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AN ORAL HISTORY OF BRITISH SCIENCE

Professor Maurice Wilkes

Interviewed by Thomas Lean

C1379/21

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Track 1

Okay.

Good. This is an interview with Professor Maurice Wilkes on June 2nd, 2010. Maurice, I was wondering if we could start with some questions about your PHD. How did you actually choose your PHD topic?

Oh, oh, well that was easy because I had a – a lifelong interest in radio, radio transmitting and that led me naturally to an interest in the earth's … the ionosphere, and there was a very flourishing ionosphere group in the Cavendish laboratory. And so I made a beeline to that, at least I didn't make a beeline, I went via the mathematical tripos, which may sound odd, I had no intention of being a professional mathematician, I wasn't good enough at mathematics for one thing. And so I … but I – mathematical tripos was still, at that time I think you could say, one of the recognised ways into the Cavendish. In Rutherford's time it had been a very important way in, less important then but it was a way into the Cavendish.

Was your PHD topic connected to any particular problem or application?

Er, er, oh, yes. My supervisor, a man about seven years older than I was although I – I regarded him as a … anyway he – he was restarting or starting a modern programme of research on very long radio waves. I mean early … early research tended to be on long waves and he thought it had fallen out of fashion because of the excitement of shortwave and he thought it might be nice to go back. And he went back a very long way because the station I worked on was a radio, was, in the Post Office days at Rugby CBR on 16 kilocycles. Well, now you could – a young man could just hear that.

Sorry, just hear that?

Just hear … his ears were supposed to be acute at a high frequency response.

Oh, right. Oh, so you could actually hear the radio waves you were working with?

Just, or at least we thought we could.

Oh. Was that actually beneficial to your work or …?

I don't think so.

Was there any particular intended application for this work in the end, such as some longwave radio communications or something of that nature perhaps?

No, no, we … er, we … I think we would have said we were … our aim was to use a study of reflected radio waves to investigate the constitution of the upper atmosphere, and as it happened I – I was one of the first people to do that quite specifically because I – I discovered that a set of measurements were plotted as a straight line and the angle of the line measured, that gave you an estimate of temperature, so I was one of the first people to actually go into this thing, I'm going to investigate the atmosphere, and coming out with an estimate of the temperature in the lower part of the ionosphere.

Oh, right. You mentioned your supervisor a moment ago, was this Ratcliffe?

Ratcliffe, yes, oh yes.

How was he as a supervisor?

Excellent.

What made him a good supervisor for you?

… Enthusiasm and he was a working supervisor, I mean he was young enough to still be doing active research and so he and … we all joined in together. He … we had a small group of three or four people and he worked, and we worked, and we all worked harder.

I think you mentioned this small group of people in your memoirs, is this JE Best, FT Farmer and HG Brooker, or Booker, sorry?

That's right.

And you were all students under Ratcliffe?

Er, no, let me see, must be careful. Best was a student, Farmer was a student, PHD students with an engineering background rather than a physics background. I was a … a physicist with a – a mathematical background though I … though I work … did in fact … under Ratcliffe I worked, I did the experimental work.

Did you all work together or did you all have individual parts of a project you were working on?

Oh, we had individual parts of a project.

Was there any competition between the research students there?

I don't know. Oh … cooperation I would have said, that I was taught oh very definitely that scientific research was a cooperative human activity.

Do you remember how you were actually taught that particular aspect of scientific work, that it was a cooperative activity?

I – I had to observe it in action.

[06:30]

You mentioned as well in your memoirs that there were weekly colloquia in Ratcliffe's room.

That's right, yes.

What actually happened in these meetings?

Oh, well, the – the basic thing would be someone would report on a paper that had appeared in the literature, a small literature but nevertheless a literature, but sometimes we'd have a speaker perhaps from another group, and sometimes we'd just have discussion.

What was the atmosphere like at these meetings? Did you all get on well together or …?

Oh, yes.

What did social life consist of as a graduate student in this period?

Well, I was – it depended on your college. I was a bit fortunate in that I was a member of St John's and still am, I'm a fellow of the college now, I wasn't then, I wasn't a fellow and … I'm sorry, what was your question?

I'm just wondering what social life consisted of for you as a graduate student.

Oh, I see. Er, well … camaraderie of laboratory work.

So you spent a lot of time in the laboratory in this period?

Oh, yes.

Could you describe your laboratory to me?

Well, there was Mon Repop, which was a wooden hut with a … with a name Mon Repop, m-o-n r-e-p-o-p, and it was – there was said to have been at one time a dog, a toy dog attached. Anyway, it was a small hut with – which quite a lot was screened off for a very, very dark room. And then we – then we had a great occasion - a brick hut which would be more – these wooden huts in the winter, it was a pretty austere kind of life. Er, there's a picture, a famous picture of J Ratcliffe talking to Rutherford, do you know it?

I don't think I've seen it, no. Is it in the memoirs or …?

I think it may – oh, my memoirs, you have them?

Yes.

Shall I just …?

Certainly, thank you.

I can see whether [reading document]. They don't seem to be here. Anyway, it's a picture of Rutherford, his hand akimbo on his shoulder – on his, you know what I mean. And he – he – Ratcliffe told me afterwards it was the actual occasion on which Ruth – which Ratcliffe, who had applied to the general board of the faculties which doled out the money for a non-recurrent grant to build a brick hut to upgrade our facilities, but that didn't really come into serious action since I – until I finished.

[10:45]

So, lots of long nights spent in the wooden hut then rather than the brick one.

Yes. Well, my, my – you see we had to, we couldn't do radio work in the Cavendish because of radio noise, so we had to go out into somewhere in the country and this was on the old, what we called the old rifle range on Grange Road. The Shorts factory was built there during the war and mine was the most remote one 'cause I was working on these very long waves and you've got to walk a long distance to get a field free area to work in.

Did you have much to do with the rest of the Cavendish laboratory in your time there or was it …?

Not – not too much unfortunately. We – we … we had some accommodation in the lab but we spent most of the time in the – in the huts.

What sort of equipment did you have in the huts?

Well, it was all interesting because [coughs] you would have said that radio technology, which had been a purely communication technology, was becoming a physical technology for making precise measurements or making measurements. And so we had a … we had a … well, typically I suppose an oscilloscope for measuring, rather crude measuring facilities and that sort of thing.

I enjoyed your description of, was it Mr Lincoln the Cavendish storekeeper?

[Laughs]. Oh, yes, yes, yes.

… through your memoirs.

Yes, yes.

So he basically restricted the components supplied to …

Oh, he did, yes, oh yes. Er, Ratcliffe was – Ratcliffe, I think, had him suitably under control but not all supervisors did.

So Ratcliffe had a looser relationship with him than other people then so he could get components out of him?

Well, Ratcliffe used to be – I mean, make people do what he told them.

[13:30]

What was your impression of Ratcliffe as a person?

Oh, I – I liked him very much, very much. Mind you, he wasn't much different in years from me, although I didn't realise that at the time.

No?

Seven years I think it was, something like that.

I was wondering as well, talking about Mr Lincoln and the components supply …

Well [laughs] we didn't get much from Mr Lincoln. Er, we – we could go and buy – if you wanted an odd potentiometer you could go to Bailey, Garner & Barrett's, which was a radio shop in … off at the Grayson Meadows [ph] and you could buy one and put it down to the lab. But on the whole they were pretty hard times, all times have been hard times as far as supply of equipment for research is concerned. There'd been an early gift of some, long before my time, of radio receivers from the – the Radio Research Board, and we had a pulse transmitter for shortwave work. But longwave work was done … we had a van which – which you could measure field strength or relative field strength and you … this was attached to the back of Ratcliffe's car and drawn out along the ground on one of these very long waves, 16 kilometres in frequency. It didn't move much during

the day and you could take a car and drive car some 60 or 70 miles or more and plot out the interference pattern on the ground.

[15:50]

You were a member of the Radio Society at Cambridge as well, I understand.

Oh, there was. It was run by JB Lewis who later became a great UK head of a lab at Chalk River. I think I got it … I got his position slightly wrong, but anyway, he went into atomic energy, after the war of course.

So you knew JB Lewis before the war as well then?

What?

You knew JB Lewis before the war?

Oh, yes, he was a fellow at Caius. He was about Ratcliffe's generation but he – he was a fellow of Caius.

What sort of person was he?

Well, he was an ama … he was an amateur soldier, a territorial soldier, and that was how some of the equipment … 'cause he'd work with [inaud] so he was a slight … slightly, I would have said, soldier, but not exaggeratedly so.

Were there any other …? So, sorry, just so I've got this straight in my head, some of the radio society equipment came from the military then?

It was at Cavendish, from the government actually. The channel would be through the Radio Research Board which was an organ of the Department of Scientific and Industrial Research, which was a direct predecessor of the SRC, Science Research Council.

Oh, right, so that's the Lewis connection?

Yes.

Right. Could you tell me a little more about the wireless society at Cambridge?

Wireless society?

Yeah.

Well, they used to meet after the – like other university societies it met after dinner on Thursday evening or something and we had lectures, often from people in industry. I remember there was much interest in cathode ray tubes for television which was in its infancy.

So did you also visit any industry facilities?

Oh, indeed yes, I remember going to GEC at Wembley. The society arranged these visits.

What about GEC at Wembley stuck in your mind?

Oh, yes, and he's still alive, I saw him the other day, a white haired man now. I think you'll find he's somewhere [inaud] otherwise I'm not sure. You see when I say my memory's … like with some of these things that I'm hesitating over, I wouldn't have hesitated some years ago.

Was there anything specific about GEC that you remember or impressed you at the time?

Well … there wasn't so much electronics research or radio research but some of the Bell Telephone Labs in United States and also GEC at Wembley but it was Anglo, Anglo-American, it didn't extend to the continent of Europe.

As well as the technical aspect of radio, in the wireless society did you ever talk about its wider social significance and things it could be used for?

I don't remember doing so but you know what young men are like, they talk about everything.

[20:20]

Yes. 1930s Cambridge is sometimes seen as a hotbed of pacifism if you read some books, I was wondering at the time if you thought of science as being something peaceful in nature or otherwise.

Oh, yes very. You see I – I grew up between the two wars, I … my memoir starts when I was five when the First World War came to an end and then I just had a nice time to get my degree, do my PHD, and get my foot on the academic ladder. I was an assistant lecturer, they called it, now they would call them university – university demonstrators. And then the war came and I got swept into radar.

How did you actually come to be involved with radar work?

Oh, well, it was Ratcliffe and Cock – and Ratcliffe … I'm sorry, I've got … cancel that, it was Cockcroft and Watson-Watt who wrote to the Air Ministry. They got together and organised a scheme for a nearly a hundred people, mostly from the Cavendish, like old boys of the Cavendish and some others. These … we were to go and work on a, still peace time of course, go and work on a radar – radar station, called RDF stations, go and work on RDF stations to get some experience that would be useful if war came. Well, it

was when that was sort of five weeks, I think it was on a six – six weeks' residence and I was in charge of a group of people, much like myself, in Canterbury. That was fine, we reported for duty, for training, within a day or two of the war breaking out, so what was supposed to have been six years' training turned into … oh, no, four or five years' training turned into six years' war. And it was very nice because the great thing about war, you can spend a lot of time worrying what you ought to do, what your duty is and whatnot; if you quite early find someone who'll tell you what to go and do, it's a great relief.

You were actually one of the earliest civilian scientists recruited into radar work weren't you?

I did what?

[23:50]

Were you one of the earlier civilian scientists recruited into radar work?

Oh, no, no, no, there was, there was a whole – there was an establishment at Bawdsey on the east coast which turned in – which turned eventually into TRE and hence into other things, it was all other things.

I was interested in the fact that you were involved in several of the research establishments in the Second World War.

Yes, oh I – I had – I was very fortunate that I had got a lot of – got a lot of very useful experience.

So you were at … just so I've got this straight in my mind, the Air Defence Experimental Establishment, the Coastal and Anti-aircraft Defence Experimental Establishment –

That's right.

– and TRE, that's …

Yes, er, yes. The only thing I didn't – there was another one called the Signals Research and Development Establishment or Signals – Signals Research Establishment, it changed its name. I never – I was never – I knew the people but I never belonged to it.

Did you notice any difference between the different establishments you were at?

Oh, yes.

Could you characterise some of them for me please?

TRE was questionably the best.

What made it the best?

I think it – it had a – a civil servant, a very able civil servant, who wasn't a technical man at all but he was very able as a chief, as a superintendent, later a chief superintendent, and then he – he had Lewis who was a Cavendish man, one of the Cavendish … one of the Cavendish youngest lecturers who I was working for, and this man, Rowe, was sensible enough to make – he perceived Lewis' technical value and made him his deputy, and this meant he – he had to do it over the heads of his existing staff, which was a bold and very right thing to do because Lewis was a remarkable man. And so from quite early he became in a key position for decision – technical discussion making. Rowe of course did the ministry's decision making in that establishment at TRE.

And this is WB Lewis again?

What?

This is WB Lewis again?

Yes.

Oh, right.

That's right.

When you say he was a remarkable man …?

Lewis?

Yes.

Oh, able, he was able. He was very, very, very good technically but he was also very able.

Are there any other people you'd single out for praise at TRE?

[27:30]

Well, of course we all joined up in some form of other, I went to ADEE which I wanted to go to TRE but it turned out that the army was not – it was not as good a place and eventually – what happened now? Er, some … the – the government was putting pressure on TRE to – or on the civilian scientific services to make people available to go and work on atomic energy, and they finally got away with give – sending – giving one person, and I indirectly was that one person, because it made an opportunity for me to say – I meant TR – if TRE were going to give someone up, TRE needs someone in exchange and I was the person in exchange for it, and I said that I'd be very happy if I could be transferred across ministerial boundaries not just attached, and they – they agreed, they

were happy to agree to that. And as it was what I really always wanted I was happy too, and so that was how I came to spend the latter part of my war service at TRE, which was then called TRE.

What did you …? What was your actual role at TRE when you first joined?

Oh, finding my feet and heels. When you go and join a big establishment you, you kick your heels for a bit, and then I finally ended up in Ratcliffe's division which was what we called the Post-Design Services, that is to say it helped – it helped … it intended to help squadrons with new equipment, new radar equipment, particularly airborne radar, help and get it going.

So would you visit squadrons yourself?

I would but I was just [inaud] slightly, it was mostly people reporting to me who did that but I did, I did visit them myself, yes.

How did you get on with RAF personnel on these visits?

Oh, very well, very well indeed. They were very cooperative, very appreciative of what we could do for them, which was quite a lot.

Were these visits for specific technical problems or just checking up on how they were getting on?

Both.

Are there any you remember in particular?

Hmm?

Are there any of these visits you remember in particular?

Not really. Ventnor was remarkable, you haven't been there I suppose?

No.

It, it's a mountain, about 600 feet or something like that on the flat surface of the Isle of Wight. But there was – oh, yes, what we were … what I was concerned with doing was bringing exper – bringing centimetric radar, ground radar or – or … and airborne into service use. That's like giving the ser – the squadrons and the groups the reports they needed – sorry, the support, the technical support mainly but not only. I mean I used to say it was like South Sea islanders who went along with a handful of pretty coloured resistors, remember they were colour coded in those days, and it was wonderful. You were very – always welcome.

And that's how you won over the RAF personnel?

Yeah. Well, it was – they were always … oh, there was no, there was no conflict, absolutely no conflict and we – we got on very well together.

[32:20]

I understand you also attended the Sunday Soviets at TRE?

Yes, sometimes, when it was anything that, for my - that I was concerned with.

Could you describe what would happen at one of these meetings please?

Rowe would take the chair, it was – it was Sunday, and the reason it was Sunday was that the establishment worked – had Saturday off, we had one day a week off and that was Saturday, and we worked on Sunday and that was for the convenience of senior RAF

officers in London who liked to come to Malvern for the weekend or one day a week perhaps, sometimes, and Sundays suited them very well. It also meant that the workshop staff, the industrial staff, got paid overtime for one day a week.

Who did most of the talking at these meetings?

Oh, general, the senior RAF – the senior TRE people and the visitors. And they – they were – there was a lot of exchange of important secret information.

What sort of secret information?

Oh, operational.

Were there any problems of communication between –

No.

– the military and systems?

No, the RAF was a very technical force, excell - a lot of excellent people.

Are there any Sunday Soviets in particular you remember?

No.

When you had these meetings with the RAF was it you taking them solutions to problems or were they bringing you problems to solve?

Oh, they were mostly discussions. And, er, you had to do it both ways, I mean the RAF had their problems but on the other hand the scientists could see problems that hadn't yet

loomed large in the RAF's eyes and so we steered the – steered the future activity in those directions.

So the scientists were pointing out problems that hadn't even arisen yet then?

Oh, yes. And, yes, I mean in fact providing a lot of the leadership … I'm sorry, I don't like to say a problem was there, they're not problems in … they were discussions about the tactical and to some extent the strategical position and how radar might be used to make things go more smoothly, bit more – and faster.

What influence did these meetings have on the work that you were doing in particular?

Well, I – I mean we – we were – I was at the TRE half of this, these meetings. We – we provided information, made – had quite an important effect on the way radar developed in the service.

[36:40]

Tell me a little bit more about what it's like working at TRE in this period. I was wondering what the social life was like, if you had time for any that is?

At TRE?

Hmmm.

Er, well, I was – being able to live in the RAF officers' mess, which was in one of the requisitioned hotels, and that was very comfortable, at least by wartime standards.

Did you have time for any entertainment outside work?

Oh, yes, there was a very good theatre in Bournemouth.

Any other clubs and societies on site or…?

Well, there was a cinema society, we had only one projector, so – but we did occasionally rent a Walt Disney.

Was it a busy place to be working?

Yes.

What was a working day like, and what time would you start?

Long.

Hmmm. What sort of activities would fill up a working day?

Meetings.

Meetings that you were calling or meetings that were being called by somebody higher up that you had to take part of?

[Laughs] Meetings seem to grow, they have a spontaneous existence.

[Laughs] Did you actually have much control over the work that you were doing there, or was it all being directed from further up?

Oh, oh yes, I mean I – yes, oh, certainly, yes.

So was there a lot of freedom in what you were doing?

Well, it didn't – you didn't look at it that way, you weren't – that's a sort of civilian idea. In – in the services you get on with the job but that means you were expected to … how to put it? You were expected to do your best but it – there was no question it was for the benefit of the RAF.

Were there RAF personnel on-site working with you?

Yes. The TRE was a civilian establishment, it had a civilian head, but also some small number, a relatively small number, of attached RAF personnel.

How did you all get on together?

Oh, like a house on fire, very – we were very, very much enthuse – very great enthusiasm for winning the war, which was seen to be necessary.

Yes. I was interested that in your memoirs you mention unresolved ethical problems when you were working on Oboe.

Oboe?

Yeah, I …

Oh, well, say it again.

In your memoirs you mention unresolved ethical problems –

I see.

– in regard to –

Well, I mean there was always a – one was more comfortable about defence rather than offence but it's an artificial distinction.

How did you …?

But – and of course Oboe was very definitely a – an attacking system … and I mean it was one extreme of the work, whereas the Chain stations – stations, the ground stations had been at the other end of the spectrum.

How did you feel about the way that science became a weapon in the Second World War?

Oh, it seemed a good idea.

Do you remember your opinions on science changing at all in this period?

No, I've not … not really.

[42:05]

I think when we – when I came in and we were chatting before, you mentioned a few things about Alec Reeves …

Yes.

Your head on Oboe.

Yes.

I was just wondering if you'd mind telling a little bit more about him for the tape.

Oh, we were talking this afternoon you mean?

Yes.

Well, a dour sort of chap but he – oh, yes, he was one of the communication types whereas I was one of the scientific types, and the scientific types rather overwhelmed people like Reeves, he never – never, never really got happy whereas everyone else, people I was concerned with, were very happy to be in a scientific establishment. He still thought of himself as an old fashioned engineer.

An old fashioned engineer as opposed to what?

A scientist.

Is that how you thought of yourself at this time?

I thought of myself as a scientist. I mean I was … well, don't make too much of this.

I'm aware that there were a lot of interesting people you've crossed paths with at TRE, were there any in particular who had an influence on you?

… No, I – I feel somehow that doesn't seem to … I can't think of anything to say about that.

Okay. I was struck, reading the memoirs again, that you were involved with a great many different systems –

Yes.

– over the course of your career –

Yes.

– in war time electronics. Were there any you found particularly interesting to work on?

[Pause] Well, I don't know, I suppose the – the airborne stuff towards the end of the war, Coastal Command. By the way, someone … I've been – I've often been asked to give interviews on things and … someone wants to come and talk to me about Coastal Command I don't know what he wants to say. I've never – I've never had that before.

No?

That particular one. But it was – it was very important at the end of the war, things like H2S, ASV and so on.

What about those particular problems appealed to you, or the particular systems appealed to you, sorry?

What about them …?

Yes. Was there anything about working on those particular Coastal Command systems that appealed to you?

Well, they were effective, they really worked. You see the chain stations – the chain only just worked, you know, for us, if for some – or some – anyway, they only just – they were only just – the supervisor radios were only just good enough, whereas the Coastal Command stuff where you get it up into the sky, they – they worked really well.

So the effective systems were the more enjoyable ones to work on?

Of course, yes.

[46:30]

What impact do you think that your wartime work on electronics had for the rest of your career?

Oh, it's all experience. I – I didn't go into radar to learn electronics, I went into radar because I knew about electronics, and a lot of other people of course went in with no knowledge of electronics, physicists and people, and learned a great deal. I learned a great deal too but I didn't go in carrying nothing.

Were there any particular skills you think you improved in this period or…?

[Pause] [Laughs] It reminds me of … when I used to visit as I did once a – once a –once a month, Coastal Command headquarters, I used to go and see a squadron leader who was my opposite number, our – our radar liaison, and he had a chalkboard in his office and he – he was – I – I suppose he was not a scientist, although he may have been, but anyway he was a liberal minded person. How's your Latin?

Non-existent.

Oh, well, what was written on the chalkboard was *Excreta Tauri*, *Excreta* that's 'shit', *tauri* 'bull,' 'of a bull' *Excreta Tauri Semper*, 'always', *Vincentes,* 'wins'.

[Laughs] He was an interesting chap to be working with.

Yeah, oh certainly.

[Laughs] Did you enjoy working with Coastal Command?

Yes, oh yes.

What about it in particular did you enjoy?

Well, I was always interested in operations, research I – I didn't particularly want to do research in wartime but I wanted to help with operations, military operations, warlike.

Right. So actually putting the science to some real world use then?

That's right.

Right. Did working in this way change your expectations after the war about what science could do?

I – I … what makes you think my views changed?

I – I just wonder –

Yeah.

[49:50]

Just sort of talk about doing – what sounds like in the start when we were talking about your early research at the Cavendish, it sounded like it was very much connected with …

Oh, it was peacetime and I was anxious to get back to peacetime, peacetime which to me was research. And of course computers were coming along then and, you know, that story I do tell in my memoirs in some detail.

Yeah.

Visit to Philadelphia and so on, visit to, yes, Philadelphia.

One final question before we move away from the war, I was wondering if you gained any useful connections as well, out of your wartime work.

Oh, yes, a lot of people, oh yes, of course. And when the wartime groups broke up some of the members drifted into the computer lab at Cambridge, or came to the computer lab at Cambridge. For example, Eric Mutch for many years was my number one … but I don't know what we've talked about, it doesn't leave anything else to talk about does it?

On the war? No, I think … I think there are just one or two more questions I'd like to ask if I could?

Yes.

Not about the wartime but about –

It was a bit noisy in places.

I'm sorry?

It was a bit noisy in places.

[Laughs] Were you pleased to be returning to Cambridge to carry on research after the war?

Oh, yes. Well, you see, as I had a small academic job my university did ask for my early return and so I came back and the – the computer lab really fell into my hands.

Right. What sort of state was it in when you got back?

What?

What sort of state was the computer lab in when you returned?

It – it had … it – it was a differential analyser that was built by Metropolitan Vickers, which I eventually sold to the Royal Military College of Science, or the Military College of Science as it was then. There was also a Meccano differential analyser which is now in a museum in Auckland, New Zealand.

When you got back after the war and there was this equipment, what facilities did you think would be needed to reconstitute the computing service?

Well, we never actually opened it as a … we never opened the lab, we were just getting it ready to open and the war came, and of course it got drawn into the wartime organisation. So I – I suppose it – it was founded before the war, '37, to exploit analogue equipment. Well, analogue equipment of course then turned out to much overrated, very limited, and so when digital computers came along it was a great relief to have something you could believe in.

[54:00]

What was your hope for the computer laboratory after the war, and what did you have in mind for it?

Oh, I don't know, winning various academic battles with other departments.

[Laughs] Were there any academic departments in particular who were on your mind?

Well, of course I was a Cavendish man and I always regarded Cavendish with Rutherford at the head, regarded Rutherford as a role model.

What was your impression of Rutherford when you were a student at the Cavendish?

… I – I had very little to do with him but I did – when – when Appleton was about to be appointed Ratcliffe brought him round to see what there was in the lab, because Appleton obviously would charge Rutherford a separate what it was – now obviously it was a separate, it was separate and a good deal larger than Ratcliffe's, but Ratcliffe brought Rutherford around so that he – as he said to me, so that he could see what he's got now, and he was of course a very impressive man, and [inaud] yes.

What about Rutherford impressed you in particular?

I – I can't add to that.

Okay.

Well, is that all you've got?

I had just one final question if that's okay.

Oh, yes.

Just, well, one or two little connected questions. When you re-founded the computer lab at the end of the Second World War, what sort of service or facility did you have in mind? What purpose was it going to fulfil?

Well, I – I don't know. You see there was … although digital – no digital computers existed until we built the EDSAC, nevertheless there was a lot of digital computing, it was done by human beings who could call them – they were in fact research students working the desk machines. So there were – digital computing was going on and people were beginning to realise, including the people who had to do the work, that it was – with determination you could make great progress, even with those primitive machine – machines. And when we – when I started building the EDSAC I had no doubt about who were going to be our users, they were people like myself. I mean I used to be doing

things that would take perhaps a week solving, solving a set of ten by ten, learning equations took about a week with a desk machine, well that could be done rapidly with a digital computer. And those were the people who we made the EDSAC available to, research students in the lab and others, anybody who could make a good case could use it.

What was your relation like with users at first?

Well –

Did you have to sort of take the system …?

No, they were applicants rather than users, they wanted to come along and use this wonderful machine.

Didn't have to advertise it at all then?

Oh, no. No, no, no, I made a firm rule I would never try to sell computers because I knew they would sell themselves, and they did at the bottom. Started with the students, the students would come in because they knew other students and if they – we had a thing called a priorities committee, which was a frightening name, it tended to be, but it was a fascinating committee for me. And of course people, quite important people in the university were prepared to come and sort of tell – tell us about their plans and what they wanted, and all in the hope of getting their fingers on some machine time. So – so … I've lost my thread.

I'm talking about relations with users.

Oh, yes. Well, as I say, they were more applicants than users.

What were their reactions when they first used the machine?

Well, of course they were – they were mostly – people who first used the machine were younger students and they – they began to take results back home, show them to their supervisors who began to talk about it and suddenly everybody was saying what a good thing, wonderful thing digital computers were.

And it just took off from there then?

Oh, yes, there was never any need to do any selling at all. I mean it's like [inaud].

It occurs to me that when … as far as I understand it, when the computing lab is first set up it's called the mathematics laboratory, yes?

Yes, mathematical.

Sorry, mathematical laboratory.

Don't make that mistake.

[Laughs]

Mathematical laboratory. Er, that was – the … it had been intended to call it the computing lab or the computer lab, but someone said we're going to call it mathematical and we – we changed it later on.

I'm just wondering when, when did computing start outgrowing mathematical at this period, was it sort –?

There was never any mathematics in the mathematical lab.

No?

No, if you'd come along at the start of the war you'd have found it was an electronics department, building a computer, we worked with oscilloscopes and – and just straight electronics lab as you would see else … elsewhere in a radar estab – establishment.

How did you actually go about building up the computer department from this point? Once you'd got EDSAC up and running, what was the next thing you were worrying about?

[Pause] Well, I don't know, I can't relate to that question somehow.

No? Oh.

More and more of the same good thing.

Did you have any problems recruiting staff for …?

No.

Where did you recruit staff from?

Well, universities, Cambridge in particular. Mostly Cambridge. Mind you, it was a very small place.

Was there anything in particular you were looking for in staff?

Accuracy.

Any particular academic field that was connected with, or just generally?

No, no.

How important were technicians in the computer lab?

Oh, terribly important, they … you see, our lab was based on the idea of a few – a few mathematicians if you like, I would say a few officers, and a lot of – and technicians. So the – the technicians did the actual engineering. Building a computer was an engineering exercise and the technicians staffed that enterprise. You're speaking now of assistant staff?

Yes, yes.

We – we talked about assistant staff.

Yeah. So very important in the organisation –

Oh, very.

– to have people like …

Oh, the university owes – owes a great debt to those people.

Would they be working purely to your instructions then or –

Yes.

– or making suggestions as well?

Oh [laughs] both I suppose, 'cause I mean I took the decisions, no-one else knew anything about it.

[Laughs].

I mean that literally, because … I'd been to Philadelphia where the centre of things were and I knew the important people, and so I brought back the – the whole idea.

Was this the Moore School conference at …?

Yes. Well, I went – I went on a – that's right, the Moore School Lectures, and visits to other centres afterwards.

What did you learn from these?

… Well, everything there was to know about computing, which wasn't very much. I mean it was a very, very pregnant or great weight, volume. Actually things to know - not much.

And ultimately that knowledge helped you to build your own computer?

Oh, yes, you see I – I got people in the computer lab who learnt it all from me, that made the disciplinary problem a very easy one. I was very fortunate, I made … I make light of it but I was extremely fortunate in the way that the computer lab just fell into my hands.

Hmmm. Do you think you've been fortunate in your career?

I have, oh, very, very fortunate. I'm sorry I … [laughs] I wish I was still I – in active career.

Hmmm. No, I can understand that. Do you mind me asking just two final questions if I may? What did you actually see your role as, as leader of the computer laboratory?

Well, I mean I knew about establishments and labs with my wartime experience and so I – I drew – I drew on that. I'd been head of laboratories in governments so … and I had

that to draw on, and my role was deciding what to do and getting the people to do it. So, as I say, I was the only person who knew anything about computing apart from my friends in Philadelphia and – and elsewhere. I imported the whole – technology would be a pompous term, the whole subject.

Did you find that people were eager to learn?

Yes, oh, yes rather [laughs].

It sounds like they were very eager to learn then [both laugh]. Any people in particular that you remember talking to about this?

Well, I mentioned Mutch who joined me, he was in war service, he – I left war service, he stayed there, and I met him some … someone introduced him at a meeting and he – he joined the lab and became … yes, he died, he died from heart failure or something like that a bit early, early in life.

Were there any other people you'd single out as being important in that early period you worked with on computing?

I don't think so. I mean I – I can't remember, I'm sure there were.

Over the long period that you actually ran the computing laboratory, what were the biggest changes do you think you witnessed?

Evolution rather than change. I mean it grew bigger and more important, it grew – the lab grew bigger and more important.

Did this change in size affect your relationship with other university departments at all?

No, I don't think so, I mean we were – we were a research department or a service department, not a research … well, we were that as well, but … yes.

What do you consider to be the high points of your career?

[Pause] Well, just being head of the lab over such a long period of time.

Are there any in particular achievements during that period you'd single out?

No, I'll leave it to you to do that.

[Laughs] I guess my final question is actually about this interview and how you found the process of it.

I think you done it rather well. Hmmm, I'd … I'd tone it down rather than – rather than hot it up, it's always the proper thing to do with a manuscript.

Have you actually enjoyed this interview today or …?

Yes, I think so, yes well.

Good.

You have?

Yes, yes, it's been interesting. How did you feel about being approached by the British Library for this project?

I was thrilled.

Oh, good.

But – but that expression comes to me from Mrs Thatcher. Mrs Thatcher, I met her at some function and we were talking and getting on very well together and she suddenly noticed the journalist were taking it all down, and she told him … don't … in return I will give you an interview now you see, and of course that flummoxed him [laughs] when she's asked him what he... when he asked her what she felt when she was asked to attend this meeting. 'Oh' she said, 'I was thrilled, you know, when I got home in the evening, the local press rang me up and asked me things about it, how did I feel. I knew exactly what to say, I was thrilled.' [laughs].

I think that seems a good place to stop for today.

I think so.

[End of Track 1]

