

**Reminiscences of a Stock Quotation System:
The Real Story of Ultronic Systems Corporation**
By Robert S. Sinn – February 2009

(The Founders: Robert S. Sinn, George Hernan, Stan Hunkins, Sam Azeez)

After my graduation from the University of Pennsylvania in June 1952, I went to work as a very junior class D engineer at RCA in Camden, New Jersey. I was part of RCA's first digital computer engineering group; at that time we had only about twenty engineers in the group. We were assigned the task of designing and building a programmable, digital computer complex to do the accounting for the US Army's major warehouse depot. The manager of the group was an American, however the manager in charge of hardware engineering was a non-repentant German, Joseph Brustmann, who was one of the scientist/engineers that the US had gathered up in Germany right after the war. My group leader was a Chinese from Taiwan, Gary Chien who had earned a Doctor of Science degree from MIT in just one year. At least a third of our group was foreigners from Hungary, England, China, Israel, Germany, etc.

Various personnel from the Moore School of Electrical Engineering had designed and built the first large scale programmable, digital computer at the University of Pennsylvania under contract from the US Army Ordinance Department. This was the famous ENIAC. RCA contracted with professors from the Moore School to go to Camden to instruct us in Boolean Algebra (the basis for binary digital computing) and the design of digital circuits and devices.

At that time in 1952 all digital computers were built using radio tubes (vacuum tubes). This made the computers massive energy burners (each tube had a filament heater) and very unreliable. There were so many tubes and the chance of failure per tube was such that the computers couldn't run for a day without failure. All this changed in 1954 when everyone switched to discreet transistors. Whereas, previously with vacuum tubes you could only get one bit (flip flop) per plug in card now with the much smaller transistor you could get up to eight bits per card. By using transistors the power requirements were drastically reduced and reliability was drastically increased.

My project was the Card Transcriber, a machine used to read IBM punch cards and then write the information onto magnetic tape. The holes in the cards were read with wire brushes as the cards were automatically fed onto a revolving drum. The electrical noise produced by the brushes made it almost impossible to read the cards. I invented a circuit which completely eliminated the electrical noise; that was my biggest contribution to the project (patent see Note 1).

RCA paid for additional education expenses for its engineers; therefore I continued my studies at the University of Pennsylvania after being accepted into the PhD, Physics program. In 1955 I was chosen to attend a Masters in Systems Engineering and Operations Research program given at the Moore School. We (ten of us) were given two days per week off to attend classes with full pay and all expenses paid by RCA. Only two of us received degrees in 1957. My thesis was "The Application of Random Walks and Ruins to the Theory of Games".

I joined the RCA Service Company in 1958 after an unhappy divorce experience. RCA was offering eighteen month 'tours of duty' in Tule, Greenland in order to set up the Ballistic Missile Early Warning System (BMEWS). At Thule we worked ten hours per day, seven days a week and were paid time and a half for overtime and double pay for Sundays and holidays. One could then earn over twice his base pay and have no expenses. The only expense was booze at the Officers' Club which was ten cents for a shot of Crown Royal. At that time I was making a base pay of about \$9,000/year as group leader of the Checkout Data Processor System. In eighteen months I could then save close to \$30,000 which in today's dollars is about \$300,000. I went to Thule in February 1960 and returned in July 1960 after only six months on site. My boss and I didn't get along and in July we agreed that I would leave.

After returning to New Jersey I continued to work on the project, but was looking to do something else. I contacted one of my former professors at the Moore School and was offered an instructorship. At that time, August 1960, my stock broker Leonard Klorfine gave me a prospectus of a new company going public underwritten by my broker Merrill Lynch Pierce Fenner and Smith. The company was SCANTLIN Electronics from Los Angeles which was founded by Jack Scantlin, a brilliant engineer from Cal Tech. The device that he invented was "QUOTRON", a desk unit that would reproduce on thermo tape a replica of the last sale transaction of any stock on the NYSE that was keyed into the desk unit. At that time the information devices available to brokers in the US were as follows:

1. The last sale ticker tape- A device that printed on a paper tape all of the sale transactions on the NYSE. The printed transaction used abbreviations to save transmission time and one had to study the usage in order to read the tape properly. Each stock had an alphabetic abbreviation of from one to three characters which is still the same today for the NYSE and AMEX, however NASDAQ went to four letters. The volume of trading for each stock was abbreviated in hundreds. The American Stock Exchange also had a ticker tape using the same techniques. At that time in 1960 the average volume on the NYSE was about one million shares per day. If the volume went much over that then the last sale ticker would run late. On a five million share day the last sale ticker would be about fifteen minutes late.

2. The bid and ask ticker tape- The same as the last sale ticker but bid and ask on each stock continuously updated. In a high volume market this was quite valuable because it ran more up to date than the last sale ticker.

3. The TRANS-LUX tape display- A device that printed the last sale ticker on transparent tape and then projected the tape onto a screen in the brokers' offices. Practically all brokers had a TRANS-LUX display and this is what they and the public would watch to see the market action.

4. The TELEREGISTER Board- A large electro-mechanical display of a selected set of stocks, showing the ticker symbol and the last sale price. A small board would show 50 stocks and a very large board would show 200 stocks. The prices of all of the stocks on the board were updated automatically in synch with the last sale ticker.

All of the above devices were practically unchanged since the 1930's. Before QUOTRON there was no way for a broker to know the last sale price of a stock unless it was one of the stocks on his TELEREGISTER Board (if he had one), or unless he had been watching the tape for that stock. The QUOTRON filled a very useful function in the brokers' office and in fact would be a necessary device in all brokerage offices. The first public offering of SCANTLIN stock was therefore a hot issue.

There were no QUOTRONS in Philadelphia where I lived, which prompted Leonard Klorfine and I to travel to New York in order to see a demonstration of the unit. Jack Scantlin was a very secretive person and there was no written description of how the QUOTRON worked. After seeing the demonstration in N.Y., it was obvious to me that the central unit had a magnetic tape that recorded the ticker signals. A person could type in the ticker symbol of a stock on a remote desk unit and the central unit would reel back and find the last ticker transmission concerning that stock and the desk unit would then print out on thermo tape a replica of the ticker's last sale print. This device was a major advance over what was available at that time but completely lacked any computer processing such as high and low and total volume for each stock for that day.

At that time I had just recently seen an advertisement where AT&T was now offering the 'DATAPHONE', a modulation/demodulation device for the transmission of digital data on the switched and dedicated voice lines, offering data speeds up to 1000 bits per second. It then occurred to me that a computer processed stock system was now feasible nationwide.

I decided to turn down the instructor offer at the University of Pennsylvania and spend full time designing a nationwide stock quotation system. In about two months I had developed the following system: the ticker transmission would be automatically interpreted by a hard wired digital computer, continually updating a magnetic drum with the last sale prices of all of the stocks on the NYSE and AMEX, at the same time computing and updating highs and lows and total volume for each stock, and as these items were updated a data packet would be generated for transmission by DATAPHONE at 1000 bits/second to identical magnetic drum storage devices in each major city in the United States. These slave magnetic drum units located in the major metropolitan centers in the US could then be accessed by desk units in local brokerage offices again using DATAPHONE transmission. The desk units would set up the ticker symbol code for the desired stock by mechanical means actuating micro switches. The local control box would interrogate each desk unit in sequence and send a request data packet by DATAPHONE to the local magnetic drum which would then send return data packets back to the local brokerage office. Each packet both for request and answer would contain the request stock alphabetic symbols plus a desk unit identifier. Because the desk units would set up the requested stock code statically the desk unit would automatically update the stock price, volume, and highs and lows without any operator intervention because the control unit could complete the interrogation of all desk units in the office in about every 2 seconds, **This is the first use that I know of which used data packet transmission with the sender's identification imbedded in the data packet in order to avoid switching- a forerunner of the internet? There was no switching in the entire system; all was done with data packets containing sender identifiers.** (see Note 2 for a listing of patents)

One of the patent attorneys whom I had known at RCA had gone into private practice in Philadelphia. I contacted him and asked him to do a patent search. The patent search came back clear and I now thought in terms of forming a company to promote and implement my invention.

The only financial person I knew was my stockbroker, Leonard Klorfine. After I explained my invention to him, he said it was a great idea if it would work. I knew many engineers and I was able to interest some of the key ones in the project. I incorporated ULTRONIC SYSTEMS CORP. with an attorney acquaintance Paul Matzko, and my small group put in about \$22,500 of seed money at 10 cents per share. I received 100,000 shares for contributing my invention plus another 50,000 shares for contributing \$5,000. Another engineer friend of mine, Sam Azeez put in \$5,000 at 10 cents and five others put in \$2,500 each at 10 cents.

One of those engineers went with me on the project full time starting January 1, 1961. He was George Hernan who was an expert circuit designer and logician. He was our V.P. Engineering and was given 25,000 shares for leaving RCA and coming with us full time but did not contribute any cash.

We moved to a 5,000 sq. ft. building in Pennsauken, New Jersey in March 1961 and Stan Hunkins and Sam Azeez came onboard full time. Stan as V.P. New Products and Sam as V.P. Production. The original system concepts and designs were mine but the actual design and implementation was done by mostly George Hernan and Stan Hunkins, whose original concepts and inventions added great value to the project. By June we had a model working in our building which we used for demonstrations in order to raise money at 50 cents per share. The desk unit was as shown in patent #3,248,700. This unit used rotating wheels to set up the ticker codes on micro switches. The stock brokers and business men who saw it said, "It's great but will it really work?" And the engineers who saw it said, "Of course it will work but will it sell?"

That spring I spent much of my time in New York trying to get NYSE approval. The NYSE had approved Scantlin's QUOTRON, but were reticent to approve our system. There was lots of politics involved. Scantlin was backed by Merrill Lynch Pierce, Fenner and Smith, the biggest retail broker and we were backed by no one. At that time Wall Street was very WASPY and there were very few Jewish member firms. By accident we happened to have a lot of Jewish financial backing out of Philadelphia including the Philadelphia office of Bach and Co., at that time the largest Jewish member firm. Our management team was Catholic, Protestant and Jewish. Finally the NYSE said they would approve us if we could get sufficient backing from a NYSE member firm. Bach and Co. then did a private placement for us of \$500,000 at \$2 per share. Finally in the fall of 1961 we were granted NYSE approval and installed our first commercial units in New York and Philadelphia.

My V.P. of sales, John Brown, and I then made a surprise sales foray into San Francisco and Los Angeles which was very successful in signing up many new customers. This jump across country was a complete surprise to Jack Scantlin and caught him off guard. We easily implemented the system by installing an AT&T leased line with DATAPHONES from our NJ offices to San Francisco and then down to Los Angeles with slave magnetic drums installed in each of these cities.

The original desk unit with the rotating wheels was not user friendly, which motivated us to develop the STOCKMASTER desk unit in 1961/1962 which used push button keys instead of the rotating wheels to set up the ticker codes. This desk unit was designed by a very good professional industrial designer and for that time had a very modern look. The keyboard actuating units are shown in patent #3,267,215. Illustrated below is the ten thousandth STOCKMASTER unit presented to me by the company in August 1967. I still have that desk unit which is shown in the photo below which was just taken today.



STOCKMASTER-circa 1962-picture taken in 2009

In April 1964 we signed a five year joint venture agreement with the international news service Reuters to put Reuters/Ultronic stock quote service into Europe, which later expanded globally. Getting the stock data to Europe was easy; we built a time division multiplexor to put onto Reuters' trans-Atlantic voice line using DATAPHONES to transmit at 1000 bits per second. This allowed us to transmit both our stock data to London and gave Reuters all of the teletype lines that they had previously. We expanded rapidly all across the US and went public with Bache and

Co in October 1964. Sam Azeez resigned just before the offering and sold all of his stock into the offering.

By 1965 the company was expanding rapidly to the extent that our Pennsauken manufacturing facilities were bursting at the seams. We bought property at Exit Four of the NJ Turnpike and built a 50,000 sq ft building in 1965/66 that won some architectural awards. This plant was then the center for all engineering, manufacturing, and the central computer processing facilities for all of the market data from all over the world. Our sales and marketing offices were located at 44 Wall St. NYC.

We developed other stock quotation devices such as 'LECTRASCAN' (an electronic ticker display) and 'MARKETMASTER' (a large video display stock and commodity desk unit with modern type keyboard input) etc., but our big problem was financing. Because we were in the leasing business we had to finance the manufacture and installation of all of the units. By 1967 our bank loans were up to the legal limit at both the Fidelity Bank and the Girard Trust bank with me as personal guarantor. The rapid acceleration in computing technology and hardware made our very large equipment investment a bit scary because of the potential obsolescence factor.

In December 1967 we decided to sell out to the Sylvania division of General Telephone. I stayed on as CEO until the summer of 1970. By this time we had over 65% of the U.S. quotation business and with Reuters 100% of the overseas quotation business. The STOCKMASTER and MARKETMASTER desk units were then widely used all over the world.

Note 1: US Patent # 2,994,476- PERFORATION SENSING CIRCUIT-Nov. 15,1986

Note 2: US Patents#

3,335,411-STOCK INFORMATION STORAGE AND REQUEST SYSTEM- April 13, 1961

3,286,235- INFORMATION STORAGE SYSTEM- May 5, 1961

3,248,700-DATA SELECTION SYSTEM- May. 31, 1961

3,283,304-DATA RETRIEVAL SYSTEM- May 31, 1961

3,281,788-DATA RETIEVAL AND COUPLING SYSTEM- Nov.3, 1961

3,267,215-CODE BAR SWITCH ACTUATOR- Sept. 7, 1962

3,310,782-DATA MESSAGE SYSTEM- Feb. 27, 1963

3,359,541-DATA RETRIEVAL SYSTEM HAVING PLURAL ADDRESSED REMOTE REQUEST STATIONS- Dec. 30, 1963