and had become interested in it.

Gardner: Rey Johnson?

Crooks: Yes. He wanted to pursue magnetic recording. I guess he read some articles that there was some recording done that was adequate. It was proven technology but nobody had really worked on it. The laboratory was turned into what they called Special Products Division. Wally McDowell and Jerry Haddad would come out to review the projects. And when we’d get ready for this, it was kind of a dog and pony show when they would come out. We’d have to work overtime and all to get ready for them because they’d always set a date so that we didn’t have time to get ready.

All the other IBM locations had country clubs for their employees for recreation. So the company arranged for 15 or 20 memberships at the local YMCA for us. We could use it for swimming. We could use it for saunas and play handball. So when we would work all day and were going to have to work that night, we’d take a break and go to the “Y”. John Haanstra, Dick Weeks, Al Ewing and I would go play handball and take a swim. And then afterwards, we’d go to a little restaurant next to the “Y” and have dinner. We’d have hamburgers. Al Ewing would play the jukebox. That was the days when they had the 45 records in the jukeboxes. You’d put your nickel in and select your song. A mechanism would go and retrieve the record from a rack and put it on a turntable. Then the needle would play the song and at the end, the mechanism would put the record back. John Haanstra said, “Well, this doesn’t make any sense to me. Why don’t they rotate all those records and when you select one of them, move the needle up and play the music.” And that was a concept that he discussed with Rey Johnson. John was known as the “jukebox genius” with that idea. Rey wanted to pursue that. He had a cardboard model made up initially showing the horizontal disks array. We would need to have a mechanism to move a recording head from disk to disk. Everybody in the lab thought, this is a Rube Goldberg. This will never work. It just is ridiculous. They would refer to this concept as the “bologna slicer”. One of the engineers drew a cartoon of an array of disks on a horizontal shaft with the caption at the bottom, “How much is that doggie in the window?” And they put it on the bulletin board. We came in. Everybody was ‘poo-poo-ing’ it. Nobody was for it. But Rey formed three teams to investigate mechanisms to move the heads between disks.

Gardner: By this time, the concept was a shaft with disks on it and then some sort of mechanism to move the heads between the disks?

Crooks: Yes, John Haanstra and I were one of three teams. There were two others.

Gardner: Do you remember who were on the other two teams?

Crooks: I have it in my notes but I don’t remember them offhand. But we spent a couple of weeks pursuing this and John and I proposed a servo system to move the heads from disk to disk. Then at the end of this, Rey had a secret ballot. He said everybody is to vote which of the three systems we should go with.

Gardner: In your notes in Tab Four, you said Don Johnson and Manning Hermes pursue approach based on IBM 402. Warren Gonder was one member of the third team.

Crooks: Yes, right.

Gardner: What did your team propose?

Crooks: We proposed a servo with a positioning potentiometer on a chain; the heads would be on this chain and it would move horizontal between the disks. The servo seemed reasonable. We had a secret ballot and everybody voted for the servo.

Gardner: The chain moved horizontally because the disks were vertical.

Crooks: Right with a positioning potentiometer to find the location.

Gardner: Then you somehow move the heads in to..

Crooks: Well, we hadn’t gotten to that much detail at that point. We just had to move the head from disk to disk.

Gardner: Can you tell us what an IBM 402 type bar is?

Crooks: No, I don’t either because I didn’t research it.

Gardner: They didn’t describe it?

Crooks: No, well I don’t remember. John and I were preoccupied with our presentation. I guess we didn’t pay too much attention to the others.

Gardner: Do you recall the cam and spring clutches?

Crooks: No. That disappeared. I don’t know anybody that remembers how that worked.

Gardner: The three teams presented their concepts. Did everybody in the lab vote?

Crooks: No, just all the members of the three teams.

Gardner: Did Rey cast a vote?

Crooks: No, he did. There were nine of us and we got all nine votes. We even voted for ourselves.

Gardner: It was unanimous.

Crooks: Yeah, it was unanimous for the servo.

Gardner: Not unlike the way the RAMAC finally turned out. You didn’t use a chain, you used a wire.

Crooks: Yes, a wire.

Gardner: Then you used the same mechanism to move the heads in between the disks.

Crooks: Yes, of course that was a long time coming; all that designing and research. I was assigned to research and develop the material for the disk. That was my first assignment.

Gardner: You started in April 1952. You worked on a printer and a couple other projects.

Crooks: That was later.

Gardner: What about the analog digital converter?

Crooks: Well, jumping ahead, they asked me to design a test stand for the RAM. And when that was being fabricated, I was assigned other projects. The analog to digital converter was during that time when the test stand was being made outside, I had these other projects.

Gardner: The same thing for the Spark piercing?

Crooks: Yes, Spark piercing. It was during that time. It took a local machine shop a long time to fabricate the nine inch steel shaft.

Gardner: That was the shaft for the test bed?

Crooks: Yes, the first test stand, horizontal.

Gardner: My understanding of the sequence, and maybe I have it wrong was first you worked on the disk material. Then you worked on the disk coating and then you worked on the test stand.

Crooks: Yes. Once we had a satisfactory disk, we had to coat them.

Gardner: The vote we talked about was January 1953.

Crooks: No, no. That was in late 1952. I think about the third quarter of 1952. In the meantime, Norm Vogel was one of the first engineers to come forth to volunteer to work on the magnetic head. Most of the engineers were anti-magnetic recording because they thought it was going to be a boondoggle. Norm Vogel came forth and said he would like to work on the read/write head. Dr. Quade was also assigned to the magnetic head. John Haanstra was in charge of the whole project at that time. I was working on selecting the material and selecting the coating. We weren’t sophisticated. We didn’t have any real technical know-how and knowledge of all this. It was everything by seat of the pants. We tried all kinds of materials; copper, glass, a material called Zomag, which was aluminum with a corrugated cardboard in between them. We tried all kinds of material until we came up with the standard record stock. In other words, you know 78 records? That’s what we selected; we used record stock. We would cut out the disk and laminate them so we would have a firm disk. It turned out- it met the flatness requirements. We had problems. How do you measure flatness of something that is 24 to 36 inches in diameter? How do you measure flatness? One of the engineers that was working with me on that decided that the best he could come up with was a tombstone. Get a good sized tombstone. They were flat. So he ordered the tombstone. We built a rack to mount the tombstone -- And it worked real good. We put our material on the tombstone and used flat gauges to measure the flatness. Most of the materials wouldn’t respond. Copper and aluminum stock, most of it; we just couldn’t get the rigidity that we needed. Glass, we couldn’t machine it properly. Magnesium was a problem because you had to be careful. You start machining that [and] you’d have a fire. We had to have fire extinguishers and sand when we were-- <Laughs> So we tried everything.

Gardner: This was flat aluminum sheet that you machined to 24 or 36 inches.

Crooks: Yes. The first ones were 36 inches in diameter.

Gardner: How’d you bind the two disks together and why?

Crooks: Well, the record stock was too thin. We just used the standard record stock and then we laminated them together.

Gardner: How were they laminated together? Just epoxy?

Crooks: Yeah and heat and pressure. It was a pretty routine- it wasn’t difficult to do that. But we wound up with pretty rigid disks. They were very rigid and flat.

Gardner: So you’ve got a disk, but now you need to record on it.

Crooks: Right, I went to the local paint store to find some sort of material to coat the disk that would accept the magnetic recording. And I said, “Do you have anything with iron particles in it? I’ve heard of red barn paint and stuff like that.” And he said, “Oh yeah, we have a 3M product that is used in the Midwest.” And he led me to believe that this paint did have iron particles in it. And I didn’t know all the technicality of it, or all the chemistry of it. But he said “It’s used on the Golden Gate Bridge to protect it against the elements. And it’s very popular in the Midwest to paint barns, and it holds up very well.” And so I bought a couple of gallons of the red barn paint. And we came back and brushed some paint on a disk, and then they tested it to see if it would record a magnetic spot, and it did. We could check the hysteresis of the spot that was recorded, and it was adequate. So then it became the problem of how do we apply this to the disk?

Gardner: How were they actually testing those hand-painted disks? Were they moving the head or spinning the disk?

Crooks: No. They just did a static magnetic test, they’d just use a magnet, and then they’d just pass a coil through the [field] and see if they’d get a signal. And they would get it, yeah.

Gardner: So we’re talking big magnetic fields now.

Crooks: Yes, right. <laughs> That was then. We thought it was pretty small then. Then we had to get this on the disk, so we tried spraying it. And first we tried hand painting of course, and we couldn’t get the right consistency, and we couldn’t get an even surface. We tried spraying it, and we couldn’t get an even surface.

Gardner: Why not spraying?

Crooks: Spraying, we just couldn’t get a consistent surface on a sizeable disk. And then we thought, “Oh, well, we’ll dip them.” <chuckles> And that was a big mess, -- a real disaster. We built a unit out of metal; it was about two inches wide and 36 inches deep. And we’d take the disk and put it down in the magnetic oxide and bring it up. It was just a gooey mess, just running all over the place. And then we decided we had to filter the magnetic oxide, because it did have little particles and bits in it, and you couldn’t tolerate that in any of the applications. So we had to filter. And it was a pretty viscous paint. And so we were having a heck of a time. Gosh, it was taking forever to filter, even with adding some acetones to it. Well, we didn’t want to dilute it. We didn’t know that we could. We had a secretary that took care of our timesheets and all, a young lady by the name of Miss Virginia Chadly. She observed this problem we were having filtering this and she said, “Gee, I don’t like your filter paper. Why don’t you try a nylon hose?” And we said, “Okay.” So she takes off one of her nylon hose, and we set it up in our filter apparatus. And, boy it works fine. And it was very timely. We could get the paint filtered right away. And this was fine, we

were proceeding. But Rey Johnson was walking by the area where we were working. And he was observed her taking off her other hose. He didn’t say anything, he kept walking and went back to his office. Soon, I got a call over the loudspeaker, “Would Mr. Crooks please come to the front office?” <chuckle> So I went up, I didn’t know what he wanted. So I went into the office and he said, “Shut the door.” And I did. Rey said, “I don't know if I really want the answer to this question, but I’ve got to ask it. Why is she taking off her hose back there in the lab?” And so I explained to him. “Oh,” I said, “oh, we’re using her hose to filter the paint.” And he said, “I’ve got to see this.” So we went back and we demonstrated the filtering system. And it worked fine, and he shook his head and he said, “Well, keep up the good work guys,” and left. And that was it. But he suggested we go and buy some hose and replace hers, and get our own. So we did, we used nylon hose to filter.

We’d tried spraying, we’d tried dipping, we tried hand painting and everything. I don't know who thought of the idea, but they said, “Why don’t you spin it?” Why don’t you take advantage of the centrifugal force? And so I built a unit that we could attach a disk and rotate it, and then apply the magnetic oxide at the center of the disk. And zip, it worked perfectly. We got an even coat, and as long as it was filtered, with no particles in it, it was even, no eddy currents, nothing. And so we did and we tested it, and it came out. We had diluted the oxide a little bit at that point, and we measured the thickness and it was five-thousands of an inch thick. They tested it magnetically and it was fine, perfect. So that was our procedure. And the first 500-plus disks we made with that process, we would set up the disk and rotate it, take a Dixie cup with a little bit of magnetic oxide in it, pour it in on the center. And we’d air dry them, and then use infrared lamps to dry them. And then somebody said, “Well, we want a good hard surface.” So somebody said, “Well, why don’t we spray a little carnauba wax on, a very light coating of carnauba wax?” So we did that, dried it with infrared lamps, and we had a good solid hard disk. And we used that procedure for the first 500 disks.

Gardner: There is a picture in your notes of a hand in space pouring a Dixie cup. That’s your hand, isn’t it?

Crooks: Yes, that is. I got the nickname of “The Hand” as a result.

Gardner: So that’s you, right?

Crooks: Right.

Gardner: And that apparatus, you believe was used to build the disk for the first 10 RAMACs?

Crooks: That’s right.

Gardner: Five hundred-plus disks?

Crooks: Yes.

Gardner: And you told me that there was a time when they were hanging all over the lab drying.

Crooks: Oh yeah. We had to get ready for the 10 models. And in fact that picture of my hand pouring it is up at the research lab, at the IBM research, south of San Jose. And it’s in their little history area. And it starts out as the first of the magnetic recording. And it is a picture of my hand pouring. I remember I was interviewed for some presentation IBM had. And they called the project manager in and said, “You know this picture?” “Oh yeah, I know that picture.” “Well here’s the gentleman, that’s his hand.” And the guy goes, “Oh!” He couldn’t believe [it]. <laughs> So that was my notoriety. I was nicknamed “The Hand” when that picture was taken.

Gardner: Now, you had left, stopped working on disk files when they actually were building those disks for the first prototype RAMACs. But it was the mechanism you built that was used to build those disks.

Crooks: Yes.

Gardner: And it was paint from 3M.

Crooks: Right.

Gardner: That I guess you ordered?

Crooks: Yes. We just bought cases, I think four-gallon cases. We bought them by the case. And they were shipped by 3M eventually. I don't know, they made some arrangement with the paint store, so that he didn’t get cut out completely. Because he was the one that started it, so I guess they gave him some part of the commission or something. But we didn’t use that much really.

Gardner: At some point, you were driving around to paint companies trying to find somebody to make volume?

Crooks: Oh, yeah. Later, there was a gentleman, Mr. Hagopian, was assigned. And they said, “Well, I think we ought to investigate a better coating and see if we can get a paint company that would give us a better iron oxide,” and so on. So we did. In the Bay Area, we went to several large paint companies. And when they’re making this, they have ball--

Gardner: Ball mills.

Crooks: Ball mills, yeah. And they said, “Well, we need a finer, you know, we’d like a finer paint with the iron oxide in it,” and all. And none of them were interested in any of it. They wouldn’t even give us the time of day, because there was no volume. They’re not going to change their ball mills and so on for a little order for IBM equipment. <chuckles> You know, IBM was not very well known in San Jose when we moved there. IBM was an eastern company, and they weren’t impressed with us at all, any of the big companies up in San Francisco.

Gardner: So now you have a disk material and you know how to coat it. I think you told me the next thing you did was build the test stand.

Crooks: Yes. They said, “Okay, we’ve got the disks, we’ve got a coating, we’ve got them working. Now we need a test stand. We’ve got to test these in volume. We want to set up a whole 50-disk array. And this test stand has to be completely free of vibration. To move the head and to record and then to retrieve it, we can’t have any vibration. So you really have got to give us a lot of meat and beef.” So I designed a very stable test stand. I used 15-inch steel I-beams. They’re big heavy things, and then a 9-inch steel machined shaft to accommodate 50 disks, and put split bearings at either end. And the shaft was as long as we needed to accommodate 50 disks. And I had them make steel spacers. Because you need to space between the disks. So we did machined steel spacers. And so the 15-inch I-beams were at either end and on the sides. And then I had on the one end of the shaft, I put a pulley. And the pulley then was connected by belts to a motor, that I went to the local hardware store and bought a ½ HP U.S. Varadrive GE motor. And hooked it up and brought the disks up to 3,600 RPM. So I had a going test stand with 50 disks that were rotating at 3,600 RPM with no vibration. And that was to be tested. And I remember, the first time we were to get it ready, Rey Johnson set a date and said, “I’ve got to have that the next day, I’ve got to have enough disks for us to test. So you’ve got to make a lot of disks and get it ready.” So I did. The night before the test, I worked all night. Al Ewing and I were in the lab, and I remember around three o’clock in the morning I had gotten the shaft loaded. And it was rotating and working, and he said, “I’ve got to try.” So Al Ewing took one of the magnetic heads and attached it to the side I-beams and recorded on one of the disks, brought it out, sent it back. And he went to the oscilloscope and he got the square wave. We read the first retrieval of a disk. And we danced around the lab, and we couldn’t believe it. It worked. <laughs> And I don't think very many people knew that. The next day they came in and they did a lot of tests and so on, and it did work.

Gardner: Now the picture in tab 13 of your notes is your test stand. It has disks of different diameters.

Crooks: Well yeah. That was the original. I guess that was before the decision to load it and to test it. And we had different sized disks, and we just put them on to take photographs. They just wanted to take photographs of the machine. It was Dave Kean that took most of the photographs. That wasn’t really an operating thing. It showed the test stand pretty well. But we started out with 36-inches, because they wanted the capacity. It eventually went to a vertical shaft, and 24-inch disks.

Gardner: Right. The capacity didn’t change much. In fact, it went up from 4 million to 5 million characters.

Crooks: Yeah, 5 megabytes.

Gardner: It shipped as 5 million characters. **T**he original Critchlow spec I think was 4 million characters. So obviously, as the disks got smaller, they increased the density to keep the capacity the same.

Crooks: Oh, that was all very sophisticated engineering. Because they had to have clocking tracks and, obviously each circumference was different as you went in on the disk. I didn’t understand any of that. I was not part of that at all. That was the double Es input.

Gardner: The fact that you say they had clocking tracks, of course one of the famous inventions in RAMAC is self-clocking. But it sounds like in the test-bed stage, they still had a clock track to separately clock the data out of the data tracks.

Crooks: Well, you know, we MEs, everybody had a slide rule. The double Es all had an oscilloscope.

Gardner: Can’t put that in your pocket.

Crooks: No, they didn’t. But the lab was just loaded with oscilloscopes.

Gardner: Now basically, you started in April of 1952. And as I understand it, you stopped working on files sometime in late 1953.

Crooks: Yes.

Gardner: Shortly after Lou Stevens took over as head of the group.

Crooks: Yeah. Dave Kean, was working on the transcribing from the disk to punch cards. He needed power supplies, and all kinds of electronic equipment, circuitry and so on. I was asked to build a frame to house a 604 power supply at one end, and in the middle a 024 keypunch. At the far end, we provided two racks for Dave Kean’s electronics, Dave Kean was just fine, he had everything that he needed. There was a transition at that point. John Haanstra left as the overall RAMAC coordinator, and Lou Stevens took over. I think it was September of 1953 or October, sometime in there.

Gardner: According to the Bashe book, it was November 1953.

Crooks: Okay, that sounds about right. And Lou had concerns that since this was going to be demonstrated to Watson, Jr., the president of IBM at the time, we didn’t want to give that impression that an awful lot of equipment to has to be put in a customer’s office. So let’s not demonstrate it in this big unit. So we broke it up. They took the power supply and put it on a dolly and put it in one corner of the room. Then we had the test stand, the 024 keypunch and other miscellaneous equipment. The RAMAC turned out to be as big as that if not bigger. That was the last real contributing engineering I did on the RAMAC.

Gardner: Now, this demonstration for Watson, Jr., is this the one where Watson, Jr., then told the team to go full speed ahead?

Crooks: Oh yes.

Gardner: So that would be after Lou took over?

Crooks: Yes, right after.

Gardner: Because earlier didn’t you tell me that Watson, Sr., had cancelled the program?

Crooks: Oh, yes. <laughs> To the best of my recollection, early in 1953, Wally McDowell wanted the board of directors to know what was going on in San Jose. He started it and all, and he wanted a demonstration. So he asked Rey Johnson to put together a presentation for the board of directors. And this was at 590 Madison Avenue, when IBM’s headquarters was still in New York City. And he said “I want you to go back and present the projects that you’re doing in San Jose. Show them what you’re doing.” “I don’t want it in real technical terms; I want it in layman’s terms, explaining what it was all about.” So John Haanstra and Rey Johnson got everything together with diagrams and easel pads and everything to make a presentation to the board of directors. I was to coordinate the charts and slides. It was a lot of stuff to carry and I was the chart carrier that’s all I was doing. I was trying to keep everything together while they were making the presentation, I’m changing charts. I was very proud of what we were doing in San Jose. I was a fly on the wall in this meeting. And lo and behold, IBM’s big income at that time was the Hollerith punch card. They sold 16 billion cards a year. Watson, Sr., introduced, the RAMAC to the board of directors as, “These are the gentlemen that are going to replace the punch card.” <laughs> And oh man, I thought Rey Johnson was going to collapse. But he tried to convince them both, Watson Sr. and the Board that no, this is not going to happen because the magnetic storage, or the machine we’re working on is going to create the need for more cards, not eliminate them. But, to make a long story short, there were other projects the various board members liked being done in San Jose. They gave a very positive reaction to Rey Johnson about what he was doing. But T.J., Sr. killed the disk file. He said “No, we don’t want the disk file. I can’t approve the budget for the disk file.” We were devastated. Because we had a lot going on in the lab on the disk file. We were taking the red eye back from New York to San Jose, and Rey Johnson was very quiet. He was really disturbed, and I knew he was very disappointed in the meeting. He called John Haanstra and I over. We were sitting in the plane next to him, and he said, “Now, this is not to be talked about, you’re not to say a thing. I’m not going to kill the disk file. I’m going to rename it. We’ve got to keep going because I believe in it and I think it’s going to work. This is a real blow.” Then he said, “you cannot tell a soul. You gentlemen are sworn to secrecy.” So we thought, “Wow. This is Rey Johnson’s career, if this gets out, going against T.J., Sr.” And so he did. It was called the disk file, and then it was called the RAMAC, he renamed it to the RAMAC. And we came back and the program went ahead.

Gardner: Watson, Jr., told you to go full speed ahead sometime in late 1953.

Crooks: Yes.

Gardner: How much earlier do you think Watson, Sr., had told you to kill the disk file? Six months, nine months?

Crooks: First part of 1953.

Gardner: First part of 1953. So basically Rey Johnson kept the program going for about six, maybe nine months?

Crooks: Yes.

Gardner: Against the approval of the chairman of the board of IBM.

Crooks: Yes. And then Junior loved it, and said in essence, “You’ve got a blank check. Go full speed ahead. This is a machine that IBM needs; it’s going to revolutionize architecture.” He said, “Imagine getting information where you don’t have to sort through cards and you don’t have to serially go through tapes.” He said, “It’s just fantastic.” Junior was very enthusiastic. And he said, “There’s only one problem.”

Gardner: Did you actually hear Junior, these were conversations you had, or you overheard Junior saying?

Crooks: Yes, we were there. It was being demonstrated to him, and he was talking to a group of engineers all sitting around. He was delighted. He was congratulating the group. You know, he was that kind of guy. T.J., Jr., involved everybody. He was great.

Gardner: Even though you stole his airplane, he didn’t hold it against you?

Crooks: <laughs> No, he didn’t. That’s another story.

Gardner: Tell us how you stole his airplane.

Crooks: <laughs> Well T.J., Jr., had been in the Air Force in World War II. And he was a pilot and he loved it, and he wanted to keep his license current. He had a plane and a pilot. And he and Wiz Miller, who was Vice President in charge of sales, both were nuts about aircraft and they both loved to ski. They would fly west, because they wanted to come west to do the western skiing. One time they landed in San Jose and came in and were reviewing the lab. He was working with Rey Johnson at the lab. Three of us went out to see the plane, Al Stone, Dick Weeks and I. We were admiring the plane. And the pilot said, “I’ve just done some work and I’ve made these changes and I want to take it up for a flight. I want to test it out. You guys want to go for a ride?” We said, “Oh, sure.” <laughs> So we did. We circled the San Jose airport, and coming back in who’s there waiting for us but T.J., Jr., and Wiz Miller? <laughs> When we got off the plane he said, “Did you have a good flight boys?” <laughs> But he was very gracious about it. But this was after, I think, he gave the [RAMAC] approval.

Gardner: I didn’t mean to imply they were related in any way. But I just thought it was good story you told me.

Crooks: Yes, he was a very gracious guy. See, in the early days, when we first started the lab, Junior would come out on one of these junkets and he’d take the whole lab to lunch at the DeAnza Hotel. The janitor, the secretaries, the engineers, everybody, he’d have a big lunch for all of us. He’d sit down and we’d all talk with him and work with him. He was a wonderful man.

[Editors note: At this point Crooks returns to describing his recollections of Watson Jr’s review of RAMAC in late 1953]

Back at the Lab, Jr. met with Rey Johnson, Louis Stevens and Crooks. “There’s one problem. We don’t have anyplace to build it.” “You’ve got to find some property and build a manufacturing plant here in San Jose to build this machine.” He said, “You know, you’ve got to get enough space and do it.” So that was it. So that’s when I left the engineering part of it. Rey called me and said, “Look, your job is to work with the First National Bank” who was helping us lease a lot of space and do a lot of things. And he said, “I want you to work with them and go find us a couple of hundred acres someplace in the valley here.” “We’ve got to do this.” “Also, you’ve got to find an architect. You’ve got to interview architects.” I had done a lot of space coordination -- I was a go-to guy for Rey Johnson. If there [were] administrative chores such as interface with the Safety Council, interface with the card plant, any kind of a committee, Rey assigned me. I became lab historian. I was the lab safety engineer, etc. I always did these things when Rey wanted to be free. In addition to the RAMAC, he had all these other projects that he had to ride herd on. So he did not have time to interface and do these extra things. So that was my job, to go out and find property and to find an architect.

Gardner: Watson, Jr., found you the architect?

Crooks: Yes <laughs> back to the aircraft. T.J. loved to fly. And Piper was coming out with some new models. Jr. was going to buy one and he was testing out Piper. T.J., knew Piper, they were good friends. Watson said, “Gee, I’d like to test this new plane out.” And Piper said, “Well, take one of our new models and fly it. Where are you going to fly?” Junior said, “I’d normally go to the West Coast, San Francisco, San Jose, I like to fly out there.” And he said, “Oh, that’s fine.” Piper said, “Why do you want to fly out there?” Junior said, “We’re going to start a new plant, we’ve got things going in San Jose. And I’ve got to go out and review some architects.” And he said, Piper said “I’ve got a son-in-law who’s an architect in San Francisco, by the name of John Bowles. He’s a big architect, and he’s got the staff.” So all the architects that I’d interviewed were gone, because T.J. called Rey and said, “I got you an architect.” So that took care of that.

In the meantime, we did find 210 acres south of San Jose. We were trying to put a package together. There was the Cottle Ranch which was most of it, and then there was 30 acres that were owned by a Japanese group that grew strawberries. So we had to negotiate not only with the Cottle family to buy their property, we went to negotiate with the Japanese family to buy these 30 acres. So we made them an offer for the 30 acres and they said, “Oh, this is great, that’s a fair price, we’ll take that. And you can have it next year.” We said, “Oh, wait a minute. No, no. We’ve got to have it now.” We’ll pay you more for the property.” And they said, “Well, this is going to be our last year for strawberries, because strawberries only grow two or three years and the soil peters out. And so they said, “Well, this is the last year.” And so they said, “Well, how much money you going to make on this? We’ll equal your profit.” So they came up with a figure. So we had to give them this money plus the cost of the property to get the 30 acres. The other 180 acres, in addition to the prune orchards, they had a lot of alfalfa fields. So I went and got the alfalfa mowed, and we sold the alfalfa for almost as much money for the strawberries -- we broke even. <laughs> So I was a hero. I saved the company quite a bit of money. <laughs>

Gardner: Actually, didn’t they farm that land for a long time?

Crooks: It was a prune orchard primarily.

Gardner: It was a prune orchard?

Crooks: Yes. A prune orchard, fruit, and alfalfa.

Gardner: But even when IBM had plants on there, they still were picking the prunes?

Crooks: Well, yeah. I moved into the farmhouse.

In the meantime, management had started a separate group called plant engineering. They sent a gentleman out by the name of Paul Richards, who needed a mechanical engineering group and an industrial engineering group. Well, when I had been with AC Sparkplug, I had had quite a bit of training in industrial engineering and layout. And Paul Richards found out that I had this experience, and he needed a chief industrial engineer. He went to Rey Johnson and said, “I’d like to have Bill. Would you transfer Bill to me?” So I got involved in that. And when I moved into the Cottle farmhouse, well, I remember the date specifically because it was February the 24th, 1956. It was the day little Bill was born. <laughs>

Gardner: Little Bill being your son?

Crooks: Yes And so I moved into the farmhouse, and there were still a lot of prune trees. But I remember we had to bring in bulldozers and take these prune trees out. And I remember coming in one morning, and there were all these prune trees that had been dropped by the bulldozers. It looked like a cemetery. Oh, it was a sad day to see all these fruit trees go. But it had to be done. We had to have a half a million square feet ready by December of 1956 to get going, because they were doing the first ten prototypes in a building at South Tenth Street.

Gardner: Earlier this afternoon, you’d mentioned that the decision to go to a disk system was not universally received. Some people called it a bologna slicer.

Crooks: Yes.

Gardner: Some people talked about the doggie in the window, you know, a pet shop. And I recall there were a couple of people who did step up early. Would you like to tell us how the attitude in the lab changed?

Crooks: I remember distinctly Norm Vogel wanting to work on a magnetic head. A read/write head he called it. He was very much interested in that project. Rey Johnson was beginning to assign people to the RAMAC. He turned it over to John Haanstra. I think Norm Vogel and Dr. Ed Quade were also assigned. I don't know if Quade volunteered or was assigned to work with Norm Vogel on the read/write head. There was a lot of electronics. Haanstra was working on the electronics, the clocking problem, you know,

and how to read. And the concentric circle problems. Trig Noyes and Johnny Lynott came forth, and they wanted to work on the RAMAC. Trig Noyes didn’t like the horizontal shaft. He pointed out a very obvious thing. “You're never going to get this damn thing through a door.” So he explained that with a 24-inch disk we could go to a vertical shaft. Lynott and Trig Noyes came from Food Machinery. They had been buddies before. They lived next to each other in Los Gatos.. They both wanted to work on the RAMAC. Johnny Lynott was an expert in castings. He had had a lot of experience at Food Machinery in castings. He knew how to have cast shoulders and how to machine them. He knew the shrinkage problems. So he volunteered to work with Trig to do the castings for the access mechanisms and the detent problems,

John Lynott designed a steel plate three-inch by one-inch that was the length of 50 disks, He drilled 50 pointed drills holes up and down. He used a solenoid spindle that was positioned into these holes and the mechanism would be positioned exactly right. The sharp points in the drilled holes lined the head up perfectly. That was Linnet’s deal. He used a solenoid to do that, so when you got close, the solenoid moved in and moved right on.

Gardner: And it was a cone going into a hole?

Crooks: Yes. It was a sharp point, a pencil point.

Gardner: So it’s a cone driving into a hole that centers.

Crooks: Yes, and they were all reinforced steel. And so that was his. John did all the cable systems and the castings.

Gardner: Was Dave Kean one of those guys who stepped up?

Crooks: Yes. I’m glad you reminded me of that. He was the one that wanted to work on the electronics that go from the magnetic recording to the punch card. To be able to take that signal and activate the O24 punch to record the information on punch cards. So he was into that wholeheartedly.

Gardner: It was these four guys who volunteered that really changed the attitude.

Crooks: Yeah, , it was, kind of, a mutual thing to volunteer. I think they got in discussions with John Haanstra and Rey Johnson, talking about the disk file and seeing how things were going to work out. And they could see where they could contribute, so I guess, you could say it was a mutual thing. I guess, they were semi volunteering. They had ideas. Again, this was the thing that getting back to Johnson’s management style was everybody was to know what everybody was doing in the lab. In other words, all the other engineers, you wanted to know about their projects. So we would have orientations from time to time of what they were doing, the oscilloscope printer, all kinds of things. So this was part of this discussion. And in doing this, Lynott and Trig Noyes and Kean saw where they could contribute. So I guess, you could say that’s volunteering. You know, they’re saying, “Oh, yeah, yeah, I know how to do that. I’d be glad to work on it.” And the enthusiasm built. And once they were into the project, they really

were enthusiastic and hard working. And they worked overtime. You know, if they were working on something and five o'clock came, they’d work until eight o'clock. They didn’t care about the time.

Gardner: But Lynott is the artist who did the doggie in the window, isn’t he?

Crooks: Yes, he did that originally. He had a good sense of humor. Coming from Food Machinery, he had seen a lot of different food machines and I guess he just felt that this was a rube goldberg. You're going to move this head between disks, and it’s going to be a doggie in the window, you know, a bologna slicer.

Gardner: Rey Johnson’s style of openness was quite a bit different than, say, IBM had at Endicott or Poughkeepsie.

Crooks: Yes, I think so. I think they were probably sectionalized. They had their projects, and nobody knew what they were doing in Building Seven, you know. But in the lab, we were small. And your cubicles and your workspaces were right next to each other. And some guy would be working on a problem, and swearing underneath his breath about he couldn’t solve this problem. And somebody would hear about it, and they would help him. They’d know something about it. And Johnson encouraged this. You know, know what they’re doing. And he would have sessions where they would share and give an orientation. Like, two engineers working on cathode ray printing, would make a presentation to all the engineers what they were doing, what their problems were. And somebody else’s project, they would make their presentation. Dr. Moron had a Logix machine, and he was trying to explain what he was doing. I think, when Lynott and Trig Noyes and Dave Kean began to become familiar with what was happening. Under John Haanstra’s encouragement, “We’ve got to do this. We’ve got to do that. We’ve got to solve this”, and they would participate.

Gardner: I think we understand that in late 1953 you stopped directly working on the disk file or RAMAC. But you still had a couple of involvements in the industrial area. You built a bunker?

Crooks: At the Julian Street Lab they were testing a machine in one of the front rooms when the split cast spacers exploded. Machined steel spacers had to be pretty tight, so they didn’t rattle. They were difficult. It took time. You had to use oil and lubrication to put them on the shaft and then slide them down. And so Lynott said, “Oh, let’s go with split cast rings, like they do on a piston in an automobile. You know, they go on easy.” And so they said, “Well, that's okay, as long as they’re under compression. You've got to have a load on these split cast rings. So you’ve got to have 50 disks and be under compression, and have them all tightened up.” Well, they got sloppy. They would be short a couple of disks, and they would rev up a machine with less than 50 disks. And they didn’t have this pressure. And when they got up to 3600, these split cast rings exploded. They came apart. And that room was just like somebody had set a bomb off. It was just little shrapnel, pieces in the walls, every place.

Gardner: This was 99 Notre Dame?

Crooks: Yes. In one of the front rooms. And the three engineers in there, God, we heard this explosion, and I come running in there. And here Wes Dickinson had caught a piece of shrapnel across his nose. It broke his nose and cut his nose, and he was bleeding. And Dick Weeks had got shrapnel in his back. And another guy had caught one across his wrist. And so there was a lot of blood. And, you know, they were in shock due to the explosion, the noise and the smoke. And so we called the ambulances, and we rushed them to the hospital. Wes Dickinson lived in a little community on the same street where I lived and all, and we know. And so Rey Johnson came to me, and he said, “Well, you know Wes Dickinson’s wife, don’t you? You go get her and take her to the hospital. You know, don’t just tell her ‘Your husband’s been hurt and he’s in the hospital.” So I had to interface, and I went and got Avril Dickinson, and somebody else went and got the wives of the other two gentlemen and went to the hospital with them. And so it was a big to do, because we were worried. But we were very fortunate. Dick Weeks took one in the back, but he had a suit coat with shoulder pads. Well, that one piece of shrapnel went into that padding in there, so it didn’t go too deep. So he wasn’t hurt too bad. The other guy had a cut wrist and all, but we took care of it. And nothing really serious, but that was it. Boy, everything was shut down, because they didn’t know what happened. So right away, I knew it was the damn split rings that was the problem. So I said, “We’ve got to go back to the machine steel rings.” You've got to have Underwriters Lab approve this operation.” We came up with an idea that we’d build a sandbag room. Over at Julian Street, we had a warehouse. We ordered several truckloads of sand and sandbags, and we built a sandbag room. It was a labyrinth. We put a RAMAC, one of the machines, in this thing with a TV camera, and the monitor outside. And so we would fire it up and run it at 3600 RPM for three hours, monitoring all the time to see if it would hold. And then, we took it up to, I think, it was 5,000 RPM for six hours. And with the steel cast rings we got the Underwriters approval.

Gardner: Sort of remind you back in the war, huh?

Crooks: Yes, right. But I remember I’d take some of those sandbags home every evening, and I was filling a sandbox in the back for my son. He was little. So we used this sand for his sandbox in the backyard. Some of the employees would take the sandbags. We finally got rid of them all. So that was quite an experience. We were lucky that no one was hurt more than that.

Gardner: Darn lucky. Actually, the RAMAC, if I recall, only turns at about 1200 RPM. It’s not…

Crooks: No, it was 3600.

Gardner: Was it 3600?

Crooks: Constantly, all the time, yeah. That was the magic number 3600. It had to be that. I don't know why. There’s got to be an explanation for that. But that was very strict, from even on the test stand, 3600 was it. I remember using the tachometer to bring it up exactly that speed.

[Editors note: The RAMAC 350 as shipped rotated its disks at 1200 RPM]

Gardner: Now, the first ten prototypes were not manufactured at 99 Notre Dame?

Crooks: Correct. Well, we needed a facility to build these ten machines. So we went and found a big fruit shed on South Tenth Street. It was a big corrugated building with a cement floor. Haanstra said, “We can, certainly, do all the assembly and testing here. We’ll have to bring in a lot of power.” We did increase the power. And all the fabricated parts and everything were bought down there. And we had all the technicians assembling the machines. And John Haanstra and Dave Kean were debugging those machines. They lived there while they were testing the machines. I remember they had cots and sleeping bags. One day, we got a call. This was in the middle of the year, in July, I think it was. It was 105 degrees outside, and oh, my God, I don't know what the temperature was inside. But it was terrible, and I got this call. I was in the farmhouse then, and I got this call from John Haanstra saying, “Hey, we’re in real trouble. We’re burning out all the diodes. It’s just too hot. We can’t operate in here. We’ve got to do something.” So wow. So I went to my boss, and I said, “Well, we’ve got to do something. We’ve got to get some air conditioning. We’ve got to get some way to cool that building.” I said, “Why don’t I call John Bowles?” Because John Bowles had air conditioning specialists and all on his staff. I called John, and I said, “Do you have somebody that can help us solve this problem, this heat problem?” And he said, “Yes, I have an air conditioning specialist. And we’re building a small motorist plant for GE in San Jose right near you there. And so you can go see him. He’s down on the plant site now working with them. You can go down there.” And so I did. And it was quite a coincidence, because I went, and it was Tom Christensen who had been a professor at the University of Arizona and was now working for John Boles as an air conditioning specialist. He taught me air conditioning at the U of A. So I knew him very well. I explained the problem to him. He said, “Well, it just so happens we’re behind schedule in this plant, and we’ve got ten tons of air conditioning sitting in railroad cars down the block here. And, maybe, we can talk them out of that and they can reorder.” And he said, “Let’s go talk to them.” So we did. We went and talked to the head contractor at GE, and he was all for it. He said, “Oh, you guys want that equipment?” “Oh,” he said, “OK, because I want more and different air conditioning. I want some changes made to that stuff.” And he said, “You take it off my hands, so I can order new stuff.” So he was all for it. But you've got to go to the top guy at GE there and see him. So we went there, and we talked to the head guy. And he called the accountant in, and he said, “These people want this equipment.” And they figured out it’s $35,000 worth of equipment down there.” And so Christensen said, “Well, they would like to buy it and utilize it in their problem at South Tenth Street.” And they said, “Well, okay. But we’ve got to have the money.” You know, the accountants were, “Okay, if you get us the money we’ll release it to you.” So I went back to the farmhouse to talk to my boss. And I was really down in the dumps, and I thought, “Oh, God. All the red tape I’m going to have to go through to get $35,000 from the east. It’ll take weeks to get approval from the east for $35,000.” It just so happened there was an IBM Executive Vice President by the name of Red Lemont who was on vacation and had stopped at the plant site to see what we were doing. And he was in the farmhouse talking to Paul Richards when I came in, and he said, “What’s the matter boys? What’s your problem?” And we said, “Well, we’ve got this heating problem. We’re going to miss the schedule. We can’t complete these machines. We’re not going to be able to ship on time. We don't know what to do, because by the time we get the $35,000 and install this air conditioning, it’ll be weeks before we can do it.” And he said, “Wow, wait a minute.” So he gets a telephone, and he calls TJ Junior, the President, and he says, “Tom, the boys have got a problem out here.” And he explained the problem to TJ Jr, “They’re going to miss the ship date.” And so he said, “Well, how do we solve it?” And he said, “Well, they need $35,000.” And Tom said, “We’ll wire it. We’ll wire it tonight.” So he did. They wired the money to the First National Bank, and they got it to the GE guy. We called two contractors to go to the railroad site and pick up that equipment, truck it to South Tenth Street. This was Thursday afternoon. And we’re going to have to build cooling towers, install this equipment and so on. And so we did. We worked 24 hours a day, and by Monday morning, we had ten tons of air conditioning in there cooling it down. And they went right back to work. And we only missed four days.

Gardner: Now, this was probably the summer of 1956?

Crooks: Yeah.

Gardner: Because you were already in the farmhouse. You had already bought Cottle Road. And the first shipment had already occurred?

Crooks: No, no, no. They hadn’t been done. They hadn’t been finished, yet.

Gardner: But I thought the first shipment was in June of ’56?

Crooks: Yeah, well, this was early. Well, you know, summer comes early in San Jose…

Gardner: So it may have been May?

Crooks: Yeah.

Gardner: So it may have been before the first shipment in June 1956 to Zellerbach…

Crooks: Yes, Crown-Zellerbach.

Gardner: Right. So this was before that?

Crooks: Yeah.

Gardner: Well, it gets hot here…

Crooks: Yeah, they were close. These machines were being final test, you know, and getting ready for shipment.

Gardner: So these were the ten prototypes?

Crooks: Yeah; right. And they weren’t all done, but they had enough of them done. And they had one machine that they were going to be on schedule for the first shipment.

Gardner: So this may have been the Zellerbach machine that was affected?

Crooks: Oh, yeah. They were working on a lot of them, but that was the first one.

Gardner: And the second machine was?

Crooks: The second machine went to America Airlines in Denver. Crown-Zellerbach had a tub system to inventory all their paper. They had a lot of paper and they were going to put all their inventory on the RAMAC. Oh, it was the best thing in the world for them. It was the best application you could think of. And America Airlines wanted to put all their reservations on the RAMAC.

[Editors note: According to IBM memo dated September 21, 1956 the first five engineering prototype 350s were installed in order at Zellerbach Paper Co., SF CA (June 1956), IBM Customer Engineering, SJ CA, U.S. Air Force, Oklahoma City OK, U.S. Navy, Norfolk VA and DuPont, Wilmington DE. United Airlines in Denver received the first production 350 in 1957.]

Gardner: Do you know who the third one went to?

Crooks: No, I don’t. Those are the only two that I got involved in. One interesting thing about the one that was going to Denver is that these machines were loaded into padded vans. That’s the only way they could ship them. We didn’t have any material handling or any special way. And so they would be all in blanket and tied down. All the RAMAC machines were shipped by van. This one van going to Denver went off a cliff. It went down and the damn thing wound up in a ravine. And they brought it up, and they brought the machine back to San Jose. It was in pretty good shape. We fixed it up and shipped it back. It was a good material handling test for us.

Gardner: That’s quite a product test.

Crooks: Yeah, that was quite a test. But it came through real well, because it was tied down and padded. And it didn’t hurt it. But that was quite a coincidence. I had Material Handling, along with the Industrial Engineering. We had to handle all the materials between departments. The layouts and all that was an Industrial Engineering problem.

Gardner: Did you say where the fruit shed was?

Crooks: South Tenth Street. It was an Old Del-Monte fruit shed.

Gardner: That was only used for those ten models. And then, production occurred?

Crooks: In Building Five. We had the first third of Building Five done by December of 1956. We used a curtain wall. We’d finish a section of the building, and we’d curtain wall. So we’d occupy it as we got it done. They started the RAMACs manufacturing and production then. But, you know, there had to be a lot of engineering and work done. There were so many levels of engineering in IBM. You started out with Research. Then, you add Development. Then, you had Product Engineering. Then, you had Manufacturing Engineering. You had Customer Engineering. And everybody got in on this thing, you know. It was unbelievable the steps that you have to go through. Because Customer Engineers were

always in there looking at the design, because they were going to have to maintain it. We were leasing machines in those days. And we had a very strict test procedures, because we wanted good quality machines, because we had to maintain them. And if they weren’t of good quality it would cost us to maintain them. Manufacturing Engineering was always down the Development Engineering’s throat, “You can’t build this thing. You haven’t designed it right, for God’s sake. You can’t get in to work on anything.” So there was quite an evolution in there between all these engineering groups to get the first machines, the first manufacturing machines going.

Gardner: Well, ten years later, I know IBM had a process they called A, B and C Test. And then, System A, B and C Test were, kind of, like, six tests you had to go through before you could ship. Would that exist as early as the that time period?

Crooks: Test Engineering was completely autonomous. They reported to headquarters. And if they said, “You can’t ship,” or “You can’t release this,” you couldn’t. You had to satisfy Test Engineering. They were really strict. They were good. But A, B and C Test, and C Test was the final test to ship to the customer, yeah. So we had to go through A Test in Development, B Test in Product and Manufacturing Engineering, and then, C Test.

Gardner: Yeah, I became familiar with those terms fifteen years later when I started in the industry. I just didn’t know how far back they went.

Crooks: Well, they set that up because they wanted quality machines because of leasing. You know, you didn’t want a haphazard machine out in the field and trying to maintain it. That just costs us a lot of money to have Customer Engineers. Because we assigned Customer Engineers to the customer’s offices. We used to keep Customer Engineers in the big customer’s facilities, you know. That’s where we got the reputation of the dark suits and white shirts. Even our Customer Engineers were dressed like that in the customer’s office.

Gardner: The last area I’d like to explore, late 1960s you're now the Personnel Manager at IBM San Jose.

Crooks: Yeah.

Gardner: There’s a huge exodus. All sorts of different numbers have been spread. What was it like in IBM San Jose in 1969 and 1968 when this was going on?

Crooks: Well, there’s a lot of concern about losing this talent, because they were taking a lot of information. Was it the Winchester or Merlin?

Gardner: It was Merlin.
[Editors note: Merlin was the code name for the IBM 3330 Disk File]

Crooks: Merlin, yeah, and they were taking engineering know how with them. But there were only two engineers that I got involved with. Because if people resigned and went with another company, we didn’t have interviews. They didn’t give us exit interviews or anything. They just left. And so I didn’t have any interface with any of them. There was only two of them. Like, when Al Shugart left, I never got to talk to Al, officially, as an IBMer on the exit. And it was Rey Herrera and Hal Eden. When Shugart resigned all hell broke loose. I mean, we had headquarters people out in San Jose, you know, really going over things. And Chuck Branscomb was there seeing what the hell’s going on. Shugart’s leaving and all, and he raised hell. And the only feedback I got from the two guys is that Shugart’s leaving because he’s been transferred and he couldn’t get along with Witt. And they said there’s going to be more. There was going to be more that goes. And so I conveyed this and brought Chuck Branscomb in. And he talked to Hal Eden, and he talked to Rey Herrera. And they talked, and they tried to make corrections. But sure enough, Rey Herrera and Hal Eden left. It wasn’t too long after that. And then, there were several of them left. But I never had the interface with any of those. I mean, as a Personnel Manager, you didn’t. Being Personnel Manager, we had a Personnel group for the plant site, a big Personnel operation. Engineering was not happy with the service they were getting from the Central Personnel. Engineering was SDD. And so I was Personnel Manager, but two of my functions were recruiting, college recruiting and professional recruiting. Those were two functions that I spent a lot of time with. And the rest of it, of course, was processing personnel problems. But there was a time when IBM had a freeze, and you couldn’t hire anybody. They wouldn’t let us hire anybody no matter what. They also gave me manpower control. You had a certain number of people you could have in the lab, and it was broken up by the different projects. So I had manpower control. And any time you wanted additional people, you had to come through manpower control. And you couldn’t hire anybody.

So they said, “We’re going to go with contract people” You know the original RAMACs were all tube. We were converting everything to transistors. So we needed a lot of circuit designers and logic designers. There were contract people in the East. They used them all the time. In fact, we had two companies come out to get us contract people. And we had to sign that we wouldn’t hire any of these people we’d bring in. I was handling all these contract people, sending them to the various departments to be interviewed. So it was an operating personnel doing of day-to-day chores. It wasn’t a typical personnel operation. But let's see, we hired-- you’ve heard the name Jack Kuehler, I’m sure.

Gardner: Oh, yes.

Crooks: And he became President of IBM. Well, we hired him from the University of Colorado. I remember hiring him. Ray AbuZayyad became general manager of the IBM San Jose site. He was one of the ones we hired from college, when I was Personnel Manager. These were top employees, top hires. And Jack Kuehler, once we had him on board, he was one of our excellent college recruiters. But we did a lot of that. But this contract thing was big volume. We were using a lot of contract people. You know, they said IBM never laid off people. Well, we didn’t hire a lot of people in that time to lay off. So that was, kind of, subterfuge. That was one of these big rumors that was started.

Gardner: Just let the contracts expire?

Crooks: Yeah, right. Then, once you didn’t need the contractor, you just let them go.

Gardner: We had a nice lunch before this session with Jack Harker. He made a comment, and you’ve made similar comments to me about how little you guys knew and how much you accomplished with stuff that was really off the shelf. Would you talk about that? Sort of finishing up the session, I mean, disk drives didn’t exist, and you guys made them happen.

Crooks: Well, the US Varadrive motor was from a hardware store, the paint, pulleys, belts, split rings, etc, were all standard items -- what you’d call off the shelf items. If we needed something, we went to the local hardware store and bought it. I don't know how to elaborate on that. We didn’t get parts from the East and all. We did get the magnetic clutch from the East. That was one of the few contributions from the East.

Gardner: You were interviewed by a Swiss reporter. You and he had a dialog about the way of doing things. I’d like you to tell us about that.

Crooks: Well, he was impressed about we didn’t have sophisticated tools. We were flying by the seat of our pants. We had inexperienced people that were new to IBM building a machine that became a billion dollar industry. And you built it with just normal components. You didn’t have any special parts. I don't know how else to explain it really. We did everything by the seat of our pants.

Gardner: I think you just explained it very, very well. Thank you very, very much. Is there anything that you want to add?

Crooks: No. I think we’ve covered pretty much everything. I can’t think of anything else. We covered my special projects. I think we’ve covered everything. I can’t really contribute much more.

Gardner: Thank you very, very much.

Crooks: Well, I really appreciate your time, Tom. And I’m just amazed at your interest in me coming back and relating my experience. My experience is, sort of, from the ground up, rather than from a management down. And I’m happy to tell the story. But there’s a lot of little things that happened in the lab that I don't think you would find too interesting. And, you know, we did goofy things. We were just Mavericks, I guess, you’d call us. We were not sophisticated like Endicott or Poughkeepsie.

Gardner: But you made it happen.

Crooks: Yeah, we did.

END OF INTERVIEW

