

Rogers



For many, he is just a name stamped on the backs of old radios found at flea markets. However, were it not for Ted Rogers, millions of people might even still be enslaved by Eveready. By Roger Allan.

FEW CANADIANS today realize that one of the keys to the world wide popularization of home radio consisted of the development of the batteryless radio, or that this invention, "Rogers' Batteryless", is included in the acrostic of one of Canada's largest radio stations, CFRB in Toronto.

Seventy years ago home radio reception was plagued with difficulties. If one were lucky, and everything was working as it should, then from ones maze of amplifying horns and earphones, wires, tubes and dry batteries, one might be able to hear a sound reminiscent of music. But in those days people had one advantage over radio enthusiasts today; everything was so new that anyone with a bit of ingenuity and a bit of spare time could not only build a receiver or transmitter, but could develop devices which could and frequently did advance radio transmission or reception capabilities.

The House of Rogers

Such was the case with Edward (Ted) Rogers, and his invention of the AC tube, which forever liberated radios from the vagaries and expense of battery dependence.

The Rogers family were Pennsylvania Quakers who had immigrated to the area around Newmarket, Ontario during the American Revolution. For several generations they were successful in business, initially in lumber and farming, later in coal and fuel oil. The Elias Rogers Coal Company in Toronto, for instance, was founded by Ted Rogers' grandfather.

Rich, successful and socially prominent, the Rogers family had every intention that young Ted should enter the business world in some rapidly rising capacity as per family custom. But it was not to be. The then

Pioneers of Electronics Series

magical world of radio intrigued Rogers too much. A servant, for instance, is quoted as recalling that the young lad's bedroom when he was about eleven years old, "was so covered with wires and gear that it was almost impossible to step around it."

He built a crystal set, and later a selective tuner with a sliding contact and two variable condensers connected to a tuned circuit. One of his earliest detectors, similar to Fessenden's, consisted of a thin platinum wire dipped into a small glass bottle containing dilute nitric acid with a thicker platinum wire mounted on the bottom. By heating the liquid, changes in resistance could be obtained. Whenever the thin platinum wire burned off, Rogers merely lowered the remainder until it touched the nitric acid again.

Like many another successful inventor, Rogers was not a particular success in the conventional school system. Educated at Pickering College, near Newmarket (built on land donated by Timothy Rogers and once part of the Rogers' farm), Rogers eventually entered the University of Toronto's School of Electrical Engineering. He quickly tired of

academia, particularly as he appeared to have a better grasp of electronics than his professors, and soon dropped out. Refusing to follow his family's wishes that he take a job in business, Rogers remained firmly entrenched in the family garage tinkering with his radios. He built a transmitter. With the call sign 3BP and broadcasting on a frequency of three hundred meters from the by then abandoned Pickering College building, he radiated a half-kilowatt spark. This was sufficient for his signal to reach the Pacific and Maritime coasts.

In 1921 the American Radio Relay League (ARRL) sponsored a test in radio signaling across the Atlantic. While the ARRL technical restrictions were stiff (wave lengths of 200 meters or less, power output less than 1 kilowatt, limited transmission duration) on December 9, with a power output of fifty watts, Rogers succeeded in being heard in Scotland, the only Canadian to achieve the objective. As Scientific American reported, "For the first time in the annals of radio, short wave low power trans-Atlantic communication became a fact." One of the other twenty nine successful operators

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As the American Edwin Armstrong broadcasting with a ninety nine watt set. Armstrong later developed the regenerative circuit and is credited with being the 'father' of FM radio.

Kill the Batteries, Ted

In 1924 Rogers decided that batteries must go. They were big, bulky, expensive, unreliable and wore out quickly. He felt that if radios were to become truly universal, then they should be reliable enough to be operated by any member of the family, and operated on ordinary household current. For this to occur, the radios needed an AC tube.

By this point in history there was a form of AC tube on the market developed by the American McCulloch. It was not very good and only succeeded in removing the 'A' battery from the set. One still needed the 'B' and 'C' batteries. While in Pittsburgh, Rogers had the opportunity to examine the McCulloch tube, complete with horn like filaments sticking out its top. Despite disuasive arguments from the American engineers that it would be impossible to design a total-AC powered radio tube (due to interference from the filament inside the tube), Rogers bought the Canadian rights to the McCulloch tube. In the family garage on Chestnut Street in Toronto, Rogers set out to prove

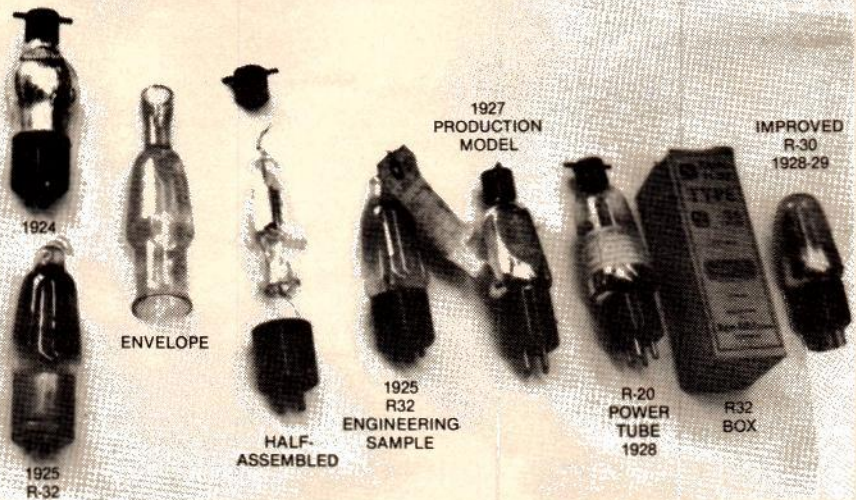


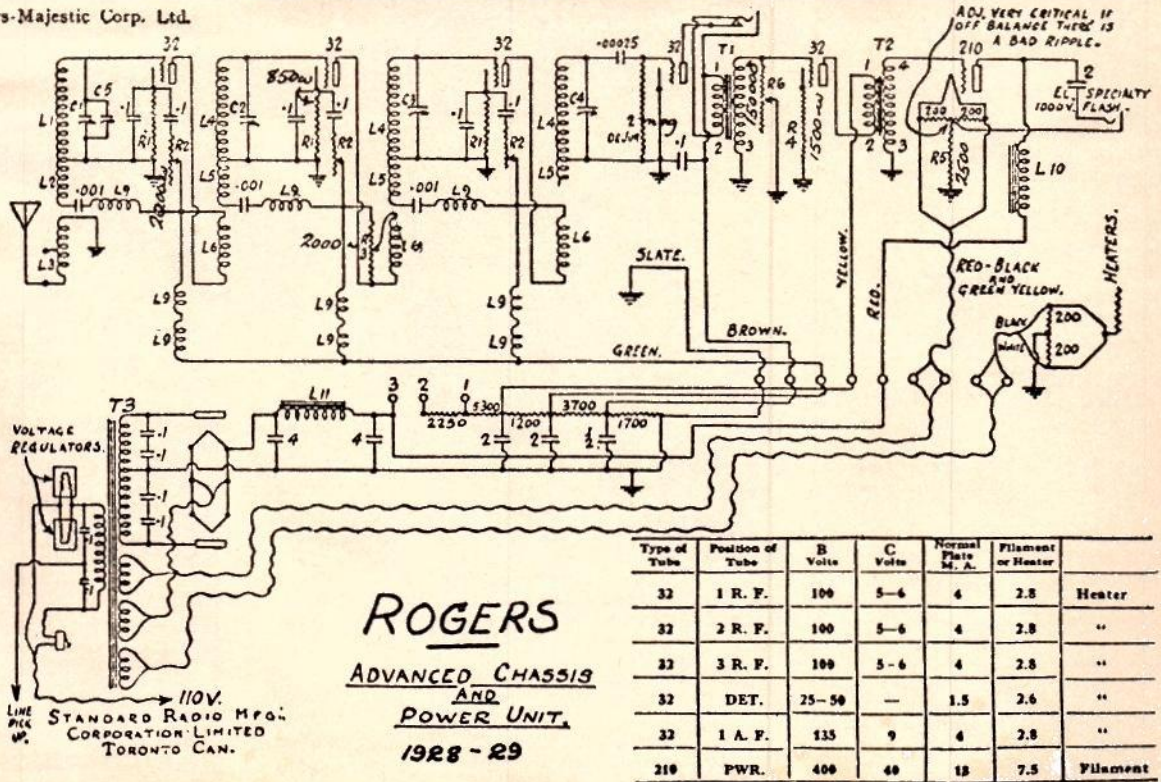
Photo by Steve Rimmer, courtesy of Mike Batch of Vintage Radio & Gramophone.



—Courtesy Rogers-Majestic Corp. Ltd.

ROGERS—5

Advanced Chassis Fitted in Models
440 Console
460 De Luxe Console
480 Table
490 Console
1928-29



ROGERS
ADVANCED CHASSIS
AND
POWER UNIT,
1928-29

Type of Tube	Position of Tube	B Volts	C Volts	Normal Plate M. A.	Filament or Heater
32	1 R. F.	100	5-6	4	2.8 Heater
32	2 R. F.	100	5-6	4	2.8 "
32	3 R. F.	100	5-6	4	2.8 "
32	DET.	25-50	—	1.5	2.6 "
32	1 A. F.	135	9	4	2.8 "
210	PWR.	400	40	18	7.5 Filament

Printed in Canada

DATA SHEET

STANDARD RADIO MFG. CORPORATION LIMITED
TORONTO CAN.

the Americans wrong.

The first step was to design a satisfactory 'B' battery eliminator for the sets. At this stage, the 'A' and 'B' substitutes were in separate units. Then came the problem of assembling them in the same cabinet as the receiving set. The first efforts to do so were unsatisfactory, due to the heavy fields set up by the various transformers and chokes. It was found that both the RF and audio circuits were grossly influenced by the alternating current. In addition to this, after the alternating current had been rectified and filtered, the direct current was modulated in the choke by the field from the transformer.

To reduce AC hum, Rogers brought the filament leads out of one end of the tube and the grid leads out of the other. This provided as much separation as was possible within the physical construction of the tube.

By the careful placement of the various parts, the use of proper shielding, the re-designing of the cores for the transformers and chokes, Rogers progressively invented the AC tube. In April of 1925 he filed a patent application on his invention, which was granted as number 269205 in March of 1927. In

Rogers words:

"My invention comprises producing a rectifier which may be used to supply the anode potential of thermionic tubes directly from a source of alternating current of commercial frequencies such as 25 or 60 cycle without causing any disturbance in the radio reception or transmission circuits in which the tubes are used."

Capitalizing on his inbred business acumen, Rogers promptly founded a company to manufacture his invention, Standard Radio Manufacturing Company, later known as Rogers Majestic Corporation, which in August 1925 produced the first commercial AC tube. Within the day, Rogers' Batteryless Radios were on display at the Canadian National Exhibition.

By 1927 Rogers had upgraded the power of batteryless transmitters to the point where they could be used for commercial broadcasting. In 1927 he founded radio station 9RB, which latter became CFRB. Broadcasting on a wavelength of 291 meters from two 100 foot masts supporting a 4 wire flat top antenna, the station was

powered by four 1 kilowatt water cooled tubes. It was located in Aurora, north of Toronto, thereby sidestepping in-city regulations governing power output.

Rogers died in the spring of 1939 of a hemorrhaging ulcer.



History of Early Radio

Pioneers of
Electronics
Series

by Roger Allan

"ONE, TWO, THREE, four. Is it snowing where you are, Mr. Thiessen? If so, telegraph back and let me know."

So spoke Aubrey Reginald Fessenden on December 23, 1900 at his Cobb Island laboratory to his research assistant in Arlington, Virginia, 50 miles away. Just 77 letters, but it ushered in the age of radio.

Fessenden, a Canadian, forced to work in the States due to lack of support in his home country (the Dominion Government preferring to subsidize the Italian, Marconi, to the tune of \$80,000) had failed to interest the Dominion government in his work and had to turn to the US Weather Bureau and to the United Fruit Company (which wanted better communications with its banana boats) for support.

Six years later, in 1906, Fessenden made the first true radio broadcast, playing "Oh Holy Night" on his violin, reading the Christmas story from the New Testament, and wishing his listeners a Merry Christmas. He then asked that anyone who had heard him to please write and let him know. The mail response from ships in Boston harbour proved the success of his experiments.

So began the Age of Radio. True, customary histories of early radio grant credit for ushering in radio to Guglielmo Marconi, but they fail to mention that his famous message from Signal Hill, Cape Breton, to Cornwall, England, took place a full year after Fessenden's transmission. Yet Marconi, despite being a late starter, and a foreigner to boot, being supported by the Dominion Government not only financially but by being granted the right to set up a chain of radio stations across Canada, typically maintains the credit.

Despite extensive amateur interest in radio, and the 1905 Wireless Telegraph Act, it was not until 1919 that the Dominion Government hired Donald Manson, a radio officer in the Royal Canadian Navy in WW I to be



CFRB in the early 1920's.

the federal government's chief inspector of radio. One of his first jobs was to licence North America's first radio station, XWA broadcasting from the Marconi factory of William Street in Montreal, which commenced operation in December of the same year playing phonograph records over the air.

By the following year, XWA broadcast its first scheduled programme. It included a full orchestra with one Miss Dorothy Tulton as soloist. It was heard in Ottawa 100 miles distant, further than any previous radio broadcast. In 1920 Canada's second radio station, CJCW, now CKRC, financed by the Winnipeg Free Press began broadcasting from a studio in Winnipeg's Carlton Street. In the same year the Canadian National Railways (CNR) broadcast from its St. Catharines terminal a program which was picked up by receivers in a railway coach on the Canadian National Exhibition grounds in Toronto.

The next few years showed a plethora of developments in Canadian radio. In 1923 there was the first church broadcast from the Fort Rouge Methodist Church in Winnipeg, the first play-by-play hockey game (from Regina) and the first university lecture and the first government intervention in active broadcasting — the inauguration of CKY owned and operated by the Government of Manitoba and run via its telephone system. By the end of 1923

the CNR had radios in all its parlour cars see (ETI December 1981) and the following year opened its own radio station at the Chateau Laurier Hotel in Ottawa. One of the first broadcasts from the Chateau Laurier was Canada's first sponsored hockey game — a Stanley Cup contest between the Ottawa *Senators* and the Montreal *Canadiens*. Livestock quotations on stations in Ottawa, Moncton and Winnipeg followed the following year, and the Dominion Observatory time signals were broadcast for the first time from St. John, New Brunswick.

In 1925 came the first really important technical breakthrough as far as the consumer of radio broadcasts was concerned — the introduction of the Rogers' Batteryless Radio (see ETI August 1982). A mantel radio model, it sold for \$250 with the loudspeaker an additional \$45. With its introduction, listeners were freed from having to constantly replace large dry cell type batteries and could listen using power from the household current.

School broadcasts began in October 1927 from Vancouver, promoted and sponsored by the Vancouver City Inspector of Public Schools, followed in 1928 by what was (probably) the first radio drama — three one-act plays by Vancouver authors. Eight months later, in 1929, the CNRV Players presented a full version of Shakespeare's "Othello" from the Vancouver studio, and two months after that a complete "Merchant of Venice". 1929 brought regular broadcasts of classical music, with opera premiering on Christmas Day, 1931, in the form of "Hansel and Gretel" sung by the Metropolitan Opera Company. "The Nation's Business", still continuing in one form or another and still devoting itself to self serving political descriptions delivered in turgid prose, premiered also in 1929.

But 1929 also marked the year that Canadian radio started to come of age — if only demonstrated by the introduction of a long litany of government inquiries, royal commissions and parliamentary committees

of investigation which continue, almost annually, to investigate Canadian broadcasting. Discounting the CNR radio network, Canada had by then some 87 radio stations which can roughly be grouped into four general categories — newspaper owned (9), private radio station societies composed of amateurs more interested in radio as a medium or hobby than in making a living from broadcasting (23 in number), commercial stations such as RCA, Marconi or Northern Electric designed and operated to make radio receiver sales more attractive (10), and private radio stations run (predominantly) by rump religious organizations such as the National Bible Students Association of the Jehovah's Witnesses, western fundamentalist sects, and the Toronto Roman Catholic Cathedral, St. Michael's, with the remainder operated by disparate organizations such as the University of Alberta, the Government of Manitoba and Queen's University. These tended to carry very pointed partisan religious texts and hate messages by such organizations as the Ku Klux Klan, including such examples as "The Roman Catholic hierarchy has begun and carries on its assaults against God's true people. In every country of earth the hierarchy carries forward this wicked persecution." (Try getting that past the CRTC today.)

What stations there were were being swamped by more powerful American stations, numbering some 604 and grouped in a number of networks, and were having their signals distorted by American stations using the same frequencies. So lacking in



The studio and transmitter often shared the same room in the early days of radio. This shows CFRB in the late twenties.

power were many of these Canadian stations, that an announcer for CKRD Red Deer Alberta, in having noted that his station had less power than a tri-light, got himself fired for telling his audience that "you are listening to CKRD Red Deer, your central Alberta light bulb."

While there had been, in 1905, a Wireless Telegraph Act, later amended to include radio telephones and voice transmission, and despite Donald Manson having been hired to inspect what there was, Canada didn't really have any sort of organization to control broadcasting in Canada.

To sort out the problems, Mackenzie King in December 1928, appointed Sir John Aird, president of the Canadian Bank of Commerce, to head a Royal Commission of enquiry into the broadcasting field. In what must be an all time record for such Commissions, Aird studied 124 written briefs, 164 oral presentations and chaired 25 public hearings across the

country, presenting, 10 months after it first sat, a 29-page bilingual report.

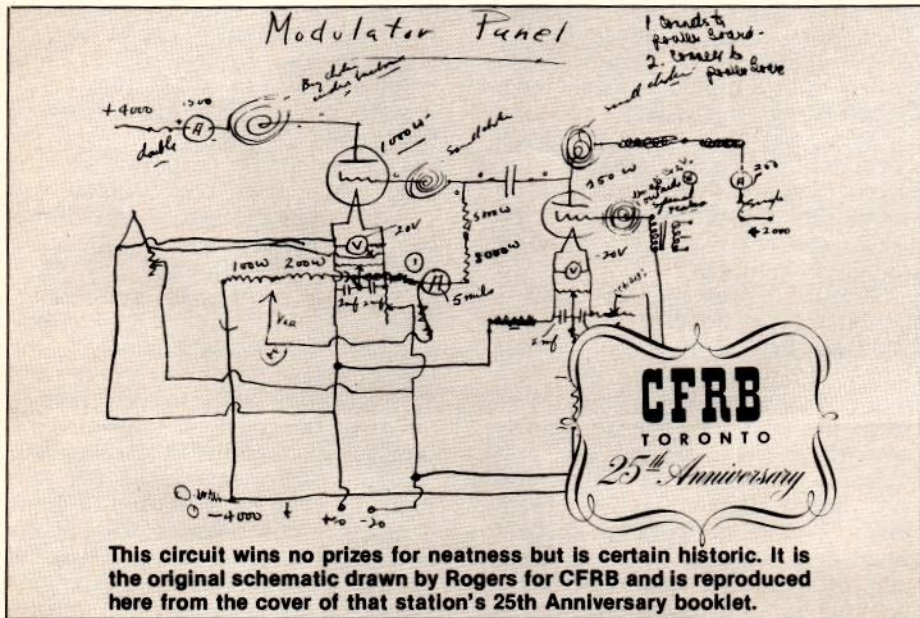
Its conclusions were succinct — only "public ownership, operation and control" could serve the public interest, that Canadians were unanimous on one "fundamental question — Canadian radio listeners want Canadian broadcasting," and that this could be achieved by the establishment of seven 50,000 watt radio transmitters across the country with an increase in the radio licence fee to \$3.00 yearly to pay for it all. Further, there should be regulations "prohibiting statements of a controversial nature or one religion making an attack upon the leaders or doctrine of another," and that the broadcasting of political matters should be carefully restricted.

Before the government could act, the general election of 1930 occurred, and when R.B. Bennet returned to power, the reaction to Aird's Report fell into two groupings. On the one hand was the Canadian Broadcaster's Association (CBA), a loosely knit organization opposed to Aird's suggestions, and on the other the Radio League of Canada (RLC). The RLC, promoted in response to the Aird Commission soon enjoyed enormous support across the country including an aggregate membership of 600,000, 50 newspapers, university presidents, women's organizations and superintendents of education. Its goal was nationalised radio directed through a public corporation with no commercial advertising.

But while the CBA and the RLC was commencing their squabbles in the halls of parliament, a more important fight was occurring in the courts — one which continues in one guise or another to this very day — who should own the airwaves: the federal or the provincial government?

The prime contenders in this jurisdictional dispute were, not surprisingly, Ottawa and Quebec. By 1931 the fight had reached the Supreme Court of Canada which, in a three to two decision, found in Ottawa's favour. The Quebec premier, Tashereau, then took the dispute to Canada's court of last resort, the Privy Council in London. It upheld the Canadian Supreme Court decision.

When the dust had settled, Bennet struck a parliamentary committee to "advise and recommend a complete technical scheme for broadcasting in Canada." The committee became the focal point of much lobbying by the CBA and the RLC — with the CBA wanting a subsidy for na-



This circuit wins no prizes for neatness but is certain historic. It is the original schematic drawn by Rogers for CFRB and is reproduced here from the cover of that station's 25th Anniversary booklet.

Continued on page 84

Early Radio



Early Canadian radio stations were usually located in unmodified buildings.

tional network programming, funding to extend services to rural and isolated areas, and a maintenance of the status quo ante bellum in regard to the regulation and operation of commercial stations. The RLC on the other hand wanted an organization modeled on the British Broadcasting Corporation.

In early 1932, the parliamentary committee handed down its report (introduced into parliament on April Fool's Day) and on May 26 of the same year the Canadian Radio Broadcasting Commission was given Royal Assent. The RLC had succeeded in

creating a national radio network, but with strings attached. The CRBC was not a corporation, its employees were to be civil servants, it was not given federal subsidies but only the revenue from the \$3 licencing fee. Its mandate was to establish a national programme service while simultaneously regulating private broadcasting in Canada. Controlled, initially by a commission consisting of a magazine editor, a forestry engineer and an engineer from the Department of National Defence, the CRBC managed to stagger on air in 1933 using equipment borrowed from the CNR.

In these roots lie the Canadian Broadcasting Corporation as we know it, the continuing fight between government and private broadcasters, and the endless difficulties faced today by the Canadian Radio and Television Commission.

Photos courtesy of CFRB and Broadcast Pioneers Library, Washington, D.C.

ETI



The early radio tubes changed the style of the music being sung. Due to their tendency to blow out when faced with high musical notes, singers were asked to keep it soft when warbling into the lampshades that usually hid their microphones protecting them from "mike fright." The most successful singer to follow these instructions, Vaughn de Leath, thereby invented in 1920 a singing style later known as "crooning".

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