

Clarence D. Tuska: Radio Pioneer, ARRL Founder



See the digital edition of *QST* to hear Clarence Tuska explaining the origins of the ARRL and *QST*. (Courtesy of the Antique Wireless Association.)

Energy, enthusiasm, and imagination defined the life of this important figure in ARRL history.

Bart Lee, K6VK

Hiram Percy Maxim and "...that brilliant Hartford youth, Clarence D. Tuska, launched our League..." in 1914, according to *QST* in April 1936.¹ Tuska's interest in technology began early on; he had started experimenting with the coherer detector for wireless telegraphy as a boy in 1907.² By 1910, he was using an untuned spark coil transmitter, two dipole antennas, and a two-slide tuning coil. He also tried an electrolytic detector from Hugo Gernsback's E.I. Importing Company "...that did not operate at all well..." He then moved up to a loose coupler, a crystal detector, and a pair of Brandes headphones.³ He met Maxim at about the time he was just starting high school in Hartford in 1910.

Tuska had made a wireless receiver and put it in a local toy store on consignment. He hoped to make some money as he had with toy airplanes and various other wireless components he had made. Maxim, whose son was interested in wireless, bought the set, but later returned it. Tuska's mother insisted that he call on Maxim to ask why — so he did. As it happened, Maxim wanted a more professional set. Tuska promptly built one for him. The two soon developed "a friendship...more of a father to foster-son relationship." The Maxim family and Tuska talked by wireless as pre-1912 stations SNW and SNT.⁴

"The Old Man" and the "Young Squirt"

Maxim was an older man in 1914, being over 40 at the time. Indeed, he was "The Old Man" who provided much of the early *QST* magazine commentary on amateur matters, including "Rotten QRM." Tuska was in his teens, a "young squirt" in the parlance of the day. Nonetheless, he became the League's — and *QST*'s — Chief Operating Officer, as it were, while working from the attic of

his home.⁵ He and Maxim founded *QST* privately in 1915 and Tuska (see Figure 1) came to own it, although the League took it over in 1919.⁶ Maxim made the 1914 announcements for the formation of a relay league of amateurs and Tuska handled the organization of it.⁷

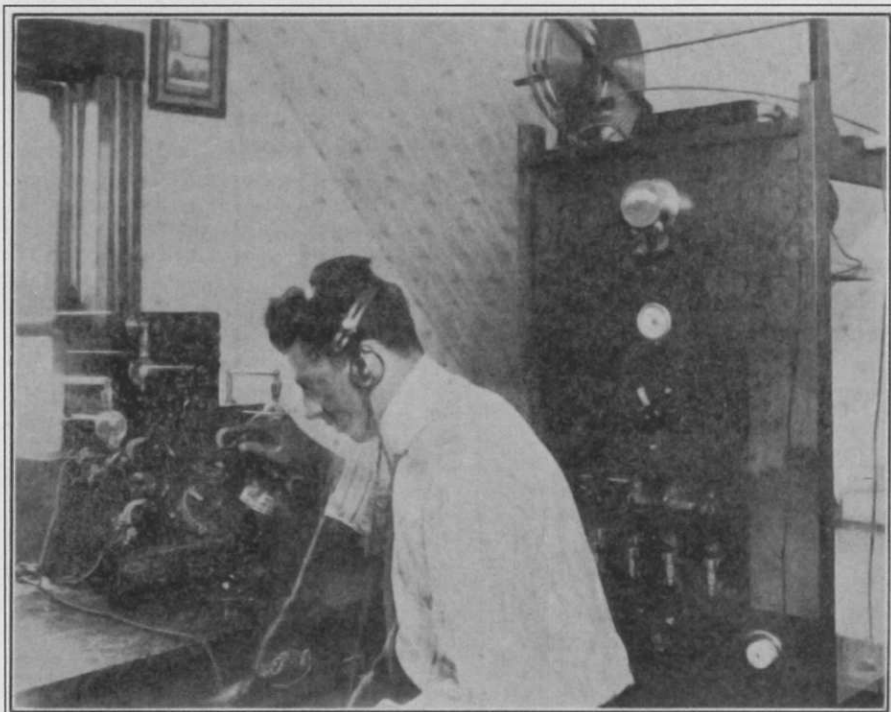
An audio file of Tuska recorded in 1980 was provided to us by the Antique Wireless Association. This



Figure 1 — Clarence Tuska in 1916 when he was 20 years old. At this time he was the secretary of the ARRL and the editor of *QST*.

audio clip is of Clarence Tuska talking about the beginnings of the ARRL and *QST*. It runs just over a minute and is available on the ARRL website at www.arrl.org/qst-in-depth.

At that time amateur signals covered only short ranges. This problem provided an opportunity to form an organization to link nearby amateurs in all directions in order to relay messages longer distances.



Clarence D. Tuska, of Hartford, Conn., who is interested in wireless telephony. By making his victrola a part of his transmitter circuit he has been giving wireless concerts for the benefit of amateurs in and about Hartford. This photograph shows Mr. Tuska at his telephone

Figure 2 — Tuska with his radiotelephone setup from the February 1917 issue of *The Wireless Age* magazine.

¹Notes appear on page 69.



Figure 3 — This restored superdyne set is quite elegant in design to blend in with the better furniture of the family parlor, in which they were often located. The open top reveals the Tuska logo. [Steven Johannessen, photo]

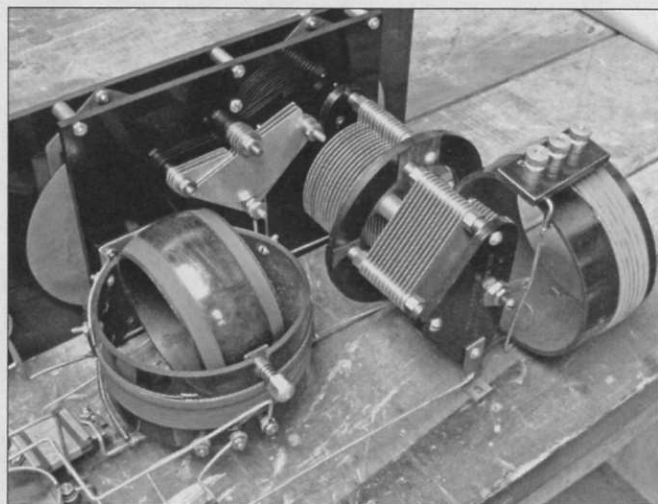


Figure 4 — This is the RF deck of a restored superdyne receiver that shows the variometer negative feedback coil arrangement Tuska invented to neutralize the tube capacitances, preventing oscillation. [Steven Johannessen, photo]

Maxim noted then: “It may be that we have in this idea a great organization in the making.” These were the days of spark sets with, at best, a 30 mile range, even on the ARRL’s special wavelength of 425 meters, about 700 kHz.⁸ Few people enjoyed telephone service and, this being before vacuum tube amplifiers, its distance was also limited. Western Union charged a monopoly price for a telegram. Regular mail, handled by rail, could take a long time to be delivered. A radio relay league could meet a demand for free, private and personal messages, perhaps even across the continent (as it soon did). It could thus show the importance and promise of Amateur Radio.

In his long career in radio, Clarence Tuska first devoted 5 years of his youth to the ARRL. The Department of Commerce issued him several radio licenses: 1AY, 1WD, 1ZT (a special class) as of 1915, and later 1XV (experimental class, 1920 – 21).⁹ Tuska enjoyed the evolving technology of radio. The Institute of Radio Engineers made him a member as early as 1915. He wrote an article for *QST* in 1916 about the new regenerative circuit and its “oscillating Audion” vacuum tube heart.¹⁰

Modulation and Imagination

The possibility of using vacuum tubes to produce continuous waves that could be modulated with voice and music seized his imagination very early (see Figure 2):

It was not long before I had a 50 W



Figure 5 — This is the left side of the superdyne’s front panel. Note that the volume control adjusts the variometer. The more negative feedback, the lower the gain in the stages. [Steven Johannessen, photo]

oscillator and a 50 W modulator in operation. I was able to transmit understandable speech and music of passable quality over a normal radius of 25 miles. It was a common occurrence for other amateurs to ask me to transmit music for visitors... Regular broadcasting, as we know it today, had not started...

...I foresaw a real future for paid broadcasting because I knew that the audience was starting to grow.¹¹

In World War I, 1st Lieutenant Tuska served in the Signal Corps, a natural fit. The first post-war issue of *QST* in June 1919, reported that he had acted as the Officer in Charge at a radio school and as a Radio Officer at two installations.¹²

Earlier in 1919, he had heard the call of commerce in the exploding field of radio. He had to make a living, and to make his own way. As a matter of personal ethics, he stepped down as ARRL Secretary at a meeting on March 16, 1919 “...by reason of commercial connections, since he was entering the radio manufacturing business.”¹³ He worked with the A.C. Gilbert Company of Hartford on promotion, crystal sets, and radio supplies.¹⁴ Then he launched his own radio manufacturing company, at first making a similar style of crystal set.¹⁵

After the war, in 1919, he testified for the ARRL before a US Senate Committee about the proposed Navy takeover of the airwaves.¹⁶ He was 24 years old at the time.

Tuska did not pursue broadcasting (despite holding the commercial land station license WQB as of September, 1921¹⁷). He did form The C.D. Tuska Company in Hartford, Connecticut initially to make radio apparatus. He then moved on to his briefly well-known superdyne circuit and manufactured several models of broadcast receivers for the home, between 1922 and 1925 (see Figure 3).¹⁸

Conquering the Squeal

Oscillation in the regenerative detector stage of the receivers of the early 1920s turned them into “bloopers,” interfering with other sets and frustrating listeners at home. Tuska and others put a stage of radio frequency amplification ahead of a non-regenerative detector, but stray capacitances in the triodes



Figure 6 — Tuska in 1957, about the time he published *Inventors and Inventions*.

of the day still sent the sets into squealing oscillation.

Tuska understood Major Edwin Howard Armstrong's regenerative circuit well, especially its use of positive feedback. Too much unintentional feedback was what caused the squeals and whistles. Tuska solved the problem by adding a variometer [An arrangement of two series-connected coils, one inside the other. When the internal coil is rotated, the inductance of the assembly would vary, hence the name. — *Ed.*] to provide negative feedback to stabilize the circuit (see Figure 4).¹⁹

He coupled the variometer from the plate to the grid in opposite polarity. Rotating the variometer provided a controlled amount of negative feedback that would cancel the stray capacity's positive feedback. If adjusted delicately, some residual-capacity positive regenerative feedback remained. In Tuska's words, this made for "...astounding degrees of amplification." Tuska had solved the technical problem and in his superdyne radios, he made this adjustment the volume control (see Figure 5). Unfortunately, this adjustment tended to require more than a consumer's level of skill.

Tuska then went to work for Atwater Kent, famous for its breadboard receivers that looked like laboratory equipment (as a marketing ploy). Eventually Tuska moved to RCA where he managed the patent department as one of David Sarnoff's pool of talented executives who had individually pioneered radio in its earliest days. He also wrote prolifically on patents. He acted as Director of Patent Operations at the RCA Laboratories in Princeton. He patented a wartime improvement to radio direction finding in 1942²⁰ and continued to invent for many more years.

In the 1950s he wrote articles for the Franklin Institute about invention and the creative process.²¹ Tuska (see Figure 6) hoped inventors would benefit from

their ingenuity. However, he also saw the larger picture: "Without adequate patent protection it is doubtful if capital would be forthcoming to make further inventions and to develop the inventive things that can continue to do so much for an improved way of life."²²

His adventures in invention and commerce made Tuska a good and sympathetic manager of electronics engineers and inventors. He wrote his books in a down-to-earth tone and used an approach that was deeply historical and humane. Clarence D. Tuska, born in 1896, and died in 1985. Hartford's brilliant youth of 1914 advanced one of the most important technologies of the 20th Century for most of his life.

Notes

- ¹"The Editor's Mill," *QST*, April 1936, p 12.
- ²CellStream History of Telecommunication Timeline Wiki, www.cellstream.com/wiki/1900-1910.
- ³C.D. Tuska, "A Memorable Meeting," *Fifty Years of ARRL*, ARRL (Newington, CT, 1965), p 5.
- ⁴*Ibid*, pp 5 – 6.
- ⁵*Ibid*, p 15; Tuska incorporated the League in 1915 along with Maxim and their lawyer.
- ⁶*Ibid*, p 26. League members raised money by bonds to pay off the debt that Tuska had taken on to publish *QST*.
- ⁷*Electrical World*, May 9, 1914, p 1057.
- ⁸C.D. Tuska, "A Memorable Meeting," *Fifty Years of ARRL*, p 14.
- ⁹*Radio Service Bulletin*, Bureau of Navigation, Department of Commerce, reports in issues 5 and 42, May 1915 and October 1920; C.D. Tuska, "A Memorable Meeting," *Fifty Years of ARRL*, p 5 for 1WD; other sources as well, not all of which are consistent as to call letters.
- ¹⁰C. D. Tuska, "The Oscillating Audion," *QST*, January 1916, pp 3 – 4.
- ¹¹C.D. Tuska, *Inventors and Inventions* (New York, 1957; nine editions).
- ¹²*QST*, June 1919, "Personal Notes." His service at Camp McClellan, Alabama is also noted in official records.
- ¹³C.D. Tuska, "A Memorable Meeting," *Fifty Years of ARRL*, p 26; ARRL has no letter of resignation on file.
- ¹⁴"Personal Notes," *QST*, June 1919, p 22; also noted in M. L. Sievers, *Crystal Clear: Vintage American Crystal Sets...* Vol 1, p 35. A 1920 A.C. Gilbert company pamphlet contains an ar-

ticle by Tuska entitled *The General Theory of Wireless Telegraphy*, A. C. Gilbert, Boy Engineering Series, Hartford, 1920, p 31.

- ¹⁵Sievers, *supra*, for Tuska model No 4007.
- ¹⁶*Use of Naval Radio Stations for Commercial Purposes*, September 4, 1919 (US GPO, 1919), p 95 (books.google.com). Tuska had already resigned as ARRL Secretary and Maxim had made prior Washington appearances.
- ¹⁷Ed Broder of Hartford radio station WDRC; www.wdrcobg.com/acgilbert3.html.
- ¹⁸Much information on Tuska's radios, and thousands of others, may be found on Ernst Erb's Radio Museum website, www.radiomuseum.org; search for "Tuska." The "dyne" suffix for so many early circuits comes from the Greek word for power or force.
- ¹⁹This analysis comes from David Rutland, *Behind the Front Panel — The Design and Development of 1920's Radios*, 1994, p 33ff (California Historical Radio Society, reprint 2014). This text relies on C. D. Tuska, "The Superdyne Receiver," *QST*, Nov 1923, pp 7 – 12.
- ²⁰US Patent 2,279,021, April 7, 1942.
- ²¹C.D. Tuska, *So You Want to Be an Inventor*, Journal of the Franklin Institute, Vol 255, No 3, pp 177 – 188 (March 1953); *Increasing Inventive Creativeness*, Vol 260, No 2, pp 93 – 98 (August 1955).
- ²²C.D. Tuska, *Inventors and Inventions* (New York, 1957; nine editions), Preface, p vi.

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See also www.CaliforniaHistoricalRadio.com
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