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Dear Eric,

I was surprised and happy to receive your fine letter. It pleases an older man when a young man finds time to ask interesting questions. This is especially true in your case because I happen to know the answers to your questions.

Yes, I was very fortunate to have some really great teachers in high school. At McKinley Junior High the principal, Francis Prescott, sometimes taught classes. She was a brilliant, warm hearted person who had a "presence" that captured the attention of the students. Another teacher was Grant Wood, the now-famous painter. He soon realized that the students in our class were totally lacking in artistic talent but he made it a fun class nonetheless. One week he brought a scratchy portable phonograph and a large canvas to the classroom. When he showed us his painting we saw a pattern of brightly colored curves which he said were pictures of the sounds he heard in a few well-worn grooves on the record. Grant painted a few more grooves of the symphony for us while we watched and teased him good naturedly. He was showing us how artists can see harmony in the mind's eye.

Washington High School was a big, stone, castle-like building facing 4th Avenue at 5th St. next to Green's Square. It was overcrowded with all of the 10th, 11th and 12th grades in Cedar Rapids; the interior construction including stairways was wooden and it was a real firetrap. Here Paul Engle, Bob Gates and I were the only students in Elizabeth Cock's English classes. Miss Cock was known as a very demanding teacher and smarter students must have managed to enroll in classes with "easier" teachers. Actually she was a fascinating and inspiring person who taught Paul Engle how to become a Rhodes Scholar and a poet and Gates and Collins how to read the great literature.

Eva M. Byerly was the Latin teacher. In those days Latin was supposed to be a required subject for all "educated" persons. Miss Byerly was a niece of Dr. Robert Millikan, a Nobel prizewinning physicist who founded the California Institute of Technology. She shared the traits of a high-intellect family. In the second and third year Latin classes Arnold Pyle (an artist), Doug Bennet Sinclair (a brain) and myself were almost the only students remaining. I am afraid we were all poor Latin students but Miss Byerly led us into many discussions of the civilizations of the Middle East, Greece, the Roman Empire, the Middle Ages and the Renaissance. We did not realize it at the time but this was a college level course in history, the arts of war and peace and philosophy. But Miss Byerly made it seem painlessly easy to high school students.

Grace DeNoon taught geometry and algebra and Hilda H. Horn taught botany; both were dedicated teachers. Miss Horn signed our papers with a monogram formed by three vertical and one horizontal pen strokes. In

Hilda's classes students cracked a cover-glass on a microscope slide only once!

What kind of grades did I get? Not long ago I found all of my high school report cards in my mother's papers. I had forgotten that all of my grades were in the high 90s! This leads me to offer a bit of advice. I had the mistaken notion that I was so smart that I did not need to study. I found that if got to class a few minutes early I could scan a geometry theorem and see what scheme Euclid used to get down to the QED. When I got to the blackboard a few minutes later I could whiz through the demonstration quickly on my feet before I forgot how to work it out. We did not have multiple choice quizzes, final exams or SATs so I never really learned how to study. Later in college I found out the hard way that I had to learn to study like everyone else. I have been fortunate since then in working with people who were brighter than me and who studied harder than I did. This is fun and I hope I can keep on learning something new every day.

Did my teachers help and encourage me? Yes, of course they did; but this was done in a very subtle way. They encouraged our curiosity about a larger world of people and ideas. I learned about radio not in Washington High where the word, radio, was almost unknown. but elsewhere on the school "campus".

There was a big "study" hall presided over by poor old Mr. Reynolds who was deaf and nearly blind so the two hour study periods allowed students to explore the campus which included the pool hall across the street, George Wilson's Electric Specialty Company located across the alley from the telephone central office and the Carnegie Library which strangely held all volumes of the proceedings of the Institute of Radio Engineers. I was a born loser at pool so I spent study periods at ESCO or reading IRE Proceedings. Wilson's one-man enterprise repaired farmer's mutual telephone switchboards that had been demolished by lightning strokes and other jobs that required the skill of a genius like Wilson. His product line included beautiful brass connector clamps used for splicing steel telephone lines. Wilson taught me to run his ancient South Bend turret lathe and a small bench milling machine. Under a highly informal arrangement, in return for machining a small batch of connectors I used his tools to make parts for my ham station and to extract needed parts and pieces from ESCO's gold mine one-of-everything stockroom. These study periods were accompanied by well spiced lectures on the telephone business past, present and future. Wilson had worked in Chicago at Automatic Electric where the first automatic telephone switches were built; he was truly an expert in his field.

How did my parents feel about my radio work? Why did I get interested in communication? Who paid for the telegrams? Both of my parents always gave me every possible encouragement in my home projects and helped me to meet other boys and men with kindred interests. When we moved to Cedar Rapids there was a grain dealer's office next to my father's office. When father took me to his office I could hear the click-clack of the telegraph sounders carrying the Chicago Board of Trade quotations in the Wilder Grain Co. office next door. This fascinated me especially when Mr. Wilder would visit patiently with me for several minutes and then stop briefly to write out in beautifully formed handwriting every quotation that had come over the wire while we had

been talking. In response to my curiosity and, I fear, impertinent questions Mr. Milder gave me several telegraph keys, sounders and "gravity" battery electrodes and explained how it all worked. Soon there was a telegraph line connecting three boys and one girl on our block on Grande Ave. We never quite mastered Morse code but instead used the slower but easier to learn Continental Morse used by the Army Signal Corps. Mary Stewart was the fastest operator and soon could "burn out" the rest of us.

To reach out farther we all built crystal detector wireless receivers and the telegraph line was chopped up into aerials so we could copy Hank Nemeec and Clark Chandler who had spark transmitters across town. Tom Brian across the street got a DeForest "audion" vacuum tube; on good nights he could receive Navy time signals from NAA in Arlington, Va. at 9:00 PM so we could all solemnly set our watches to the exact second. More than a dream this was a very real and ever widening new world for all of us.

I am afraid your question about paying for the telegrams calls for a lengthy answer but it involves more interesting people and you are entitled to an answer.

The early physicists, Helmholtz and Hertz, first proposed and demonstrated that electromagnetic waves longer than visible light waves obeyed the laws of optics and could be focused in a line-of-sight beam, reflected, etc. just like visible light. Hertz' experiments were done in the centimeter wavelength region now used for radar and satellite communication. Marconi found that if still longer waves were used the waves would be refracted around the curvature of the earth and over-the-horizon and even transoceanic communication was possible. When I first became an amateur, scientists had neatly packaged these theories in what was known as the Austin-Cohen radio propagation formula. This formula showed that waves shorter than about 200 meters (higher in frequency than about 1500 kilohertz) were nearly useless for long distance communication. All naval and commercial wireless stations used wavelengths longer than 500 meters. Our present AM radio broadcast band lies between 200 and 500 meters. Accordingly amateur experimenters were allowed to explore the "useless" wavelengths shorter than 200 meters. Two other scientists, Kennelly and Heavyside, theorized that the sun's ultraviolet light must ionize the outer atmosphere forming ionized layers that would absorb medium wavelength radio waves and that this would account for the limited range of daytime communication experienced by ships at sea. Only very long wavelengths requiring tremendously high antennas could be used for long distance communication in daylight hours.

Amateurs had found that short waves became very weak at distances of 100-200 miles as predicted by theory but surprisingly became strong again at about 1000 miles. Could it be that short waves were being reflected back earthward by the Kennelly-Heavyside ionized layer? I had been able to contact a fellow ham, John Reinartz, 1QP in Massachusetts in this way on 80 meters.

John told me that he was planning a test on 20 meters with Ed Willis, 6TS, in Los Angeles in full daylight. This would require a double bounce back from the ionized layer to span 3000 miles but there was a chance that it might work at the short 20 meter wavelength! This seemed

like a crazy scheme but why not try it? I decided to tune my receiver to 20 meters at the scheduled time to see what would happen. Their signals came through loud and clear so I scrambled to get my transmitter working on 20 meters overnight and was able to make it a three-way contact the next day. We reasoned that the 1QP's and 6TS's signals were making two hops between Massachusetts and California being reflected twice by the ionized layer and once by the earth's surface near the midpoint. My station 9CXX in Cedar Rapids was about at the midpoint distance from both the east and west coasts giving me one hop transmission to 1QP on the east coast and to 6TS on the west coast. Later research done by many people would show that, indeed, this could be that case but that other, more complex propagation modes also existed on short waves.

Reinartz' crazy scheme caught the attention of the arctic explorer, Capt. Donald S. MacMillan and the National Geographic Society. He was asked to sail as radio operator on the schooner Bowdin on a voyage to Etah at the northern tip of Greenland the following year. My parents obligingly arranged our spring vacation so that we would be at Wiscasset, Me. when the Bowdin sailed for Etah. I met Reinartz on the Bowdin and carefully worked out schedules, wavelengths and radio operating plans based on what we had learned about the behaviour of 20 meter waves. As we expected and hoped, once the Bowdin reached about 60 degrees north latitude the Kennelly-Heavyside layer started working for us and we had strong mid-day (not nighttime) signals both ways every day. My only problem was using my left hand to keep my receiver tuned to Reinartz' frequency which reacted to the Bowdin's roll in the seas while I copied his CW (continuous wave radio telegraph) signals with my right hand.

The small Navy vessel, Perry, accompanying the Bowdin was equipped with standard long wavelength Navy transmitters but the small size of its antenna made long wave communication inefficient beyond a few hundred miles range. John Reinartz' success using 20 meter daylight waves on the arctic expedition was being closely watched by Dr. A. Hoyt Taylor, director of the newly founded Naval Research Laboratory in Anacostia, D. C. Dr. Taylor quickly launched a truly scientific study of short wave propagation that led to adoption of short wave radio by the U. S. Navy. It was my privilege to meet Dr. Taylor many times and he showed me how scientific work is done.

After copying MacMillan's sometimes lengthy messages on humid Iowa summer days I would cool off while coasting down hill on my bike to the Western Union office on 2nd Avenue to file the dispatches at "press rate" (collect) to the National Geo. Society in Washington, D. C. So now you know who paid for the messages.

I know your grandpa, Milo Soukup very well and his brother, Leo and I remember your great grandpa Soukup too. The Soukup family helped the Radio Company get started and kept it going; these are some of my favorite people. Ask grandpa Milo to tell you about the time I took him to Kansas City to fix the first Autotune transmitter. While I listened to nonsensical advice offered by the TWA engineer, Howard Morgan, Milo quietly reworked and realigned the transmitter and got it going right.

I write few letters and rarely one this long. You asked about people and things that give me pleasure to write about. I am sure that you

also will find people in Cedar Rapids that will enrich your life as well.

Sincerely,

A handwritten signature in cursive script, appearing to read "A. H. Albee". The signature is written in dark ink on a white background.