Computer History Museum

Oral History of Rainer Mallebrein

Interviewed by
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Steinbach: First the data: This is an interview with Mr. Rainer Mallebrein for the oral history collection of the Computer History Museum in Mountain View, California. My name is Günter Steinbach, I am in California and I am talking over the phone with Mr. Mallebrein who is in Singen am Hohentwiel in Germany – in one of the most beautiful corners of Germany. Hello Mr. Mallebrein and thank you very much for agreeing to grant an interview to the Museum.

Mallebrein: Yes, thank you very much. We are indeed in the most beautiful corner of Germany. Lake Constance, our *Bodensee*, is very close to us, it's only about 7km away and so in summer we spend a lot of time on Lake Constance. It is a very pretty vacation place that draws many visitors from Germany and elsewhere.

Steinbach: I contacted you because a long time ago you invented and developed a computer mouse. But here we don't want to limit ourselves to that one thing; we want to record the story of your life from the beginning up to now. So let's start at the beginning: Where and how did you grow up, what hobbies did you have in childhood and youth?

Mallebrein: I was born in 1933, that was before World War II. The first eight years of my life I lived in Frankenthal in the Palatinate and went to primary school there for the first two grades. When the war broke out my father, he was a doctor of internal medicine, had to go to war as an army doctor. My mother was Swiss, and came from Solothurn in Switzerland, from a well-known titled Swiss family, the von Rolls. That time was of course very hard for her. She was a good mother. I have one brother, his name is Ubald, that was also my Swiss grandfather's first name. My name is Rainer. My mother admired the German poet Rainer Maria Rilke, hence my first name. The start of the war made life very dangerous there because of a large chemical industry plant nearby and my mother moved away with us boys. Once to my aunt in Herbolzheim near Freiburg and then again to my paternal grandmother in Freiburg. We suffered badly in the war. My mother was afraid of bombing raids. I too lived through several bombing raids, sheltering in the basement. It was terrifying, we stood together under a crossbeam in our basement and were afraid the house would collapse under the close-by bomb hits. The basements were reinforced with timber braces to improve our safety.

After Freiburg we had to move again because bombs were falling there too. Now Ravensburg was our new home town. Of course with every move I had to change schools again. Then in May of 1945 we moved to my grandparents in Solothurn, in Switzerland. There I had to get used to a very different school system. I also had to learn the Swiss language. But I adapted quickly to life there and I liked it very much.

My grandfather was also an engineer, he studied in Berne and then lived as a farmer on Sumatra, in Deli and Serdang, from 1889 to 1909. He had set up a rubber plantation there and he often told us children stories about it. That was always very interesting for us. He was very innovative and also was the first to import coffee plants from Brazil to Sumatra. Sumatra's first coffee trees were planted on his rubber plantation were planted. Well, so much for this history. By then he had become wealthy through his plantation. He built a large, beautiful villa in Solothurn and we boys were happy and proud there and had a good life. Unfortunately he lost much of his hard-earned money on the stock exchange with shares of the then well-known Swedish newcomer company of Ivar Kreuger.

After the war, in 1948 we resettled in Germany, in Singen am Hohentwiel where I am still living today. At the time my father was head of medicine at the Singen municipal hospital. Now there was stability in my life again after I had been going through so much change in my schooling before.

Here in Singen I went to high school which I found hard to get used to. In Switzerland we spoke three languages, German, French, Italian, while here in Germany they taught French and English – the whole curriculum was mismatched. I did not make it all the way to the high school diploma and dropped out. That was a hard decision. I even attended the Salem Castle School, if that means anything to you, a very famous boarding school on Lake Constance. Unfortunately I couldn't get my footing there either and dropped out after two semesters.

So I was out of school for a whole year and I started to build a television set from scratch in the basement of our house. I had to build the chassis and mount the vacuum tubes in it. Those were the EF14 back then. Also the band filters and just about everything I constructed myself. In the process I learned about the Nyquist corner by studying books on the subject. Not everything I could make myself: The high-frequency tuner for selecting the channels, I bought that. I also bought the high-voltage (horizontal deflection) transformer for the 18kV anode supply of the picture tube. But everything else I made myself, the whole intermediate frequency chain, the whole audio amplifier, the whole mechanical base with the picture tube mount and everything else that went with it.

I remember very well that the television set was finished in time for the coronation of Queen Elisabeth II of England on June 2nd, 1953 and the whole family and friends could experience the coronation on live TV.

Steinbach: Question: Could you really buy picture tubes already at that time?

Mallebrein: Oh yes, that was a 36-cm tube, it was about so big, so wide and so high, and you could buy those. And this tube I mounted in an old wine crate and later I clad the crate with a velvet curtain. And that set worked for many more years in my parents' house. At that time we had one of the very first sets in our city. I had also constructed the antenna myself, taking a long wooden slat, mounting the λ/4-rods on it and connecting them crosswise to get the correct phase relationship. I had to first study the theory behind it in the literature. It had turned into a large antenna, about 3.5 meters high. The TV transmitter was in Zurich and we had a good reception in Singen.

However, my father worried a lot about my lack of higher education. He said, "You can't go on like this, boy. You got to do something." So then he arranged an apprenticeship for me. I entered an apprentice-ship with Pintsch Electro in Constance to become an electrical technician. And this apprenticeship changed my life. Suddenly I found myself transformed from a weak high school student into the quickest learner among the apprentices. That gave me enormous motivation to further my education. My take-away from this is: An apprenticeship or a practical education in a field like electrical technician, where for a few months or a longer time you have to learn how to file, use a lathe, drill, mill, and weld, learn to work on the factory floor, and get the requisite field-specific knowledge in technical school, that will form you for the rest of your life.

There I acquired a keen feeling for the whole of technology. Even today I still keep applying the skills I learned back then. My graduation project was a rotating coil, a rotating antenna coupling coil which I had to design and build on my own. In all that I did very well and above all I had become a very good graduate. That raised my self-esteem so much that I said, "so, and now you have to continue on to college." So I prepared myself and did a pre-semester of preparatory classes. I passed the admissions test at the technical college in Constance and started right away with my studies in their regular program. So you could say that in effect I left my deficient early schooling behind and went on to add much more knowledge in later life so that today I have caught up with a good education in many fields. I have this habit which I am trying to pass on to my grandkids now, as in "You have to inspect everything, boys. You can't walk by some interesting technical object without inspecting it closely and asking yourselves, how does this function and how is it put together?" All this kind of behavior I explained to my grandkids from an early age on. And I still today like to discuss all manner of stories of "how came this about" with them. I enjoy it and they find it fun too. I do also believe that a certain knowledge of the history of technology

helps us to internalize our understanding. One of my grandsons is studying electrical engineering, the other mechanical engineering, both at the Munich university.

I am very proud of those two for they continue this engineering tradition of our family.   My grandpa in Switzerland was a mechanical engineer and was able to put those skills to good use for developing his farm in Sumatra, then later for his various other endeavors in Switzerland. During the time when I lived with him he involved me in many tasks and gave me technical guidance that is even now fresh and clear in my memory. For this reason I still admire him greatly. My paternal grandpa, whom I never knew personally because he passed away too soon, was a chemist and a lawyer. He invented a patent medicine, very well-known in Europe, and marketed it under the trademark *Mallebrin* starting in 1924. Mallebrin is still a well-known gargle compound, very effective against anginous strep throat. It still belongs to the tried-and-true staple medications like Aspirin. Even my father, being a doctor, developed together with medical companies a device for measuring goiters, a so-called *Strumameter* and patented it. The line of engineers continues with me, Rainer Mallebrein, our son Georg Mallebrein, and son-in-law Clemens Baumgartner, father of my grandsons Sebastian Baumgartner and Tobias Baumgartner. And not to forget, my late father-in-law Walter Küster was an engineer too. As you see, a long history of engineers.

Steinbach: I think I have heard the name Mallebrein too, yes.

Mallebrein: I'm sure you had to gargle with it as a child when you had a sore throat. It doesn't taste particularly good but it works well. I could tell you how it achieves its effect but that would lead us too far astray.

Steinbach: (laughs) OK, so your engineering degree then is from the technical college in Constance?

Mallebrein: Oh yes..

Steinbach: And when was that?

Mallebrein: That was in February of 1957.

Steinbach: OK

Mallebrein: But you'll laugh: Yesterday I sent a letter to the technical college in Constance with the title "The Mouse comes from FH [[*Fachhochschule* – technical college]] Constance."

Steinbach: (laughs)

Mallebrein: Have not had a response yet, I'm waiting to hear what the college will say to that.

Steinbach: (laughs) Good!

Mallebrein: What would your next question be?

Steinbach: The next question is, where did you find work right out of college?

Mallebrein: Yes, well, here goes, February of 1957. Pretty much on the day of my final exams, which I passed well, I was hired into an engineering position at Pintsch Electro, the same company where I had done the interesting apprenticeship before. But this company was taken over a short time later by Telefunken. And now began for me a very challenging and interesting career. Today I am surprised myself how many different tasks I had to complete in that company.

Steinbach: OK, please.

Mallebrein: Alright, you'll tell me when it gets too much, yes?

Steinbach: Yes, yes, please continue, yes.

Mallebrein: So I started in February '57, as a new employee under the guidance of Dr. Konrad Dinter, to build a Radar signal bandwidth compression system. The task then was to coordinate shipping at the North Sea mouth of the river Elbe by means of multiple coupled Radar stations and feed the data to a central pilot guidance office in Cuxhaven. To do that the signals from the individual Radar stations in the coast segments had to be consolidated. However, the point-to-point radio links of the time did not have enough bandwidth to allow that. For that reason we at Telefunken set out to reduce the bandwidth of the Radar signals. And we approached this in an innovative, a completely novel way. We recorded the signals as charge pattern along a circular path on the phosphor coating of a standard CRT and read them out again during the scan intervals of the Radar systems, with the read-out speed reduced to about 1/100 of the write speed. So that was my first major task and already it was great fun for me. We did have some problems with the stability of the Lissajous-curve read-out, though. It did not stay locked over the course of a day and drifted off. When that happened the read trace did not overlap with the write trace anymore. And so they ordered me to sit in the Radar tower at the *Alte Liebe* pier in Cuxhaven for several weeks, checking the convergence all day long and correcting it when needed. Of course I felt like a prisoner there.

Steinbach; (laughs)

Mallebrein: Right, so that was the topic of bandwidth compression. The system went on to undergo testing by the shipping authority at Brunsbüttelkog but unfortunately we did not get the large order we had hoped for. Another company, Philips, beat us to completion and was awarded the contract. After that we did not pursue this technology any further.

Then my 2nd task arrived, oh, I had forgotten all about it. That was a tape recorder to digitally record narrowband Radar signals. I took a Telefunken tape recorder, meaning a high-end studio recorder, and modified this unit so it became possible to record short digital radar pulses. This allowed us to record the bandwidth-compressed Radar signals on the magnetic tape. I finished that task in a relatively short time and by myself, without guidance by a manager.

Then came the next project. It was around the year 1960 that I developed, together with my co-worker Herr Reindl, an industrial television system, CCTV in English, for closed circuit TV system. That led to several patent applications, among them an automatic iris control - all very new for me. Back then the image was recorded in a Vidicon; I don't know whether people nowadays still know what a Vidicon was.

Steinbach: I have heard the term but I cold not describe it. A video recording tube.

Mallebrein: Yes, it is a small recording tube with a semiconductor layer on the face on which the light coming in through the lens forms a charge image. Then you can scan the charge image out and you get a video signal. Those were the first TV tubes for CCTV cameras. I built our first camera with them. About a year later I developed a fully transistorized version. I was very proud of this transistor camera because we were the first to complete the development, ahead of the competition. Unfortunately it never went into series production because Telefunken, in financial trouble at the time, completely exited the CCTV business. A little later Telefunken was bought by big AEG and later the whole was called AEG-Telefunken.

In 1963, after the close of the camera project, my department and I were given the important task of defining and then also developing a display terminal for connection to our computers under contract to the federal office for flight safety (BfS, *Bundesanstalt für Flugsicherung*, corresponding to the FAA in the US). This device was supposed to display the digitized air traffic situation at the airports for easy viewing by the flight controllers in the towers. I'm not sure whether the flight traffic control in the US is still called FAA.

Steinbach: Right, yes, yes.

Mallebrein: I need to add here that our department at AEG-Telefunken in Ulm, had designed and then built a so-called Radar target extractor. This target extractor had the function of converting the analog flight target data delivered by the Radar system from polar coordinates (ρ/φ) to catesian coordinates (x/y) and digitize those. And of course you needed a new kind of data display for this digital data. It needed to display the targets at the exactly correct position, enable adding text labels to them, and also allow for displaying vector graphics to indicate the flight paths. Compared to a Radar screen these new display terminals have a much higher image refresh rate of 60 Hertz. Therefore you are not using the classic radar screen anymore with its long-persistence and rather dim phosphor.

Mallebrein: To explain I'd like to add that in the case of the classic Radar display screen the refresh rate depends on how fast the antenna revolves. In our case that was once every 3 seconds. So to allow the air traffic controller to recognize the target well the screen has to be coated with a long-persistence phosphor. That was the P39. In contrast with that the new digital display used a bright white phosphor, the kind used in black and white television sets. The round display tube which we built into our terminal was a modern steel-body tube. It had fairly flat screen with a diameter of about one meter. We sourced this tube from the Rauland company in the US.

Today of course this is all solved in different ways. You use the bright flicker free color LCD displays familiar from television. I could add a lot more details about development work on these at the time innovative displays but that would get us too far afield.

In addition to the airplane target dot the Radar system used the SSR system (Secondary Surveillance Radar) to supply an identification code, the flight altitude, and the speed. To these important label values the human controller had to add further information such as the airline flight code. This meant the additional task for us of defining the flight target using an entry system, today it would be called cursor and mouse. We came up with several different ways of doing that, and tested them. First we tried an 'ultrasound curtain' in front of the screen. This setup recognized the exact position of the pointing finger on the screen and we displayed it on screen as a marker, today called the cursor. Sadly this very effective and precise method did not pan out because the user's arm tired too fast with constant use. Another attempt was to use a light pen. In terms of technology this pen with a photo diode in the tip was very expensive to implement because the position of the tip had to be found by means of a location grid. This visible grid was very distracting for the controllers and besides here too their arms fatigued too fast. Therefore at the time of the official acceptance of the system by our customer BfS in December of 1970 we were building the tracking ball into the work station surface, the same device that was being used in the US for flight control applications.

But now on to the mouse, our *Rollkugel*. In parallel to the BfS project, about from 1966 on we also worked on a graphical / alphanumeric display terminal based on the same technology as the display workstation SAP 300 and the display terminal SIG 3001 for the air traffic controllers. This smaller commercial display terminal had an off-the-shelf television picture tube with a screen diagonal of about 24 inches. We envisioned universities, colleges, and science labs as our target customer group.
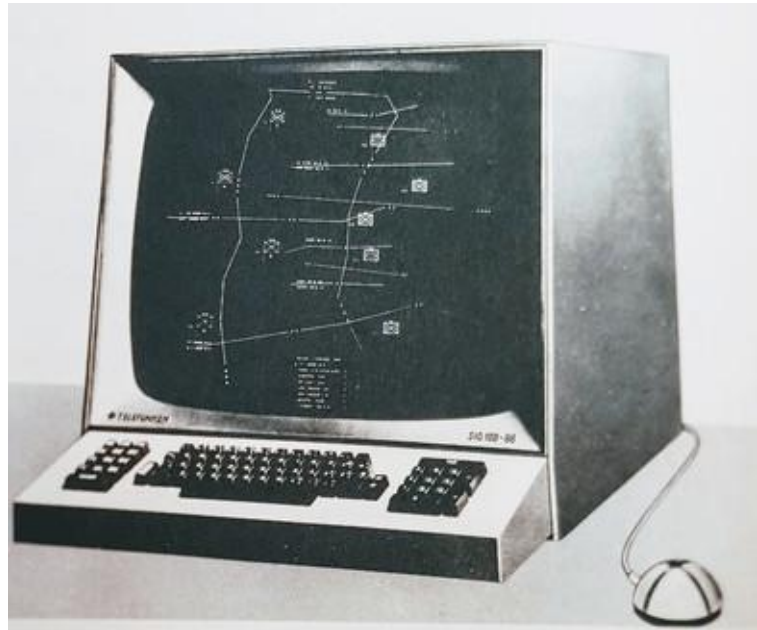
So it was only logical that the development of this display terminal included an improved man-machine interface in the form of a system for controlling the screen marker (cursor). At the time I was of the opinion that a trackball system was out of the question because it had to be built into the work surface, negating the flexibility of the work station, especially for use at universities. So it occurred to me to flip the trackball over and have the ball roll over the desk. That was the birth of our *Rollkugel* (rolling ball). It was around the end of 1966. We designed a *Rollkugel* housing with the ball mount and two 5-bit gray code resolvers. We needed these rotary encoders so we could interface the *Rollkugel* to our TR86 peripheral (front-end) computer. It also gave

us the option of connecting the *Rollkugel* to the computer over long teletype lines. This interface however worked at a data rate of only 50 baud, meaning 50 characters per second. To ensure jerk-free on-screen cursor movement our software specialist and mathematician Dr. Fuhrmann developed an algorithm for processing the encoder data. One quirk of the system was that moving the *Rollkugel* at high speed resulted in more than one full revolution of the encoders between data words which meant ambiguous code values. The computer had to recognize and correct that to keep the cursor from jumping on the screen.

Steinbach: Question: The ball did not have any big electronics inside, there were only the pulses?

Mallebrein: It had zero electronics inside. It only had the two Gray code encoders. You see that in the photo: There is nothing inside but the Gray code encoders.

Steinbach: OK, yes.

Mallebrein: With the retirement of the TR-440 computers and their successors TR 445 in the 1980s the *Rollkugel* was forgotten. It was only rediscovered in 2009 when the well-known German computer historian Dr. Ralf Bülow of the technical college in Kiel inspected old AEG-Telefunken files. Then the story was published in the trade journal 'CT'. [[See links https://www.heise.de/newsticker/meldung/Auf-den-Spuren-der-deutschen-Computermaus-216255.html and http://blog.hnf.de/wenn-die-maus-zweimal-klingelt/]] Dr. Bülow figured also out that the *Rollkugel* of AEG-Telefunken in Constance was publicly announced a good two months before the big mouse demonstration of the American mouse pioneer Douglas Engelbart, namely in a final development report for our government computer development subsidy written by one of my leading employees, Herr Dipl.-Ing. Günter Neubauer. I remember still that this final report was written many months after completion of the data display terminal SIG 100 and the *Rollkugel* RKS 100. That means our *Rollkugel* must have been completed as early as around the start of 1966.

Ever since the rediscovery of the mouse history by Dr. Bülow interest in the *Rollkugel* has been mounting considerably. On 12/10/2016 the Stuttgart university celebrated the 50-year anniversary of the German computer mouse, with Professor Dr. Gunzenhäuser and myself attending. Professor Dr. Gunzenhäuser had been one of the first users of the *Rollkugel* at the university and in the '60s and '70s he drove application software development. Unfortunately he has passed away in the meantime. The computer museum at the Stuttgart university still has an original original *Rollkugel*. Several trade publications and regular newspapers have shown an interest in this topic – and now the Computer History Museum in California too.

Steinbach: Did you apply for a patent on the *Rollkugel*?

Mallebrein: That's an especially tragic story. Yes, we did apply for a patent on the *Rollkugel* and it was denied. The patent office informed us that a system with two encoders which capture the movement of a ball was already known in a technical sense and therefore was not novel. And so they denied the application for reasons of "insufficient inventive content". Crazy. Looking back I have to say though that it was our own fault for not stressing the great usefulness of the man-machine interface. But you have to keep in mind that this happened a full 14 years before the appearance of the first Personal Computer of

the IBM company and that we therefore underestimated the importance of this medium for today's widespread general use. What a mistake!

Steinbach: How much did they charge for the mouse, or was it not priced out separately?

Mallebrein: The mouse was not very expensive. It may have cost 1500 Marks including the interface electronics. The mechanical setup consisted just of these two encoders from a French company, plus the housing and the ball, and then the interface electronics to mate it to the teletype interface. In the beginning we had some problems with the angle encoders (resolvers) because their contacts, which read out the code, oxidized, which led to contact errors and thus to code errors. I still remember well a phone call with this supplier company, trying to clear up this problem. And they solved the problem very quickly and after that it all worked well. Today the *Rollkugel* looks a bit clumsy and heavy but we did not see it that way back then*.*

At the time I was a member of the American SID association, SID stood for Society for Information Display. This society still exists, as I found on the Internet. I was a member for many years and attended several Meetings of the SID in Washington and other places where I could gather lots of information about modern display technology.

Steinbach: Yes.

Mallebrein: Now something more to the term *Rollkugel*, I need to get back to that. Here in Germany we were somewhat more relative to other countries when it came to coining terms for new devices. So the term "mouse" for an input device for air traffic control or other official entities would have been totally alien to us. Even for private use the term "mouse" would have been unsuitable. By now of course things are quite different. I heard and saw the term "mouse" applied to a modern man-machine interface device for the first time very much later, namely in the year 1984 at the Hanover Fair, at the booth of the Apple company with the Macintosh.

Steinbach: Could you briefly talk about what became of Telefunken and Telefunken's computer business?

Mallebrein: The TR440 was a very special machine in that it implemented many forward looking ideas. I too had the opportunity to add an important feature for stabilizing the reliability of data readout from core memory. This was the compensation of pulse disturbances coupling into the long read wires of the core memory. Even today you still find the method I used back then on many data cables in the form of the black "lump" in the cable. This lump contains a toroidal ferrite core through which the data or power cables are threaded. Its effect is that high frequency disturbances flowing on the ground wire are compensated by coupling them equally onto the data wires.

Why then did the ingenious TR440 not meet with more success? At about one mega instruction per second (MIPS) it kept up well with the IBM/370 with respect to computing power. And its operating and programming environment was only bested by the now widely popular Unix system. By the way, a PC of the early 1980s had a roughly comparable number of MIPS. An important reason for the low level of interest in the TR440 was that more and more customers demanded commercial standard software that had already found a market in the IBM world. But with our emphasis on the scientific market we were not set up the satisfy this demand. The small number of TR440 installations – less than 50 – did not allow that. The last mainframe computer system was delivered in the late 1970s. The last system was retired in 1989 in the data center of AEG-Telefunken in Konstanz.

AEG-Telefunken had to file for bankruptcy in 1982 because of the dire financial state in some important business segments like nuclear power plant construction, Olympia typewriters, the television division in Hanover, and not the least information technology in Constance. Then in 1985 we were acquired by Daimler-Benz. After that the company, which in good times had had about 160,000 employees, was restructured, some parts were sold, and in 1996 it was dissolved. A very sad story.

Steinbach: OK, yes, continue.

Mallebrein: The next project at AEG-Telefunken, after the large graphics display terminal SIG 100, was to develop a lower cost smaller data display unit for the desk of the programmer and also for commercial applications. So we rushed to design a purely alphanumeric display terminal SIG 50. This unit was meant to connect to our computers via the popular RS232 interface. The development went relatively fast and a first series of 100 units was produced. An outstanding innovation was the use of so-called crystal delay line memories for the video buffer because of their substantial cost advantage. These delay line memories were mass produced for use in TV sets and therefore very cheap. To explain I'll add that they were an important component for stabilizing the color reproduction in European PAL TV receivers. PAL (*Phase Alternate Line*) was a breakthrough invention by Mr. Bruch at Telefunken, allowing the compensation of NTSC's color instability. Our little joke back then was to say that the term NTSC stood for *Never The Same Color.*

In 1970 then we developed a touch input option for the SIG 50. We were prompted by some customers from the commercial sales space where these terminals were being used successfully. They expressed the wish to use a simple finger touch on an item number to call up the display of item details and price. Because of my experience with the air traffic control workstation for the BfS I knew right away how to solve this. We contacted a specialty glass supplier in Liechtenstein and learned that it was possible to apply transparent contact areas and conductors on a glass sheet. To recognize a finger touch on a contact patch we connected a relatively high-impedance voltage source of about 250 volts AC through a neon lamp so that the lamp lit up on a touch. With a photo sensor we sensed the light and sent it to the logic circuitry. That made up our invention of the touch input display screen. We applied for a patent for this system and it was granted.

Steinbach: (laughs) So directly conducting the current through the user.

Mallebrein: Exactly! (laughs)

Steinbach: (laughs) OK. Oh yes, why go complicated if simple does it too.

Mallebrein: Now we get to a new chapter: From 1973 to 1975 we had worked on planning and concept design of a completely new programmable intelligent display terminal. It was meant as the successor of the SIG 50. A real challenge. This device was supposed to be software adaptable to any of the data transmission protocols in use at the time. It was also to offer intelligent preprocessing functionality. In today's terms it was to be a forerunner of the freely programmable PC. For the logic components we planned to use the well-known 7400 series from Texas instruments. For the CPU we planned to use the 8008 from Intel. We had done preliminary analyses of the newly introduced processors and found this CPU to be well suited for our purposes. We were quite confident that we would have a terminal which would embody the functionality of all competing units. This was a fascinating project for me.

But then a bombshell hit. AEG-Telefunken's upper management decided to save costs and concentrate competence areas by moving us from Constance to Ulm. And with that all our plans were overthrown. Within a few short weeks one after another of my development engineers handed me their resignations because they did not want to move to Ulm, they preferred to look for other employers. And with that we had lost all of our development capabilities. That was a catastrophe for me. It was the end of the development of the SIG 52. In August 1975 my own workplace was transferred to Ulm. What made this an especially hard hit was the fact that we had just built a new house in mid-1974. So I rented a room in Ulm and lived there only Monday to Friday.

But this idea of the intelligent data terminal stuck with me even there and I succeeded to convince my new manager to continue the line of data display terminals. It wasn't easy but I managed to do it. However, I didn't have a development group anymore but had landed in distribution where I had taken

over a information technology department.   So I had the idea of looking for a suitable unit on the open market and reselling it. So then I did in-depth market research, especially in the the American market, and came up with a list of about 5 favorites. Around the middle of 1977 we visited these companies, had them explain their devices, and also settled the commercial questions. During the trip itself we found our preferred company and got in-depth information from them. That company was Ontel on Long Island. Ontel offered exactly the device which we had specified as the SIG 52. At the time Ontel was only a very small garage company. Their device was a freely programmable computer or data terminal, with the Intel 80085-A2 processor, 8kB, 16kB, or 32kB of semiconductor memory, and an 800kB diskette drive. They also offered an operating system called MDOS for the unit (not from Bill Gates) and an application programming language called OPL-1 (Ontel Programming Language 1). This desktop computer was way superior to all the other products that we learned about. Even back then it was really a fully formed PC. Later, about 1979, they introduced an interface to a CDC hard disk drive with a 5MB removable disk. Up to 10 desktops could connect to one disk drive, allowing it to manage the data of multiple work stations. I was enthusiastic about it from the first minute. The company's president Mr. David Ophir was a genius and is still today a good friend of mine. The Ontel company was a subsidiary of Caesars World and after the close of the technical and commercial negotiations AEG-Telefunken invested in the company too. David Ophir set up talks with Bill Gates about acquiring the Microsoft DOS operating system but that did not come to pass.

Using this OP-1 system, which we at AEG-Telefunken called *Telecomp 52*, we developed together with some software companies around 1980 a deployment management system for the Bavarian Red Cross in the city of Munich. This system centrally managed all hospital beds in the whole city. And with that setup we wrote history in the field of multi-user desktop computer systems. Beside this deployment management system there were also systems for notaries and law offices and especially inventory control systems. Many Telecomp 52 units were used as workstation terminals on the TR440. We sold over 1200 *Telecomp 52* systems.

Steinbach: Question: Was that for the German market or internationally?

Mallebrein: For us it was only the German market. But of course there were many other Ontel contract partners operating all over the world. The Ontel customers came together multiple times for meetings in the USA.

Steinbach: OK.

Mallebrein: So far the *Telecomp 52* business went nicely. But in August 1981 IBM entered the market with the first 'Personal Computer' for a very low price relative to our offerings. This IBM PC cost about 8,500 Marks complete with a 5MB hard disk and a floppy drive while our *Telecomp 52* in that config-uration cost almost four times as much. A catastrophe! Our order flow dried up very quickly and the business became unprofitable. Ontel too was hit hard, as time went on they had to file for bankruptcy and were sold. Another tragic ending. In 1983 then I left the Ulm site of AEG-Telefunken and was hired into the new communications technology business unit in Constance.

Here they had grandiose plans with a product called Synfobase and with in-house networks, in both cases tied to the dawning of the PC era.   Synfobase was slated to be a self-contained associative database management system with its own hard dirk drive for connection to a PC. I however was of the opinion that there was not suffucient future in this system because surely within a short time span equivalent database software for the PC itself would appear. All in all I did not get along well with the new and largely inexperienced management team in Constance. There were too many fundamental differences of opinion. This led to my having to leave the company in 1984, after 30 years of successful work, promotion to managing engineer, with many patents and many successes behind me.

So then I went to a small regional company by the name of Hengstler in Aldingen, close enough that I could just drive there every day by car. Hengstler was world renowned for their electro-mechanical counters. With these counters they had started to implement personnel time tracking for smaller companies and had great success with that. Based on this product line they had evolved into electronic time tracking systems. I took over a department linked to sales and distribution and a project called MINFOS 380 with a process computer and accounting terminals for time tracking. However, that model was being phased out. Later we replaced the process computer with a PC since that had become more powerful in the meantime. In this project I cooperated with an external software vendor. The system was called IPEV (the German acronym for *I*ntegrated *P*ersonnel time *T*racking and *M*anagement.)

This project at Hengstler was quite successful but it clashed with a new and very resource-hungry project of the research and development department which again was based on a dedicated process computer. And again there were heated discussions with the development department because they disparaged the PC solution. The software concepts were incompatible as well. Finally I left the company in 1994 after ten years there and went into early retirement. A short while later Hengstler sold the time tracking division to another company. IPEV was continued successfully. That made me personally very glad and proud.

Steinbach: And how do you keep busy in retirement?

Mallebrein: Oh, I don't know. No different from many other retirees, I guess, I'm still active. I don't sit still when it comes to computer technology. I want to keep myself fully informed in that regard, fully up to date. Most of the PC and related technology I learned only in retirement. This here is my new workplace, with this laptop plus my Samsung S7 smartphone. And otherwise I have to say the days pass faster than I'd like.

Steinbach: (laughs) Yes, I guess I have noticed that too. Not long ago an acquaintance said now that he is retired he wonders how he used to find time for a regular job.

Mallebrein: (laughs) Yes, that... yes, exactly. I can't really imagine that anymore. I have not ever been bored, not a moment. Today e.g. I checked out the new smartphone S9 at a local electronics retailer.

Steinbach: I meant to ask you, in conclusion, do you have some advice you'd like to give to future engineers?

Mallebrein: Advice, yes, yes. What is a future engineer? He is a young person with a suitable education and, most importantly of course, with an interest in technology. This interest can be encouraged by parents or others if in daily life you keep pointing out interesting objects to the children and thereby stimulate their interest. And when they grow a bit older and you show them e.g. an old steel bridge over a river and ask them, "why does this look like it does, what is the purpose of the many cross braces, and how does this all hold together?" There are so many interesting objects all around us, you just have to recognize them and think about them. Only with this kind of background will you enjoy technical education and will you scale the sometimes difficult cliffs of e.g. higher mathematics. Certainly a predisposition toward technology plays a major role too. And that you'll want to start developing in early childhood with stimulating construction kits and later also with electronic toys. My grandsons started very early in that direction, guided by their father and grandfather. Today one of them is studying electrical engineering and the other mechanical engineering at the Munich University. Both can look forward to an interesting future. Our son Georg too let himself be infected by his father's professional interests and built many projects in his early youth. He studied at the Stuttgart university and earned his Diplom-Ingenieur degree with good grades. He has worked for many years in important positions at the Bosch company in

Stuttgart. These days he works in their research department on the impending transition to electrical transportation. On the side he teaches 'Motronics' at the technical college in Esslingen.

I would like to add another thing from my own experience. Should there be a dip in interest or problems of learning and absorption on the path of the engineering education, the prescription is to absolve a prolonged period of practical training. Practical training will convey an internal connection with technology and will build up the motivation to move on and up.

Steinbach: OK, Thank you very much, again thank you for the interview.

Mallebrein: You are very welcome. It's fun for me and I'm eager to see how it will go over in the USA.

END OF THE INTERVIEW