

## **1935: WLW vs. CFRB**

Gord Rabjohn, March 2019

The '30's was the era of very high-power AM broadcast stations. "Skip" signals bouncing off of the Heavyside layer allow radio reception over vastly longer distances at night. Some stations enjoyed the benefit of a "Clear Channel", that is, a frequency assignment not shared with any other station in North America at night (other stations sharing the clear channel frequencies would either shut-down at night, or significantly lower their operating power at night), or shared with at most 2 other stations geographically separated. Such stations still exist. See for example [en.wikipedia.org/wiki/Clear-channel\\_station](https://en.wikipedia.org/wiki/Clear_channel_station) . "Clear Channel" stations were originally proposed as an economical means of serving the vast rural areas of North America, albeit only at night.

One such station was WLW in Cincinnati, Ohio. WLW was owned by Powel Crosley, of Crosley Radio fame. WLW had been broadcasting since 1922, and with the technical expertise of its patron, was among the most advanced stations in the US. In May 1934, WLW started broadcasting at 500,000 watts of power at 700kHz (they are still at 700kHz today). They were the only station licensed at this power level in the US, so this was uncharted territory, and complaints that WLW was interfering with other stations poured in. Most notable were complaints from CFRB, Toronto, that operated at 690kHz at that time (since 1948, they have operated at 1010kHz). In December 1934, the FCC (under pressure from the Canadian government thru the US State Department (essentially their foreign ministry)) ordered WLW to drop their power back to 50,000 watts at night. High power operation was really only beneficial during the night, so this restriction made WLW's half-million-dollar, half-million-watt investment essentially wasted. (ref: [en.wikipedia.org/wiki/WLW](https://en.wikipedia.org/wiki/WLW) )

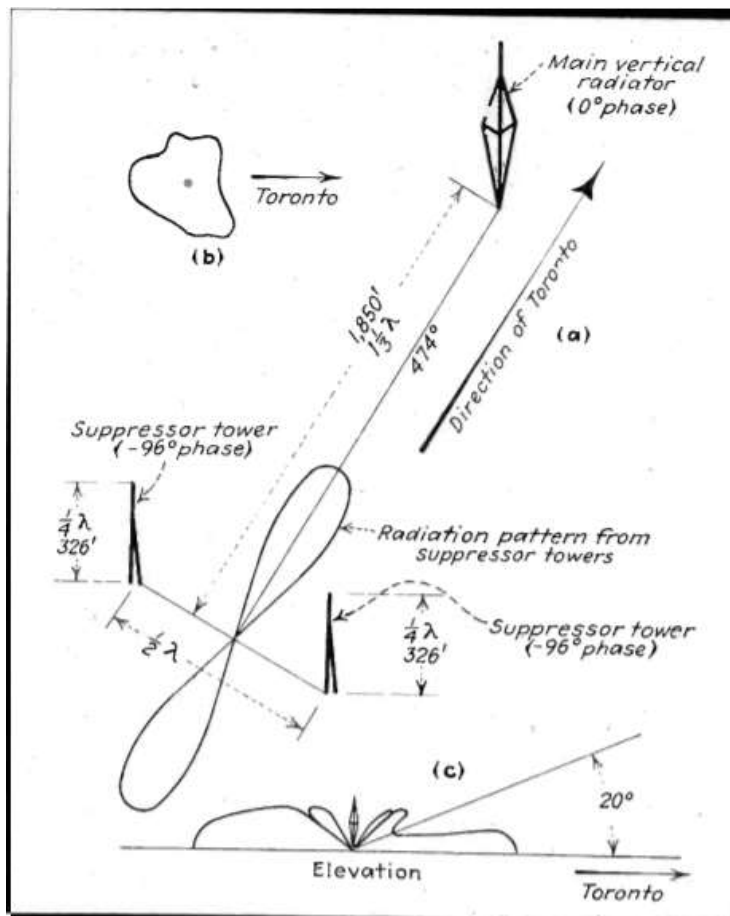
The fact that CFRB (owned by Rogers. CFRB = Canada's First Rogers Batteryless <https://en.wikipedia.org/wiki/CFRB> ), and WLW were competing radio equipment manufacturers may have fueled the feud further. However, many radio stations of that era were owned by equipment manufacturers, so the same competitiveness must have existed between many stations.

WLW needed a way to make their signal directional. The solution that they arrived at is outlined in the May 1935 edition of "Electronics" magazine [www.americanradiohistory.com/Archive-Electronics/30s/Electronics-1935-05.pdf](http://www.americanradiohistory.com/Archive-Electronics/30s/Electronics-1935-05.pdf) . By installing two additional vertical radiators, 326 feet high, operating at 85,000 watts, in an appropriate phase compared to the main antenna, they could place a power null not just in the direction of Toronto, but a 150 mile radius around Toronto. The skywave causing interference to the Toronto area was calculated to be radiated at a 20 degree angle above the horizon. The two verticals radiated only in this direction. The illustration, taken from Electronics, describes it clearly. Or not. The construction of these radiators (in close vicinity to the main transmitter) was apparently complicated by the induced voltage on metal parts used in the construction. All metal parts had to be grounded before handling to avoid sparking and shocks. Upon completion, field strength was measured in the Toronto area at night as the transmitter alternated between 2 modes: transmitting at 50,000 watts with the cancellation circuit off, and at 500,000 watts with the cancellation circuit on. They found that the field strength in both modes of operation was equivalent in the Toronto area.

By the middle of 1935, this system was proven, and the FCC issued consecutive temporary short-term licenses to allow WLW to operate at 500,000 watts, which they did. Other US stations understood the benefit of this high-power operation and requested licenses. However, anti-monopoly sentiment in the

US made the super-power stations unpopular in the US senate. The “Wheeler Resolution” recommended a maximum power of 50,000 watts for all AM stations in the US for competitive reasons. Wheeler was also concerned about a single station wielding too much political power, leading to the rise of dictators such as Mussolini, Hitler, and Stalin. By 1939, the FCC restricted emissions to 50,000 watts on the AM band, except in experimental broadcasts in the middle of the night. WLW fought the ruling, but complied, and continued technical work in the wee hours. This work allowed them to incrementally improve transmit power up to 1,000,000 watts, and helped improve the reliability of the RCA high-power transmitters. Having transmitters capable of high-power operation in emergencies was seen as an asset as WW2 broke out. Indeed, many other countries do not have a 50,000 watt restriction. There are a few 2,000,000 watt stations in Europe!

The directional null was seen as a technical breakthrough at the time, but was only used for 4 years, and intermittently thereafter. WLW’s huge effort to increase their radio audience, and CFRB’s and the Canadian government’s effort to preserve their radio audience demonstrates the commercial (hmmm, double meaning here!) importance of AM radio at that time. By 1939, an AM radio was affordable to anyone with access to electricity, and would play an important role in the turbulent years ahead. However, few would have predicted the transformative change that television would have on the broadcast industry, and the decline of the importance of AM radio.



This antenna system is designed to lay down a 50 kw. signal around Toronto and a 500 kw. signal everywhere else. (a) Dimensions and phasing of the array. (b) Ground-wave signal pattern. (c) Profile view of radiation pattern

May, 1935 — ELECTRONICS