

### **1973 Harwell – Disillusion – The End of an Era.**

“Midway in life’s allotted span  
I found myself in a dark wood,  
Where the straight path I sought in vain.”

Dante Alighieri

I suppose that I must consider this to be the time of my midlife crisis! However, what happened here was not of my making. It seemed to me that the ‘Grand Illusion’ had gone – the childlike awe with which I held the perfect world of science was dead. The excitement and pioneering spirit of my early years at Harwell had evaporated, all the good men had departed, and we were left in an administrative nightmare.

It is interesting that this fate was predicted by a friend who worked at the Radio Research Establishment, in Slough I think! That was founded in the early part of the 20<sup>th</sup> century, and in his opinion was long dead!

#### **A new task**

Early in 1973, I was transferred to another department. It is interesting that I cannot remember the name of the group; it obviously made so little impression on me! I was not very happy about the move, but had no choice. I was working for Dr. Adams, someone to whom I took an instant dislike! He was a creepy sort of individual, and an alleged homosexual.

The work concerned the new, and not yet built, Prototype Fast Reactor (PFR). We went to Risley, the engineering department of the UKAEA, to find out what they required. They wanted an ultrasonic scanner to work inside the reactor vessel, to monitor the access to the fuel channels. As the piezo-electric crystals which are normally used, would not survive in that harsh environment, they were looking for a new material to take its place. Our job would be to find and test a new suitable crystal.

#### **PFR**

The Prototype Fast Reactor was a fast breeder reactor using MOX fuel, and cooled with liquid metal. Its designed output would be 250 MW (e) It was heralded as the ‘System of the next Century’, the future of nuclear power stations.

MOX fuel is a mixture of Plutonium and Uranium oxides. The coolant an alloy of Sodium and Potassium, pumped using an electromagnetic system.

In order to access the fuel channels, the top of the reactor vessel, would normally have one hole for each channel. However the engineers had decided to be clever, and have a limited number of holes, and to rotate the top plate to align the hole with the channel. I am not sure of the reason for this

design, but to me it seemed much easier to seal a number of small holes, than to go to the complexity of a seal for a rotating top plate! When I heard this, I think I laughed and said that it seemed like a crazy idea. I don't think that the engineers even noticed my amusement, all they were concerned about, was to have a picture of the inside the vessel, so they could see that there was no obstruction, before they rotated the top plate.

Back at Harwell, I pondered on this problem. I thought that the whole idea was, not only crazy, but could also be dangerous. I also did not get on with Dr. Adams. In the short time that we were together, I soon found out that we just did not seem to be on the same wavelength, and his superior attitude really annoyed me. After reflection, I decided that I did not want to be involved in that work. However, I was not sure how to proceed.

### **The Way Out**

I was just wondering if I could find another position at Harwell, when I was fortunate to hear the news, that the administration was offering early retirement terms. It seemed that with the reduction of nuclear work, Harwell was overstaffed, and they wanted to get rid of people. I made an appointment, and went to see the man who was supervising this offer. He was very polite, and after taking some details, he confirmed that I was eligible for these terms.

This was, I suppose 'Premature Retirement'. I was offered a lump sum of 1 ½ years salary, and a pension based on final salary, and the number of years of service. After confirming that my service included the time when I worked for the Ministry of Supply (before the UKAEA took over), and also my time on National Service, I was quite happy. The only down side was that the pension would be fixed at that level, until I was 55 years old. However, it would receive nominal increases each year, in line with the Retail Prices Index, and would catch up at the age of 55. I was quite surprised that it all seemed so easy.

He prepared a written statement of the offer, and told me that I would have time to consider whether to accept. I thought that it was a very generous offer, but could not accept without first discussing the matter with Alison.

Aly and I spent the whole of the next day talking about the offer, and the various options which lay before me. I was quite keen to spend some time working for myself. I had a few ideas of what I would do, and if it did not work out, I would find another job in the computer field, which was a rapidly expanding option. It was a lovely spring day, so we went for a walk. I remember sitting on a log in Fence wood, in brilliant sunshine, discussing our future. We eventually decided to give it a go, and accept the offer.

The next day I went back to the 'admin' office and accepted the offer. What happened next rather surprised me. I had expected to leave immediately, but I was given the choice of when to leave, as long as it was within the next year. Without much thought, I chose my next birthday, in October 1973. I was pleased that I still got the annual salary increment on my birthday! An added bonus.

It is interesting that the early retirement option turned out to be so popular, that they had to take on extra administration staff to cope with the demand.

I now had to find a job for the next six months. I was surprised to find that there were a number of short term options. I chose to work for Peter Goggin, who was wanting some help on data recording, a field in which I had a lot of experience.

### **Materials Testing Laboratory**

Peter was still working on carbon fibres and composites, and was now responsible for several testing machines. The largest had a capacity of 100 tonnes! When a sample fractures, it was required to record in detail what happened. As this occurs in a very short period of time, it was necessary to have a fast data recorder. It was my brief to record the digital data from the machine, so that it could be read out at a lower rate for analysis.

In the early 1970's Texas Instruments had introduced a range of TTL (transistor-transistor-logic) chips. This ranged from simple logic gates, to complex functions. I was aware of this, but had not looked into it in any detail. It included some RAM (random-access-memory) chips, and also a range of data shift registers, which could be used for data storage. This was all very fast logic, which was very suitable for the purpose. However, when I looked into the cost of the memory, I found it to be extremely expensive. I made a survey of all the memory chips I could find, and was horrified at the cost. One of the cheapest was a SSR (Static Shift Register) with 1 Kb of memory. It was not Texas, but it was compatible with TTL logic. I decided to use this memory. Several chips (as many as required) could be formed into a loop, and the data fed into the loop. The data would then circulate round the loop, with fresh data being fed in continuously, until a trigger from the machine told it to stop. The data could then be read out at a suitable low speed.

It took me some time to get up to speed with the TTL logic. However, it all seemed to be very simple, once I had learnt the rules. I obtained a number of TTL 74 series chips from our stores, but I had to put in a special order for the SSR memory chips. With a 5 volt power supply, and a 'breadboard', I was soon testing and getting familiar with the logic. (N.B. a 'breadboard' is a mounting and connection system, which is used as a test vehicle.)

I am now finding it difficult to remember all that happened. However, I did produce a very basic system, that demonstrated the principle involved, before it was my time to leave Harwell.

[ The experience that I gained at that time was invaluable, when at a later date, I joined a company called Gresham Lion, whose products were largely based on TTL logic.]

On my last day at Harwell, I invited the few friends that I had left, to the social club for a farewell drink. Of course this included John Simmons. When this was over, I gave John a lift back to building 393. As we said goodbye, John seemed very concerned about my future, and wished me luck, in my new venture. Although we had worked together for over twenty years, we never met again, or had any contact.

[ The PFR reactor first became critical in 1974. However, with delays, leaks, and reliability problems, it did not reach its design output until 1985. It was closed down in 1994. No more reactors of this design were built. ]



*Not to be read  
or opened*