

the guru



The man who follows the crowd, will usually get no further than the crowd. The man who walks alone, is likely to find himself in places no one has ever been before.. Creativity in living is not without its attendant difficulties, for peculiarity breeds contempt. And the unfortunate thing about being ahead of your time is that when people finally realize you were right they'll say it was obvious all along.

# W E P E R O H I M A R A T I N



1979

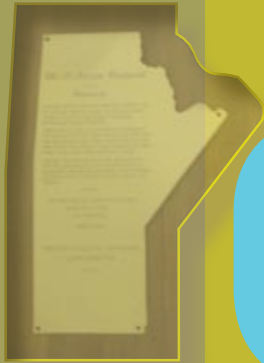


1979



2006

You have two choices in Life, you can dissolve into the mainstream, or you can be distinct.



The man and his credo who helped shape the future of a province



To be distinct you must be different.  
To be different you must strive to be what  
no one else but you can be.....



### **Biography**

Dr. Martin Wederpohl graduated with B.Sc. (cum laude) from the University of the Witwatersrand in Johannesburg, South Africa. He joined the British General Electric Company (GEC) in 1954 as a graduate apprentice and during the period 1954 to 1957 was with A. Reyrolle in the North of England as a research engineer. He received his PhD from the University of Manchester Institute of Science and Technology (UMIST) in 1957.

He became the telecommunications planning engineer for ESKOM in 1957 to 1961 and during more than 40 years employment worked for major companies such as Brown Boveri, Ericsson, Reyrolle, GEC. He also worked in UMIST and in 1974 became professor and Dean of Engineering at the University of Manitoba, Canada. Martin was British and later Canadian Regular Member of CIGRE Study Committee 35 - Telecontrol.

After his retirement in 1998 he became Dean of Applied Science at the University Of British Columbia. He is the recipient of many international awards.

The full biography can download from the PAC World web site.



Martin as Dux medal

(top student of the year)

prize winner at

**PAC World:** Please tell us about **Grey College,** the place where you were born and your family?

**MW:** I was born in Pretoria, South Africa in 1933. I lived there until 1941. Pretoria was known for its blue skies and wonderful climate.

It had a 12 month growing season with European fruit and crops in winter and tropical produce in summer. Although the war broke out in 1939 with South Africa joining the Allies, we were so far from the war zone that it did not have much of an effect on us.

My paternal grand parents were Lutheran missionaries who went to Southern Rhodesia, now known as Zimbabwe in the late 19th Century. They made the journey by boat from Europe to Cape Town, rail to Kimberley and then ox-wagon to Gutu south of what is now Harare. The ox wagon stage was about 800 miles. In the 1950's my grandfather was recognized as a Rhodesian pioneer being amongst the first 50 Europeans to settle there. In addition to theology my grandfather had to study medicine, midwifery, carpentry and so on because there were no facilities for contracting anyone

to help. The family was a self survival unit. My maternal grand parents, also Lutheran missionaries, settled 50 miles northwest of Pietersburg in the Northern Transvaal near the Zimbabwe border. While my grandfather was doing his missionary work, my grand mother established a hospital to deal with leprosy - the main scourge among the African people. After she had contained leprosy she started to tackle tuberculosis which was the second scourge. One of my aunts finished that work and the facility became a large general hospital. Her pioneer work among the black people was recognized four years ago with the help of Nelson Mandela.

**PAC World:** What is the first memory from your childhood that has something to do with technology?

**MW:** My father became a land surveyor and later retired as the surveyor general of the Transvaal and Chairman of the South African town planning commission. He had grown up in an environment where if you needed anything you made it yourself. Until the war broke out South Africa relied on Britain to provide its manufactured needs. Now we were isolated. During this time my mother learned to make her own soap and grew her own fruit and vegetables. My father had a passion for mathematics, astronomy and carpentry.

One of this projects was to turn his motorcar into a lathe so he could make a standard lamp for our living room.

To do this he jacked the car, took one of the wheels off, made a wooden chuck. While he wielded the chisel I controlled the speed of the car from hand signals he gave me. This was the beginning of my interest in technology.

**PAC World:** Did you know what you would like to become when you grow up?

**MW:** My father was clearly an inspiration. I built my own elastic powered balsa wood model planes. My introduction to electronics was to build a crystal radio receiver. I made my own crystal by melting a mixture of lead and flowers of sulphur and pouring the mess in to a container of cold water. A sharp crack with a hammer and a “cats” whisker made by wrapping a piece of wire around the tip of a pencil.

The tuning coil was length of insulated copper wire wrapped around a spent toilet roll holder. The only thing I could not make was a set of headphones which I obtained from a scrap merchant.

From this beginning I graduated to radio receivers using thermionic tubes which at that time was the basis for all electronics. Using regeneration (positive feedback) I could receive stations world wide with only one tube. This was the beginning of my passion for electrical engineering. To gain entrance in to one of the three electrical engineering departments in the country I had to obtain a first class school leaving certificate with distinctions in mathematics, physics and chemistry. Right through my school years my goal was to study electrical engineering at university.

**PAC World:** Did you play any sports?

**MW:** While at school I played cricket, tennis and learned to swim. I was particularly fond of cricket and was chosen for the school team in my final year.

**PAC World:** You received your B. Sc. Degree at the age of twenty. How did that happen?

**MW:** I graduated from school when I was 16 and this accounts for the fact that I obtained my bachelor’s degree when I was twenty. I don’t know why I was two years younger than normal. I may have jumped a couple of classes at some stage. There were only two of us who graduated cum-laude in the engineering faculty, one of my fellow students and me, and I was also top of the class.

**PAC World:** When and how did you become interested in electric power?

**MW:** After I graduated in 1953, I left South Africa for England where I started work for the British General Electric Company in Birmingham (GEC, not affiliated with GE in the States). I was what is known as a graduate apprentice. This was a two year program which took one right through a particular industry. This included manufacture, testing, design, contracts, installation, commissioning and sales.

**PAC World:** In 1957 you developed a distance relay based on transistors. Why did you decide to do that?

**MW:** At one time I was working in the department which manufactured protection relays and systems when I read about an event in the RCA research laboratories in Princeton,



England 1957, Martin on the right with brother Peter

NJ. RCA had succeeded in manufacturing by hand a device called a junction transistor using Germanium. As graduate apprentices we were allowed to read in the company library for one hour a day. There I had read about the work of a GE engineer, A. R. C. Warrington, the originator of the induction cup relay, who had manufactured an experimental electronic relay using thermionic tubes. I suggested to my boss in the relay plant that we might look into the application of junction transistors but got a very negative rebuff. Fortunately I had made the acquaintance of a very brilliant research engineer by the name of Friedlander. He suggested that I try to obtain a position in a university because the company would not be able to provide the facilities I required. I was fortunate enough to obtain a research scholarship to the Manchester College of Technology. My work proceeded very rapidly and I soon had a working transistor relay following the lines suggested by Warrington.

However I had no means of testing the transient performance so my supervisor arranged for me to work in the Reyrolle relay research laboratory in North East England. The company was so impressed with the potential of transistors that they offered me a good salary to pursue my work with them. In less than three years I had a full three zone distance relay terminal passing laboratory tests with flying colors. For this work Manchester University awarded me the PhD degree. The company obtained permission from the South African Electricity Supply Commission to test the system on a 66 kV transmission line. This was in an area which had one of the highest lightning incidences in the world. This would establish the ability of transistors to operate in the hostile environment of a power system with surges, over-currents and over-voltages.

At this time I was appointed by the South African Electricity Supply Commission as their telecommunications planning engineer. I was seconded to the British GEC in



1957

**PhD Graduation  
at Manchester  
University, UK**

Coventry and then Brown Boveri in Switzerland before returning to South Africa. At this stage I monitored the performance of the distance relay. I also discovered an anomalous wave propagation phenomenon on a power line which stimulated my interest in the solution of multi-conductor wave equations.

After about three years Reyrolle decided to develop transistor relays commercially using the new Silicon transistor technology which by 1960 had displaced Germanium. I was offered the post of Section Leader in Charge of protection research and development. I accepted on condition that I could spend a substantial part of my time working on multi-conductor wave propagation using their computer. This was agreed. Over the next three years, 1962 to 1964, I developed transistor distance relays, transistor phase comparison power line carrier relays and a range of individual over current and voltage relays for the company. I finally left to become a staff member at the University of Manchester Institute of Science and Technology in order to enable me to pursue my research into wave propagation in multi-conductor transmission lines!

**PAC World: You worked for utilities, manufacturers and universities. Which is your favorite?**

**MW:** It is difficult for me to say which of the three major areas I worked in was most rewarding because they are so different. My work in industry was highly creative and consequently satisfying. My university career was stimulated from the discovery of anomalous propagation on power



lines. I was determined to find the explanation. This led to the steady state model of multi-conductor power lines. I extended this work to resolve a controversy in CIGRE about the transient recovery voltage in a line after clearing a short line fault. All the modern analysis packages for analyzing transmission line performance are based on my work and for which I am recognized. My involvement with utilities was rewarding in a different way. I found my ability to encourage people to work in large harmonious teams was very satisfying. I moved to Canada after I was approached by some staff members at the University of Manitoba to allow my name to stand as dean of the faculty of engineering. The faculty was stagnating and it was felt that I could facilitate some of the activity which I had done in Manchester.

**PAC World: What was the most rewarding experience from your career?**

**MW:** The two most rewarding experiences I had in my career was the invention of transistor solid state relays systems and the formalization of the theory of wave propagation in multi-conductor transmission lines.

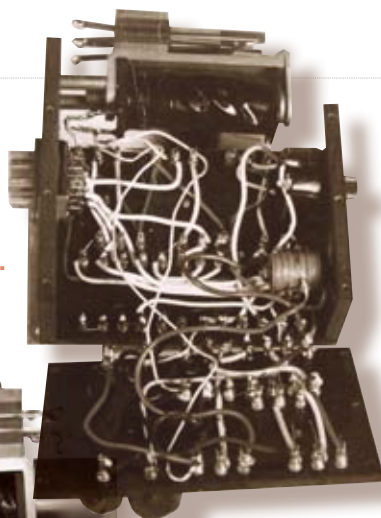
**PAC World: What was the most difficult experience?**

**MW:** The most difficult thing I had to do in my career was to convince people that I was not crazy. I presented my two papers on transistor distance protection to the IEE in 1955 when I was 22 years old. I was berated in the discussion after my presentation by the top protection engineers in the country saying things like "young man when you are old and experienced as me you won't make ridiculous propositions in public".

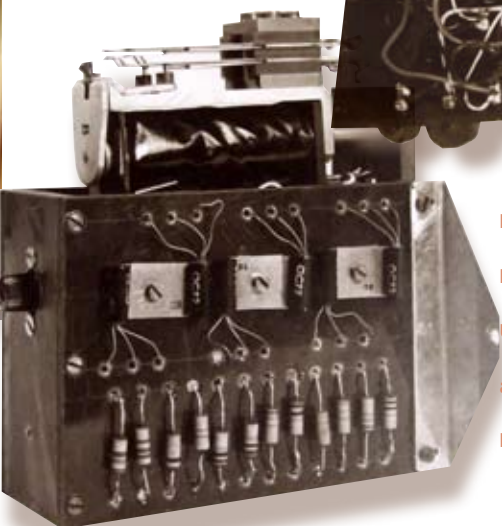
**PAC World: Do you see a difference between students when you were in college and today?**

**MW:** I see a big difference between the students now and in my early years. When I started work in England, the

In 1954 I started  
pioneer work on  
transistor circuits.



For this work  
Manchester  
University  
awarded me the  
PhD degree.



country was still recovering from the war. Money was extremely tight. To do research we had to design our own measuring equipment because the money to purchase was not available. We became very adroit at using slide rulers effectively because there were no computers. My concern about modern students is the mentality that "if I can't buy it I can't do it". Also there is an unfortunate tendency to number crunch problems before understanding the underlying principles. It is thus very difficult for these students to know whether their results are reasonable. Students have lost the ability to judge orders of magnitude.

**PAC World: Do you follow the developments of new technology, especially IEC 61850?**

**MW:** I am not in a position to comment in detail on IEC 61850. As near as I can judge it is a tool which can be used in power system protection applications.

**PAC World: Synchrophasor measurements are becoming available in dedicated or multifunctional devices. What applications do you see in the immediate and more distant future?**

**MW:** Again I am not in a position to comment in detail synchrophasor measurements. There have been many experiments including here in British Columbia. I believe the technology provides very useful information but how it is used will depend on algorithms yet to be developed.

**PAC World: We have been using for about a century sequence components for power systems analysis. With**

**the advancement in computer technology and taking into consideration the unbalanced nature of real power networks, do you think it is time to switch from sequence to three-phase models?**

**MW:** The use of symmetrical components in fault analysis and protection is extraordinarily powerful and valuable. Think of the many ground fault protection systems which have been developed through an understanding of symmetrical components. While computers enable very precise calculations to be made the results are sets of numbers which give very little insight as to the nature of the protection algorithms needed. In my time I have made major contributions to three phase models, I am nevertheless an ardent supporter of the continued use of symmetrical components.

**PAC World: What is your opinion on primary and backup protection? Do you believe in same device for both or different operating principles and different hardware?**

**MW:** I am a great believer in separating functions in protective systems. Although it is possible to incorporate everything in one digital algorithm it is very dangerous. Even simple duplication is not good enough. The transmission line protection systems I developed used at least two different operating principles example phase comparison carrier protection as well as distance protection in physically separated units.

**PAC World: You have been a Regular Member of CIGRE 35 (Tele-control) for both Britain and Canada. What is the impact of CIGRE on our industry?**

**MW:** It is not necessary to be a member of CIGRE to understand developments. This can be done by reading the proceedings. To me the invaluable part of membership was in meeting specialists from all over the world, having discussions with them and working together.

**PAC World: You received many awards during your career. Is there one that you consider the most important and if Yes, why?**

**MW:** The award I cherish most is the faculty teaching prize I obtained from the students. My goal in being an instructor was to communicate understanding and this I did. Our students evaluated us at the end of a course. My greatest pleasure was from the many students who said "this professor listens to our questions respectfully, answers them if he can and admits that he does not know everything."

**PAC World: What do you think is the biggest challenge for the industry?**

**MW:** I believe the biggest challenge for the industry is to acknowledge where we are now and strive to make continual improvements. The driving force should be simplicity, not writing more learned papers.

**PAC World: How do you see the future of the protection, automation and control industry?**

**MW:** Engineers have been allowing politicians, economists and laymen to drive their activities without question. Look at the absurd debate about "green" energy. The most incredible claims and statements are being made for the hydrogen economy. Only now, and albeit slowly, is the discussion



I love to walk around the beautiful vineyards and the Okanagan Lake

veering to the question “*where is the hydrogen going to come from?*”. I keep wondering when engineers who drive our world will take their place in the leadership of the world.

**PAC World: You have been teaching all over the world? Can you compare these experiences?**

**MW:** As I have traveled around the world I have been involved with good, bad and indifferent institutions. If I had my way I would outlaw the use of the words teach and school in a university environment and substitute lecture and university. You can teach someone to work a lathe. You cannot teach someone to split the atom when conventional wisdom says it is indivisible. My first lecture to a new class of students is to say “I hope I teach you nothing in this course but do hope I inspire you to understand a great deal”. Students have been indoctrinated in the belief that if not taught at university they are handicapped for life. My answer to this assertion is to ask how would you like to attend a university where there was no course in semiconductor physics or transistor technology. This was my situation.

**PAC World: Our industry is in crisis due to the aging of specialists and lack of interest in power engineering by college students.**

**What can we do to fix that problem?**

**MW:** In 1954 I started pioneer work on transistor circuits, never using thermionic tubes which I had in my university courses. What my university gave me was the ability to create knowledge. In this context my most favorite saying, attributed to the ancient Chinese: “*If you hear you forget,*



We often like to have our coffee at the Matterhorn Cafe.

*If you see you know, If you do you understand*”. Too many universities rely on almost exclusively on classroom instruction and then wonder why their students don’t make contributions. We have to convince our governments of the importance and respect that engineers need if we are to survive. Compare the remuneration of lawyers, doctors, pop stars, golfers etc. with that of engineers. I have watched Canada fall from the second most prosperous country in the world to 40th and falling. When I was growing up in South Africa in the 30’s and 40’s all our household appliances were imported from Canada. Now Canada imports most of its electrical needs from Asia, increasingly from China. Although not as bad, the same trend is evident in the United States. Consider that incredible company Hewlett-Packard. It has been brought to a shadow of its former glory by MBA’s whose only ability is to acquire assets then strip them to show a profit. Creativity disappears in the process.

**PAC World: What do you like to do when you are not teaching or consulting? Do you have a hobby?**

**MW:** I have had a number of hobbies over the years. Model plane building, woodwork, photography and cross-country skiing amongst others.

**PAC World: Do you have a motto that has guided you through your life?**

**MW:** Here is my motto on the illegible image I sent you: CREATIVITY.

**PAC World: What is your favorite food?**

**MW:** My favorite food is Avocado- Shrimp.

**PAC World: What is the advice you would give to protection, automation and control engineers that are just starting their career?**

**MW:** Find knowledgeable people, ask them questions, listen to their answers. See what is around you. If you don’t understand something, don’t rest until you know why. Maintain absolute integrity at all times. I found in my career that telling people stories (parables) in relation to a question is the most powerful way of inculcating comprehension. Students often came to my office after hours and asked me to tell them a story.