

**Dr Cecil Green Hon KBE in interview with Dr Max Blythe  
Oxford, 24 June 1994**

MB Dr Green, you've grown up with the century. You were born in 1900.

CG I was born in a small town in a northern suburb of Manchester, Lancashire, and lived there for all of two years when my folks decided... in fact, my mother's entire family – she was one of seven children – they all decided to emigrate. That was the fashionable thing to do in those days, to go to the New World and earn your fortune and then when you were ready to retire, come on back to England, maybe open up a pub. And my particular mother and father decided to emigrate to Canada, first to eastern Canada, such as Nova Scotia and Halifax, and then they migrated from there next to Montreal and then to Toronto.

MB Your father went out there first?

CG He went first.

MB To find work.

CG That was the fashionable thing to do.

MB And saved enough money to take you out there.

CG Yes. Yes. That's right.

MB Tell me about Charles, Charles Green. He must have been a remarkable man.

CG He was.

MB He worked hard all his life.

CG He certainly did. He was a great swimmer, at the same time, he was quite a musical man, he used to like to play the concertina.

MB That must have been something.

CG Yes. Yes.

MB Is that where you got your first love of music, listening to...

CG Maybe so. Only in my case, I undertook lessons on the violin and eventually became good enough to be a member of the Vancouver Symphony.

MB Yes, you were.

CG Yes.

MB Your father was hard working, he was engineering, he was an engineering worker?

CG He was a maintenance electrician.

MB And found work, and although there were difficulties sometimes and he had to change jobs, he eventually got you over there.

CG Yes. Yes.

MB And Maggie took you to Canada when you were two?

CG That's right.

MB Maggie was one of the most strong women that I've ever read about.

CG Yes.

MB I've read your biography, and Maggie comes out of it wonderfully.

CG Yes, she had a backbone of steel.

MB Tell me a little bit about Mum.

CG About my mother?

MB About Mum, yes.

CG Well, she was a wonderful lady, hard working too. My father used to work and she used to work too. And their great ambition was for me to grow up in life and be more successful in life than any other of my cousins. I didn't have any brothers or sisters, but I had many cousins and she wanted me to outdo them all.

MB She wanted you to be best.

CG And she realised... in fact, I used to say, at times, I used to love to play so much with my boy companions, in fact, I had such a good time that I used to say, 'I wish school had never been invented!' And my mother heard me say that once and, boy, did I get a bawling out!

MB She pitched it at you?

CG There are parents today who are indifferent as to whether their children will go to school or not. If the child doesn't want school, that's all right with them. Well, that could have been the same with me, but my mother was the one who did the thinking for me in those early days, and she decided there's one way for me to outdo my cousins and that was to receive a superior education. So...

MB What did she look like, Mum, was she a small lady?

CG Oh, medium-size. She was very aggressive though, physically aggressive.

MB She knew what she wanted for you.

CG Yes. She wanted me... well, she wanted me to get... she wasn't going to tell me what to get. You know, some parents used to say in the old days, 'You ought to get into this, it pays the most money.' That's not the important thing to do. And apparently, my mother, with my father's agreement, decided that I ought to get into something that I felt was going to be absolutely suitable for me. And I got interested in electricity.

MB Was that through Father, because he was into electricity? Was that Father, really, that did that?

CG Yeah. Yeah. And he got me interested in that. In fact, he got me a job one year when I was in high school. He got me a job up in the town of Antioch, in Northern British Columbia.

MB Where he was working?

CG Where he was working. And so I became an electrician's helper up there.

MB That was in copper smelting?

CG Smelter, copper smelter. And...

MB Did you work with your father at that time? Did you work with him?

CG No, didn't work with him. He didn't think that would be a good idea, to work with him. He thought it would be much better if I worked for some of his friends.

MB I also noted from your biography that you wired people's houses in summer holidays.

CG I what?

MB You wired people's homes up.

CG Oh, I did that, yes, when I came back. Yes.

MB You had a few jobs in those holidays.

CG Yes. Yes. So, as I say, I decided I wanted to be an electrician – electrical engineer. And the University of British Columbia, when I got to the University of British Columbia, that was just started, and there wasn't any such thing as electrical engineering education.

MB Right. So what did you read, physics? You read physics? Chemistry?

CG Yes.

MB Maths?

CG Applied Science, they called it. Maths, physics, chemistry, a little biology too.

MB And was that University good?

CG That was the University of British Columbia. When I finally... I kept on desiring to be an electrical engineer, and due to the influence of one of my University of British Columbia professors in chemistry, who was a graduate of MIT [Massachusetts Institute of Technology], he persuaded me to think seriously about going to MIT.

MB That was an important transition, to go to MIT?

CG Yes. And so I applied to MIT, and I sent them my credentials back there, and they decided to accept me. They said, 'We'll accept you if you will take a chance on being good enough as a student back here.' So my mother and father agreed.

MB That was a big decision?

CG Yes.

MB Because this was going to be expensive?

CG That was going to be expensive, yes. And in order to cut down the expenses and to obtain money, my mother and father sold their house in Vancouver and that money then was used to pay the cost of my going back to Boston. And at that time, my father was still working up there. My mother never lived with him, he used to come down every couple of months to visit my mother.

MB She went with you?

CG And she...

MB To Boston?

CG Yes, yes.

MB And he continued to work in a smelter?

CG Yes. We migrated on a train all the way back to Boston. And so we got an apartment, small apartment, two miles away from MIT, away up Mass Avenue, in fact, located just outside of Harvard Square.

MB And you used to walk in every day to MIT?

CG I used to walk there. It was two miles each way.

MB But a nice walk?

CG Yes, down Mass Avenue.

MB You crossed the river?

CG Mass Avenue, you know. Not far from the river, no. No, Mass Avenue went straight down, straight down to MIT, and then it crossed Harvard Bridge over the Charles River. And I took the... so when I transferred to MIT from the University of British Columbia, I was at the end of my sophomore year. I had been majoring in applied science, and I went back to MIT and they enlisted me, enrolled me, in the junior year of electrical engineering, in the co-operative Programme. There were several companies I could go with, but I elected to go with General Electric; I thought that'd be the most pure electricity. Another co-operative company was the T&T, but I didn't want telephones, I wanted electrical engineering.

MB And this meant you went out, every year, to work in a General Electric...

CG Every three months.

MB Every three months?

CG They alternated me with four semesters a year, starting in the first semester at MIT, then the next semester in one of the General Electric plants – in fact, the one in the River Works up in... just outside of Boston, for three months. Then back to MIT again and then up to another General Electric plant, in Pittsfield, in Western Massachusetts, and then back to MIT again. And then, as I say, then the one after that was up to Schenectady.

MB In 1923?

CG Yes. The main plant. In fact, I had to go back afterwards. That's where I did my Master's thesis.

MB That was an exciting thesis.

CG Yes.

MB It's still in the University, isn't it, the thesis?

CG Oh yes.

MB You worked on alternators?

CG It was a study of the distribution of leaking floods around a saline pole alternator.

MB Oh, right. And that was a pretty useful piece of work to do.

CG Eh?

MB That was a very useful piece of work to do for you.

CG Yes.

MB You felt very satisfied with it.

CG Yes.

MB And that was carried out when you were in...

CG So, as I say, that's where I did the...

MB Your project.

CG Yes.

MB And that's when you met...

CG That's where I did the work for my thesis.

MB And that's when you met your wife, Ida?

CG Yeah, because she was working for General Electric in the Department of Customer Statistics, on the top floor of the research building that I was in. And she had a friend, a girl friend who was a secretary, and they used to have lunch together, and this girl friend told her one day, 'You know, Ida, there's a new young man down here in the Research Department, and I like his looks, I like his habit, and his behaviour. I think you might like to meet him too.' So Ida was curious enough that she accepted the invitation to come down and meet this guy. So as she came down the elevator and was crossing the lobby outside the research area, she saw a young man on the far side, who was crossing too, and from a distance she liked his looks, in fact, she thought - this is what she told me afterwards, she said, 'I liked the thought of that young man, the appearance of that young man, and I thought, "Well, there is the kind of a young man I think I'd like to marry."' So she went on in to her girl friend and her girl friend then took her to meet me, in the particular research corner, and I turned out to be the same man as she had seen in the distance. So you might say it was love at first sight!

MB And you felt that also?

CG And so we met each other and we liked each other well enough to make some dates to see each other afterwards.

MB Ida had a remarkable family, the Flansburghs.

CG Yes.

MB Would you like to tell me a little bit about that family? They must have been rather interesting people to meet.

CG Yeah. Yeah. They were descendants, descendants of the early debt settlers in New York State, up state New York. In fact, Ida's forefathers had built the first frame house in Schenectady, in Saratoga County, which is in the foothills of the Adirondack Mountains, just outside of Schenectady. And Ida's father – they lived on a farm out there – and Ida's father used to do a little farming in his spare time. At the same time, he worked for General Electric, in the Turbine Department, turbine, construction turbine.

MB You worked there, actually, at one time, too.

CG And my... and my research was done, as I say, on the steam turbine generator design, and that's where I met her father, see.

MB Yes. And so you got to know that family pretty well, quite quickly.

CG Yeah. Yes. I had, you know, a romance with her till I had to go back to MIT in order to spend the final semester to graduate, and we corresponded back and forth. And Ida told me afterwards, she said, 'You know, I was in love with you and I think you were in love with me, but I couldn't help thinking that when you graduated, you'd probably go back to your home town and marry some hometown girl.' Well, it so happened that when I finally graduated, I got three offers of jobs, and one was from General Electric in Schenectady and that was the one I immediately accepted, in the Department of Steam Turbine Generator Design.

MB That must have been a marvellous time.

CG Yes.

MB Because you'd just got two degrees.

CG Yes.

MB You'd completed a thesis, and that was good.

CG Yes.

MB You got two degrees.

CG Yes.

MB A Bachelor's and a Master's.

CG Bachelor's and Master's degree.

MB In electrical engineering.

CG In 1924.

MB And you were all set with the first job.

CG Yeah.

MB And it was quite well paid.

CG Yeah.

MB Real money!

CG It was pretty good, yes. At the same time, I was an instructor in the student programme in the General Electric plant, and so, as I say, my mother came back then, and my father too, came back to visit me.

MB He came back to see your graduation?

CG Yes. Yes. And he decided to stay.

MB So that was an important time.

CG Yes, it was.

MB You were in love...

CG Yes.

MB You'd got the qualifications you needed, and you'd got a job.

CG Yes. So, as I say, I enjoyed the companionship I had in that department. But, at the same time, I began to get a little worried, and that was as I got better acquainted, still better acquainted with my companions, I discovered that they'd all been in that department for fifteen or twenty years, and that's what worried me. I began to feel, 'Well, this is interesting all right, but I hate the idea that I'll still be doing this same thing fifteen or twenty years from now.' And about that time, a classmate of mine, named Miles W Pennybacker, who originated in Western Virginia, Parkersburgh, West Virginia, he wrote me a letter and said, 'Cecil, you may not know it, but when I graduated, I decided to stay here in Cambridge and join a brand new little electronics company and it's located on the edge of the MIT campus.' And he said, 'I'd like to suggest to you that you try and come down here. I think what you ought to do is give up the idea of being a small cog in that big machine up there in Schenectady, come on down and get in on the ground floor of this brand new little electronic company. And, incidentally, I've given it a name, Raytheon. Raytheon, that's a contraction of two Greek words. And why don't you come down?' Well, that's exactly what I felt was, what I'd like to get into, something that was new and would grow with a small company. And so I propositioned my girlfriend. I told her of my desire to get into something brand new back in Boston, but I didn't want to go without her, would she consider marrying me? Well, it took her one and a half seconds to say yes! And so we went... so we got married in Schenectady, in a little old church, Episcopal Church there. And our honeymoon then consisted of immediately going down to Boston and my starting to work.

MB That was the honeymoon?

CG That was the honeymoon trip!

MB What was Raytheon like? What was the firm like?

CG Oh, it only had a couple of dozen people, very small, up on the fourth floor of the Suffolk Building in Candle Square, just one corner of the fourth floor. And its purpose was to develop a vacuum tube which would eliminate, which would rectify alternating current.

MB So you could turn AC into DC?

CG Yeah, DC, yes.

MB For kind of radios and things?

CG Yes. Yeah. Then that was... that provided the energy then for the radio station. And so I found that very, very interesting, all right. But again, I began to get another difficulty and that is I developed West Coast fever.

MB Yeah. That was strong all your life?

CG Yes. And that is, I wanted to go back, particularly to Vancouver. So Ida and I saved enough money, and Ida was willing to go so far away from her hometown. So we saved enough money to buy a second hand Chevrolet touring car and also get an umbrella tent and a small gasoline stove, and we then... oh yeah, I forgot to mention, too, that when I left Schenectady, one of the chief engineers of the department, I told him I was thinking of leaving, he said, 'Cecil, are you unhappy?' I said, 'No, I'm not unhappy.' 'Well, has somebody been mistreating you?' 'No'. 'Well, why the devil are you going to leave?' 'Well', I said, 'I hate to tell you, but I feel like a small cog in a big machine.' He was ready for that. He said, 'Let's imagine the biggest oil tank in the world, maybe with a million barrels of oil in it. Put one little air bubble down the bottom of that tank, what does that bubble of air do? It starts rising to the top. It doesn't care how much oil is around it, it keeps rising to the top. That could be you in General Electric.' I thanked him for the compliment, but told him I had already committed myself.

MB This journey, this major journey, this was in Tillie, your first car?

CG Yeah.

MB That was an incredible car.

CG Yes.

MB That was a great love...

CG And Ida and I camped ourselves all the way from Boston, all the way to San Francisco, where my mother and father were there.

MB So you went to San Francisco...

CG And then we drove up to Vancouver.

MB And all the way back to Vancouver.

CG Yes.

MB That was an enormous trip.

CG Oh God, yes!

MB Because roads weren't very good then.

CG Yes.

MB The roads were awful!

CG There was no freeways in those days. You went through every little town and village, all across.

MB You must have had lots of adventures.

CG Yes. That was a time of adventures. But Ida could have divorced me by saying I was unstable! But it was all an adventure to her. So we got to Vancouver, we stayed with an aunt and uncle of mine, so as to cut down on expense while I looked for a job. And, of course, there was absolutely no need for electrical engineers then. And so...

MB You went to Seattle at some time?

CG So then I drove back to Seattle and thought, 'Well, if we can't live in Vancouver, maybe we could live in a nearby city like Seattle.' Again, I looked around there, and I couldn't find a damned thing. In fact, I even looked at the ads in the newspaper. And I always remember one particular ad that I answered, it said, 'How would you like to earn \$10,000 a year?' Of course, that was an enormous salary in those days. So I answered that. And what it consisted of was an ad by a man who had invented a turn indicator to put on the rear end of an automobile. In those early days the only way you could tell anybody behind you that you were going to make a right or left turn, was to put your hand out, one way or the other, open the window and put your hand out. And in order to save that, this man invented a device, which would be an illuminated arm to be installed at the back of the automobile, so it would swing this way or that way, with a light inside it. So he said, 'If you can sell one of those to every car registered in the State of Washington, your commission will be \$10,000.' I said, 'Oh God, that's ridiculous. That's ridiculous!' So I finally gave up then.

MB You had thoughts of going into business?

CG Eh?

MB You had thoughts of going into business at that time.

CG Yes.

MB You thought of doing neon tubes, I think?

CG Oh yes. Yeah. Well, in Seattle, I noticed that neon signs were just beginning to appear, and I knew quite a bit about glass bending, with my days in Raytheon, and also in the handling of inert gases – argon, neon, and helium – and you'd use those in our vacuum tube. So I thought, 'Well, Goddam, maybe I can go back to Vancouver and start a neon sign business there.' So I looked up the manager of the Seattle Company – Alesco Products Corporation – and the manager encouraged me to go back to Vancouver, and he said, 'I'll tell you what. I'd like to suggest that you spend a week or so with one of my best salesmen so as to learn the sales points,' which I gladly did. So I was there. And one of the sales points was that a neon sign only consumes one-tenth of the electrical energy of a bulb sign. So, 'God, that sounds good'. So I went back up to Vancouver then, with Ida's co-operation again, and again staying with my aunt and uncle and my cousin Madge. And I then decided to look up an old retired farmer who I used to chauffeur for, during my earlier days in Vancouver.

MB Student holidays, and things?

CG Eh?

MB Student holiday times you'd work for him?

CG Yes. Yes. And I told him that I was back here again, and I wanted to start a neon sign... so I told him all about it, and I gave him the argument about consuming only one-tenth of power, and then he said, 'I tell you what. I'll be glad to give you enough money to get a... start a shop, if you show me an order or two.' Well, I thought that was a reasonable suggestion. So I then went down town, visited all the major department stores, such as Woodwards, David Spencers, and Hudsons Bay, and Henry Burkes, Jeweller, and so on, and one after the other, they were all interested in it already. And I said, 'Well...' In fact, one of them said, 'Where is your shop, by the way?' 'Well,' I said, 'I haven't got it.' 'Oh, come on back when you get your show.' So it was the perfect example of the chicken and the egg.

MB You couldn't...

CG Couldn't get an order without a shop...

MB And couldn't get a shop without an order.

CG ...and I couldn't get a shop without an order. So, at the same time, one of the store managers had said, 'Say, young fella, before you start, install this new electrical device, you're going to have to have permission from the city electrician.' I said, 'Who is he and where is he?' 'Well, his name is Fletcher. He's up on the fourth floor of the British Columbia Electric Building' – that sounded suspicious to me, the City Electrician! Anyway, I went down there and I found him, and I made the mistake of telling him that one of the sales points was that it only consumes one-tenth of the power

(Inaudible). He says, 'Hey,' he says, 'Let me tell you something, or let me ask you something. What is the purpose of an electric sign?' I thought that was a silly question, but anyway I answered by saying, 'Oh, it's to publicise the good name of the particular establishment to which it's connected.' He said, 'That's not the most important reason. The most important reason actually is to help illuminate the street.' And that was in the days when electric signs weren't up on the top of the buildings, they were down... sticking out, low, over the pedestrian level, over the sidewalk. And he said, 'I tell you what, I'll give you permission to install these neon signs if you promise to put a border of bulbs all around, incandescent bulbs all around these signs.'

MB He didn't want it.

CG Oh, gave up completely. So...

MB That was a rather tough time.

CG Yeah, it was.

MB You were running out of money quite fast, I think.

CG Yes. And that... many many years later, when I... again visiting Vancouver, I received the city of Vancouver's highest award, and that was the Freedom of the City Award, and that was given to me at a dinner party by the mayor of Vancouver, Gordon Campbell, and he presented me and then asked me to make a few remarks, and I said, 'Mr Mayor, will this Freedom of the City Award allow me now to park my automobile in front of a fire hydrant if I want?' He said, 'Oh, sure!' And I said, 'Well, I guess that the real reason for my getting it is, it's given to me... you've given this to me as a previous citizen of Vancouver who succeeded in life by leaving town!'

MB Where did you actually go to, from Vancouver, to find work?

CG Back to Boston.

MB Back to Boston?

CG We migrated all the way back to Boston. And I have a... I have a front page of the *Boston Globe*, with a picture on it, in that front page, and the title of the article was – and this is a picture of Ida and me standing in front of our umbrella tent in the camp grounds on the edge of Boston, and the article heading says, 'Young couple, after travelling 10,000 miles around this country, have finally decided Boston is the best place to be after all.' And one of my associates in Raytheon saw that in the paper, and one of them came up, 'Well, you damn fool, are you ready to go back to work now?' I said, 'I sure am! I haven't got any money left!'

MB I think you were down to \$15 at one time.

CG Yeah. Yeah. So I went back there and after a very short time, West Coast fever started again.

MB That was a strong feeling.

CG We... Ida and I, again, we ... only this time, I got a job offer to go work for an electronics company located in Palo Alto, on the edge of the Stanford campus, and I got a job offer then to go up there and be the foreman in the Electronic Fabrication Shop. And that's where I ...

MB And this was a telegraph/telephone company?

CG Yes. Federal Telegraph.

MB And how did that work out? That was quite good for the first few months?

CG Yes. Yes. And I was located, that plant was located exactly where... at the front door of Stanford University campus and on El Comina Real, and located exactly where the Holiday Inn is located today, which is my favourite place, this thing!

MB You worked on a discharge tube there?

CG Anyway, what really happened was that I became acquainted with Charlie Litton, who I got to admire because of his capability in glass blowing.

MB He was a remarkable man.

CG He was. He was remarkable in being able to stick glass and metal together in the production of 20 kilowatt transmitting tubing. My hours, work hours, were from eight in the morning till five in the afternoon, as foreman of the production shop. But Charlie Litton's work hours were from four o'clock in the afternoon till midnight. Now, he wanted to do his glass blowing when it was quiet and nobody was going to open the door and suddenly let a draught of cold air in on this molten metal in his hand. I got so fascinated with his capability. He had graduated from Stanford, he also graduated from IT&T, and he became, as I say, one of the... one of the experts in the whole damn country. Well, as I say, I was so fascinated, so in order to... I felt I'd like to understudy him, so I went to work in the morning at eight o'clock and came home at five for dinner, and then immediately I walked back to the plant, just to work, until midnight. And that went on day after day and Ida got completely fed up with that.

MB Yes, she didn't like it much.

CG That's the thing. We'd only been married about four years then, and to be living alone so much. And it so happened, she'd been in correspondence with the wife of a man that I'd worked with in Raytheon, who left Raytheon too, but he got into this new geophysical exploration business, and they were looking around for a new... new help. And Ida, in writing to the wife of this man, told her of the miserable life she was leading, and she said, 'If your husband, Roland, can think of some kind of a job to attract Cecil away from this, I'd really appreciate it.' Well, as I say, they were looking round for...

MB This is Roland and Helen Beers?

CG Roland Beers, yes.

MB He was a close friend of yours for many years?

CG Yes. Yes. So I got a job offer then from Eugene McDermott, who was the vice-president of Geophysical Service, I think it was for \$550 a month, which was damned good salary. It was about twice what I was getting at Federal Telegraph. And

...

MB This must have been about the beginning of the 1930s?

CG Yeah. Yeah, it was. That's right. Absolutely.

MB And that wasn't a good time in America, you were lucky to be having a job.

CG That's right. That was still a major depression. But this new geophysical method was so effective, it was using reflection seismology, instead of the old refraction, and it had been invented by the man named J C Karcher who was the man who started this company. So, as I say, I got a job, so I accepted an offer to...

MB You're going to take charge of a field party.

CG I told Charlie Litton that I planned to leave. He said, 'What are you going to do?' I said, 'This oil exploration.' 'Oh, hell, we don't need any more of those. Why, all the oil tanks around the country are overflowing. We don't need any more.' I said, 'Well, I'm sorry, Charlie, but I've committed myself.' So I finally left, by loading up our touring car we had and ending up, after three days of driving, in the big town of Maud, Oklahoma, population two hundred and seventy five! And I started out as party chief, of this new crew, working on the contract with Twin States [Oil Company], which was an Oklahoma subsidiary of Sun Oil Company. And that's when I developed ulcers, because I'd never seen it. And to be the foreman, the headman of this crew, boy!

MB That was about twelve people, several wagons, a whole lot of equipment?

CG Yes.

MB You were prospecting for oil?

CG Yes.

MB That was a tough job.

CG It sure was. But Ida enjoyed it because we were living together all the time then. I set up my office wherever we lived; I had to have an office and things...

MB You were always on the move.

CG Yes. Yeah, during the next six years, Ida and I lived in practically every small town in Kansas, Oklahoma, Texas and North Louisiana. In other words, we must have been in about fifty different towns, all the way down as far as Laredo, Southern Texas.

MB You had some interesting episodes. You had a crew that became a family.

CG Yes.

MB You lived as a family.

CG Yes. That's right. I was the party chief and Ida was the party mother!

MB On one occasion, I remember, the men were all sleeping... I read in the biography that you found all your men in a very sleepy state. This is the time of prohibition, I think.

CG Yeah, well, what had happened was, yes, they were working on a farm, and the owner of the farm came down and saw them and said, 'What are you guys doing here?' 'Oh, we're drilling holes.' 'Drilling holes? What for?' 'Well, we're looking for oil.' 'Oh, for God's sake! I tell you what, I don't care, as long as you stay out of this, this is good land, and stay down the creek bottom there.' And they agreed to do that. And he said, 'Well, you fellas are so co-operative, I'd like to be a little sociable by offering you a drink.' He says, 'I've got some... I've got some home brew.' So they all had to have a drink, and they drank so much they got sleepy. When I came up to see how they were doing, they were all asleep in the shade. I said, 'It's a damn good thing I found you, instead of the man representing the oil company we're working for!'

MB But the man had had some alcohol buried around the place.

CG Yes. Yes.

MB What an interesting time.

CG Yes. Yes.

MB But the thirties weren't easy, because there were problems for the company at times.

CG Yes. Yes. Oh, and then, after six years, I was promoted from party chief to supervisor, with my headquarters, my first headquarters then, in Shreveport, Louisiana, Northern Louisiana. That meant I had to inspect the quality of work that our crews were doing in East Texas, South Arkansas, and Northern Louisiana.

MB That meant you were pretty busy, always on the road.

CG Yeah. At the same time, I had to try to sell new contracts to oil companies in that area. And that's when I first started to drink alcohol.

MB The first time?

CG Yeah. I had never drunk anything, not even wine or beer. But the reason I started all of a sudden was I discovered in order to sell a contract, a new contract to a new oil company, you had to get acquainted with the senior, senior man, in that

company. And the best way to get acquainted was to start out by inviting him for dinner or lunch, and that means, 'Would you like a cocktail?' because some people can't unstick their tongues from the top of their mouth unless they've had a little alcohol, you know. And having agreed to do it, you can't expect him to drink alone, he'd feel uncomfortable if you drank water while he drank whisky.

MB So that's how it started?

CG Eh?

MB So that's how it started.

CG Yeah. And that's where, in later years, in the... the president, what's his name, of the United States, who's just been over to Korea...?

MB Jimmy Carter?

CG Carter, Jimmy Carter, he was... in fact, he said, 'You shouldn't be allowed to put the cost of a dinner or a lunch on your expense account if it included alcohol,' because he was so much against alcohol. Well, as I say, he should have been the damned pope instead of being president! Because, as I say, alcohol does have a very useful purpose.

MB Those trips that you had to see many crews now, you had... I think you had four or five crews when you first became a supervisor, regional supervisor, you used to go and see all those crews, but you began to give your opinion about the kind of surveying maps that they'd got, in other places. And you went to Ecuador in the late thirties, you went to Ecuador?

CG Yes. Oh yes, I got involved... my first foreign assignment was to go down on check on a crew we had working in Ecuador, for Anglo-Ecuadorian Oil Company.

MB Was that an interesting time?

CG Yes.

MB I mean, your first time, really, abroad.

CG And I went down there and looked at the work they were doing and I decided they weren't doing very good work, we weren't able to get good results in that area. So I recommend the crew terminate and brought it home. And that was my first aeroplane trip. It took about four days to fly down there, from Fort Dallas down there, Guayaquil, Ecuador.

MB In recent years, you've never been out of aeroplanes! That was the start of it.

CG That was my first aeroplane trip, '37.

MB Coming towards the 1940s now, which are going to be the exciting time, okay, of getting Texas Instruments started, but before you actually got to the really important...

CG Yeah. It so happened that in those later years – that is around 1940 – the president of Geophysical Service Company... you see, we weren't... the purpose of our company was to give service information, we had, actually, no involvement in production. And the reason for that was that the oil company, which was our customer, would be assured that we were not going to use that information we got for any personal purpose, it would be given to them only. Well, it so happened that Karcher, J C [John Clarence] Karcher, the president, very quietly started... whenever a crew was idle, in between contracts, he'd do a little exploration on his own, and he finally got... he got successful enough and did some drilling and found himself in the oil business. And, of course, that went on. And finally, our major oil company customers found out about this and they really raised hell! They said, 'We're going to terminate you.' So it was decided that four of us would buy the assets of the company and start a new company, new ownership, with Karcher out of it.

MB Right. So he'd take the petrol bit away, and you'd be left with Geophysical Services Incorporated?

CG Yes. Yes.

MB That took some launching, though, because you needed quite a lot of capital.

CG I had... in order to buy the assets of the company, I had to raise something like \$55,000. Well, of course, I didn't have that much cash, but due to the friendship I had with one of the senior officers of the Republic Bank in Dallas, I was able to borrow enough money. But just before that, though, Ida and I had been at headquarters in California, first in Bakersfield, then in Los Angeles, and we fell in love with California. We decided, 'Oh, let's... I think we'll leave the company'. So I tried to get a job in one of the aircraft companies out there, but that didn't work out too well. And, anyway, I told my friends in Dallas, that I was thinking of returning and they said, 'Before you do anything about that, come back, we have something to tell you of interest,' and that was the opportunity to buy part of the company, and the headquarters instead of California, the headquarters in Dallas, and so I went back to Dallas and that's when I agreed. And Ida, of course, agreed to go with me. And I always remember when we bought it, one of my three partners said, 'Ida, now that we're going to own this company, and supposing we make quite a bit of money, what would you like to do with the money?' And do you know what she said? She said, 'I think I'd like to be a philanthropist.' Yeah. I always remember that. He remembered it too. Anyway... anyway, no sooner had we signed up for this agreement and made this loan from the bank, than Pearl Harbour took place and we were immediately at war. And Selective Service went into action, with the announcement, 'Looking for new petroleum is not important to the military, the military effort. You better get your men, your technical men, into something more essential, otherwise we're going to draft them into the military. And if we need any more oil, all we have to do is open up the valves of existing oil fields wider, which, of course, would be a terrible mistake.' And, anyway, one of us, Erik Jonnson, my partner, decided to go back to Dallas, back to Washington, see if he could get us... the technical people into something more important, as a

sideline. Well, I stayed behind and tried to hold the company together by fighting draft boards. But anyway, when Erik got back there, he discovered that a man named Victor Vacquier, a research physicist with Gulf Oil Company in Pittsburgh, had just invented and developed MAD – Magnetic Aerial Detector. And this was a device that would be so sensitive to minute changes in the strength of the earth's magnetic field, and it was designed by the Gulf Oil Company as a device in doing reconnaissance work over virgin country. For example, they just obtained the concession in the country of Mozambique, South Africa, South-East Africa, and as I say, this device was so sensitive it had to be pulled in at the end, behind a low flying aeroplane, at the end of a few hundred foot long electric cable, to get it completely away from the metal in the plane. And flying low over country, it would be affected by the depth from the surface down to the basement rock, to the granite, and as you were going across country you'd get a weakening and that meant that the basement rock had gone down deeper, and that could be a basin, maybe filled with sedimentary rocks, which, at the same time, could contain a reservoir with oil in it. But, at the same time, the Bureau of Aeronautics of the Navy, under the leadership of Lieutenant Pat Haggerty, heard about this invention, and at the same time, the great threat that we were facing in those days was German submarines lying offshore, our Atlantic harbours, waiting to sink our ships taking off for Europe, with either soldiers or supplies. And the Bureau of Aeronautics said, 'My God, anything that sensitive might be able to detect the presence of a submerged iron body, such as a German submarine.' And so they were able to borrow this invention from Gulf, and immediately started looking around for somebody to make them for them. And we... and Erik Jonnson happened to be in Washington at that time, so we were one of the first to make those things. So that was the very very beginning.

MB You were into electronics in a big way.

CG Electronics, yes.

MB Perhaps I could just ask you about the development of Texas Instruments?

CG As I say, we started out with the... with the making of these magnetic aerial detectors during the war, and when the armistice came, and the Russians lowered their Iron Curtain, so we continued with... but we began to get a little worried though, we felt the Russians might change their minds and raise the Iron Curtain and immediately all this electronic stuff would be cancelled. So we felt we ought to get into something that was of a civilian nature, something that... Well, we knew we couldn't get into making vacuum tubes, we couldn't begin to compete with long-established companies, so we learned though, again by going back to Washington, we learned that three men, [Walter H] Brattain, [John] Bardene and [William] Shockley at Bell Laboratories,<sup>1</sup> had just invented the transistor to replace the vacuum tube. And we thought, 'Well, maybe we can get a contract to make those,' so we did. We were one of the first making transistors. But we were making them out of the metal that had been used by Bell Laboratories, that's germanium. It was soon discovered that germanium has limitations. For example, to get the transistor up to a temperature, in an environment where the temperature is 135° Fahrenheit, you've no longer got a transistor. So we said, 'Well, my God!' At that time, it was also known that if, somehow, we could learn to make them out of silicon instead, the cut-off temperature then would be 250°

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<sup>1</sup> John Bardeen and Walter Houser Brattain shared the Nobel Prize in Physics in 1956 with William Shockley for their researches on semiconductors and their discovery of the transistor effect.

Centigrade. So we... as I say, 135° Fahrenheit, that was the temperature of... in summer time, on a hot summer day in Bakersfield, California, where we used to fry eggs on the sidewalk! Anyway, we learned... we were the first ones, we had hired one of the assistants, the technical assistants of these three Nobel Prizewinners, came to work for our company, and he's the man who developed silicon transistors.<sup>2</sup> And then another man in the company, we put him to work, and he was to develop multiple circuits. In other words, he developed the chip. So that really got TI [Texas Instruments] off to a big start then. In fact, it was so important that this man of ours had invented the transistor... I mean, the chip... he has his name in the [National Inventors'] Hall of Fame, back in Washington, along with Thomas Edison.<sup>3</sup> And, as I say, that really gave TI a big start. And the next thing that happened, we began to grow then. And we found out we had difficulty increasing the size of the company. We had difficulty attracting young people to come to Texas. For example, there's an example where I was touring the country, visiting universities, soliciting, recruiting, and I happened to visit Northwestern University, it's located in Evanston, Illinois, a suburb of Chicago, and I was interested in seeing who they might have in the way of recent graduates, not fresh graduates, but recent graduates, who had been out long enough to get a little stability, but who wanted to change their job. So it was a case of visiting the alumni placement office, and there a very nice lady in charge gave me a box of cards to ruffle through, and as I was doing that I must have let out a loud moan, because she came over: 'Mr Green, don't you like the looks of our alumni?' I said, 'I like the looks very much, but there's one question. On each of these cards, I don't know why they answer it the way they do.' 'Oh, what's the question?' 'Where would you like your next position to be located, geographically?' And I noticed practically every one said, 'Chicago area.' 'Well, what's wrong with that, Mr Green?' 'Well,' I said, 'My God, haven't they heard of Texas and Dallas, Fort Worth, in particular?' And she said, 'Mr. Green, I don't like to hurt your feelings, but I'm afraid that our alumni regard that part of our country as being down in the boondocks. So we began to realise then we had to have a high tech environment, education environment. The existing universities in that part of the world had never graduated a PhD – not a one – in science or engineering, so we realised that we had got to do something about it. We had either got to move the company to a town where a high tech environment existed, such as in the Boston area, or the New York-New Jersey area, or the Chicago area, or Los Angeles, or the Bay region of San Francisco. We didn't feel like doing that because we liked where we were located and, particularly, it was very strong non-union – that was very attractive. So we decided what we ought to do then was to start a company called GRCSW (Graduate Research Center of the Southwest). We put up the money and took our technical people as part-time teachers, and the idea then was to go to each one of the surrounding universities, to get them to send us their graduate students for us to train, and when we had trained them and they were then capable of receiving PhDs, we would send them back to their university then to graduate. Do you know how many we got? Zero! The idea is that no university is ever going to admit its deficiency, so we got none. So then we realised, my God, I guess we're going to have to have a full fledged university. We didn't have that kind of money. But, anyway, we had some buildings we had built and we had twelve hundred acres of land, so we went to the University of...I mean, Texas, A&M University System, and they were interested all right, provided we give them the land and the buildings with an endowment of twenty

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<sup>2</sup> Gordon K Teal.

<sup>3</sup> Jack St Clair Kilby. Awarded the Nobel Prize in Physics in 2000 for his part in the invention of the integrated circuit.

five millions, which we didn't begin... So then we went to the University of Texas System and they agreed to take it on. We gave them the buildings and three hundred and fifty acres of land – not the twelve hundred but only three fifty. We kept the rest of the land. And they took it on, and that started the University of Texas at Dallas. At the same time, we decided to collaborate, to help existing private universities to get together, so we created... I created a TV(?) system, TAGER (The Association for Graduate Education and Research). And that was a closed-circuit television system, where all these universities tied together – and it still operates today – and where a teacher in one particular subject... It was a case of collaborating the strengths of all the different universities together, so that a professor would not only have a class in front of him, but he'd have classmates in all the other universities and also in all of the existing high tech industrial plants. And that's still operating today. As I say, it's unique in the world. As I say, I'm the author of that.

MB That's impressive. And you've created... Ida and yourself created so many other foundations all over the world.

CG We have project IDA [International Deployment of Accelerometers],<sup>4</sup>of course, that's an earthquake thing.

MB Yes. Can I just come in the last minutes of our interview, Dr Green, can I just come in the last few minutes to Green College, Oxford, and talk about your founding Green College? I think that started with a conversation with William Gibson – 1957?

CG William Gibson had been a student here – he got his PhD here – and he persuaded us on one of our trips... visits to tour the British Isles that we ought to visit Oxford. I said, 'Well, we've been visiting Cambridge, I have a very good friend there, his name's Teddy [Edward Crisp] Bullard, who is head of geophysics there, we've been visiting him.' 'Oh,' he said, 'you ought to go to it.' So we made a date to meet him here and to introduce us to Sir Richard Doll. They told us about their ambition to start a new college, and if we were [able] to help supplement it... and to specialise in the education in clinical medicine. And they told us how much money it would be and we agreed, we finally agreed to do it. Of course, I was sympathetic because of my British heritage. It was obvious it would be a nice thing to do. And besides, you see, I had a plant here too, you know, in Bedford. I thought it would be a good idea, a good supplement. It has worked out very, very well. So well, it's imitated now in Vancouver and also in Dallas, and they're pleading with us in Australia.

MB For a Green College in Australia, in Sydney?

CG But I've run out of our money.

MB But there have been so many things that you have funded. Perhaps I could just ask you, medicine has always been of interest to you since your ulcers, I think, and you've funded many developments in medicine?

CG Yes, yes, I've been very much involved with Scripps Clinic and Research Foundation. And, in fact, as a result of Ida's dying in the Green Hospital of Scripps

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<sup>4</sup> Project IDA is a global digital seismic network that collects data for low-frequency seismology.

Clinic – she died of lymphocytic leukaemia in the Green Hospital there – and as a result of that, our friends in the Clinic decided there ought to be a cancer research centre, so that's named [after] her. They decided to name it for Ida, then they added my name after it. So that's doing a good job under a man named Dr Lawrence Piro – the science of cancer research.

MB In this last part of our interview, perhaps we'll... that was a very sad time losing Ida. Perhaps we'll just put the last words of our conversation about Ida, because she contributed so much to your work and life.

CG She was a wonderful partner. Not only, as I say, a beloved wife, but a wonderful partner in everything I did. We gave together, we worked together, we played together, we travelled together.

MB Dr Green, it's been very nice to talk to you today, I've thoroughly enjoyed that.

CG It has. I only wish Ida could be here. Ida would be a good one to have a few words.