The Bell Telephone Manufacturing Company of Antwerp, Belgium

by Bob Estreich and Jan Verhelst

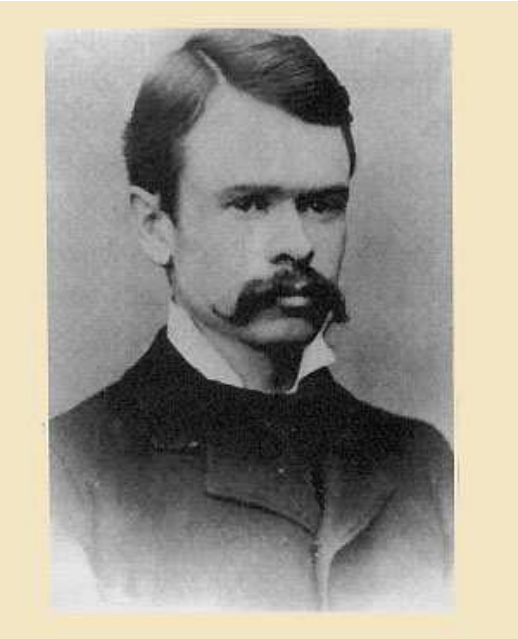
BTMC was an unusual company. Founded almost at the birth of telephony, it continued under a series of owners, most of whom allowed it to remain fairly independent of centralized control. As well as a manufacturer it became a leading research centre, a role it continues today.

The Bell Period

Alexander Graham Bell's telephone had excited little interest in Britain at first, but this was not the case in Continental Europe. Europe was an early adopter of telephones. As early as 1880 the American Bell company established the European headquarters of the International Bell Telephone Company in Brussels to handle sales of fully imported telephones and switchboards. Enos Barton of Grey and Barton, an electrical goods supplier, also visited Europe in the same year to report on the possibility of his company moving into Europe. At this time he was supplying the Western Union Telegraph company with telephones and telegraph equipment. To reflect the increasing involvement between the companies, Grey and Barton was renamed Western Electric in April 1872. When Western Union lost the patent war with Bell in 1879, Western Electric found itself without a customer for its phones. In the event, American Bell bought into Western Electric to supply its telephones, since its current suppliers were falling seriously behind in filling orders. In February 1882 Western Electric and Bell signed a contract making Western Electric Bell's sole telephone supplier.

Theodore Vail, the head of the Bell company (now American Bell Telephone) was keen on exporting to Europe. He was convinced by Enos Barton of Western Electric and Gardiner Hubbard of American Bell that European manufacture rather than importing was the only solution that would overcome the local nationalistic feelings and the high cost of freight and tariffs. Antwerp was also where they built their first European exchange. They obtained some concessions from the Belgian state to build and exploit telephone networks (in the 1890s the state took over the networks, after the concessions expired). IBTC had no production facilities of its own and imported equipment from the U.S. Originally they obtained their products from suppliers of the American Bell Telephone Company such as Williams and Gilliland, and later from Western Electric.

On 26th April 1882 the Bell Telephone Manufacturing Company was founded, and opened its factory in Antwerp. It was 45% owned by Bell and 55% by Western Electric. Ezra Gilliland of Western Electric was sent to Europe to set up the company. Once it was running smoothly, Gilliland returned to the United States. Western Electric's overseas operations were placed under the control of Francis Welles, a young American. He was listed in the BTMC minutes as "administrateur délégué", roughly equivalent to a General Manager. The Board consisted of Arthur Van den Nest, banker and vice mayor of Antwerp (chairman); Francis Welles ("administratreur délégué"); Alexis Mols, financier and trader (secretary); Jean-Corneille and Louis De Groof (they had been the local Bell agents); and J. Stappers. Other local dignitaries were Ernest and Maximilian Grisar (Ernest was one of the founders of the local Bell operating company, Maximilian was a local businessman involved in a mining company in the Congo) and Jacques Osterrieth. After a few months JC De Groof was appointed as second "administrateur délégué" to assist Francis Welles. Having a Belgian in charge helped politically, and would have been necessary while Welles was travelling around Europe.



Welles was a college graduate, the first employed by W.E. He was a good choice. Aged 27, he was educated and multilingual, and he set about building a network of agents throughout Europe to give the company a presence in each major country. Within a year or so the Antwerp company employed 35 people, and was gaining new contracts in a number of European countries. Although BTMC's intention was to build the conventional two- and three-box wall phones (initially from imported parts), they soon found that local firms like L M Ericsson and Siemens & Halske were making better, smaller phones in styles that were preferred by the public. For instance, the handset was introduced by Ericsson in 1892. The equivalent Bell units, especially the Blake transmitter, were too bulky to be used in a handset.

Following a fire that destroyed the factory on July 22, 1882, Welles was authorised by Western Electric to rebuild. This showed their faith in the potential of the European markets. Construction of the new factory began on November 13, 1882.

In 1884 BTMC considered expanding into the production to multiple switchboards, developed by Leroy B.Firman and patented in 1882. This was a new system that facilitated connections in the exchange, and simplified and speeded up the work of the telephone operator. BTMC started producing complete switchboards in 1887 (after a transition period where they used switchboards partially manufactured in the US.)

The BTMC factory quickly evolved a range of European phones to compete with other companies. This removed the extra cost of import tariffs. To some extent they were quite successful. In the earliest models, they used some parts bought in from other manufacturers until they could design their own versions. In other phones, they copied local styles. Most of these never got back to the U.S., and are now uncommon. In particular, they developed their own handset desk phones long before the U.S.A. brought them into use. Their first desk phone (known in Australia as the Eiffel Tower, a name applied to Ericsson's Skeletal phone in the U.S.) sold widely through Britain and its colonies and some European countries, but is practically unknown in the United States. It was most likely only produced in the Antwerp factory, and possibly later at the Woolwich factory set up by Western Electric in Britain. By the turn of the century the Antwerp factory had grown to around 700 employees.

Exports were actively promoted, especially under John Balthazar Christoffel, a born salesman, starting from 1891. As Commercial Director he opened new markets in India, South America and China. The agencies around Europe were successful. BTMC exports continued to develop, to Australia, England, Sweden, Germany, Norway, Denmark, the Netherlands, Italy, Greece, Hungary, Russia, Austria, Egypt, Panama, Japan, China, Argentina and Switzerland.

The Western Electric Period

In July 1890 American Bell sold its share of BTMC to Western Electric and became purely an operating company. Western Electric added their own directors to the BTMC board. Some of the replaced directors set up their own company, ATEA (Ateliers de Téléphone et Electricité Anversoise, a French acronym for “Antwerp Telephone and Electrical Works"). This company is the subject of ongoing research by Jan Verhelst. His work in progress is available at http://home.scarlet.be/jan.verhelst/atea/atea_english.htm .

In the U.S. Western Electric and Bell were having difficulties agreeing on each others' role in telecommunications. Bell tended to regard WE as its captive supplier (it owned around 60% of WE) while Enos Barton of WE regarded telephones as just one of a large range of products to be produced by WE. He saw WE's future as being the producer and inventor of a wide range of electrical equipment to buffer the company against any slowdown in the telephone market. As a result, production of phones was falling seriously behind in the U.S. and BTMC was left largely to its own devices. Since it only produced telephones, it was not really involved in the internal disputes. It had another big advantage. It had ready exposure to all the new technologies being invented in Europe, many of which were far more efficient than what was in use in the U.S.. European inventions were incorporated into their products, such as Trophime Delville's new type of transmitter, developed in 1894. They began producing CB switchboards as early as 1902. In spite of this, John Carty, Western Electric's Chief Engineer in the U.S. , wrote in a 1906 memo “*Every effort in the Department is being executed towards perfecting the engineering methods. Noone is employed who, as an inventor, is capable of originating new apparatus of novel design. In consequence of this it will be necessary in many cases to depend on the acquisition of inventions of outside men.”* This statement ignored BTMC, who was later to fill some of the research gap.

BTMC was more inclined to experiment than its U.S. parent. Some early phones use cast aluminium cradles and transmitter and receiver shells as an alternative to the more expensive machined and plated brass used by other makers. It introduced steel cased phones and automatic switching before the U.S., and the early handsets have already been mentioned. The styling was a departure from the U.S. boxy wallsets, although the designs were always less elaborate than, say, L M Ericsson. As in the U.S., there was an emphasis on improving the reliability of the components.

In 1910 there was an important meeting in Paris of the "Bureau Internationale de l'Union Télégraphique" on the subject of "Telephony Automation". There were 100 representatives of 21 countries present. They came to the conclusion that there was now sufficient mechanical and electrical reliability in automatic systems. The acceptance of automatic exchanges in the market was now merely an economical, and not a technical probem. This meeting was a sign for all (European) telecom manufacturers to widen their products in the automatic telephony. WE in the U.S., however, did very little work in this new area.

As a result, one vital area in which BTMC was decades ahead of its U.S. parent was automatic telephony. In 1903 W.E. in the U.S. obtained the rights to the Lorimer Brothers' automatic switching system and began redeveloping it - at a leisurely rate, due to the lack of funding. Under engineer F R McBerty and others it had become partly developed as the Rotary and Panel systems, but the feeling at W.E. was that Rotary would not be suitable for U.S. use. WE transferred the development of the McBerty Rotary System as Nr. 7 to their affiliate E Zwietusch & Co. in Germany in order to obtain orders from the German Reichspost. Eduard Zwietusch was an American from German origins, on the payroll of International Western Electric. In 1904 Zwietusch became a naturalized German. His work resulted in the principles of the control mechanisms of the Rotary exchanges being patented in 1911 in Germany and England. In 1912 his company was bought out by Siemens &

Halske, although he remained in charge until 1921.

This left WE out of control of its product. WE kept a minority interest in the company, however, and they managed to withdraw the Rotary development and switch it to BTMC. Under Francis Welles, BTMC had been working towards producing Rotary exchanges for the Belgian market. WE planned to manufacture the Rotary system both in its facilities in Antwerp (BTMC) for the European continental market and North Woolwich (near London) for the U.K and its Dominions. In 1912 McBerty was transferred to Belgium to support the further development and to set up the manufacturing processes. His main efforts were in the development of the half cylindrical selector from the full cylindrical Lorimer-selector as well as engineering the early exchanges on site. There was another engineering group active in developing the control mechanisms and the panel selector.

At the outbreak of World War 1 Belgium was invaded by Germany. The Reichpost orders were cancelled and the major parts of an exchange ordered for Berlin were installed instead at Angiers in France. It went into service in 1915.

Major fundamental developments were done during WW-1 (1916-1917) in the WE plant at Hawthorn USA, by combining the McBerty Nr7 system with control principles of the Automanual-concept acquired by WE in 1916. These were introduced from 1919-1920 throughout Europe as the 7A(Automanual) system. McBerty's mechanical engineering developments were as from 1920 redone by Deakin, resulting in new finders and selectors for the systems 7A1, 7A2, 7B and 7D, while using the 7300-selectors for the electronic controlled versions 7E and 7EN as well.

(This information is kindly provided by Thomas C. Lof, author of "125 Jaar Bellen met Bell" on the history of the Dutch affiliate of BTMC, its predecessor (NBTM) and successors.)

The Rotary system became a major seller in Europe and countries as far afield as New Zealand. BTMC already had semi-automatic switches in 1912 and 1915 in Landskrona (Sweden) and Angers (France). The first fully automatic switch was put in service in Darlington (England) on 10th October 1914, one day after BTMC closed down for four years after Belgium was invaded. BTMC also produced WE's first dial for the Rotary system, and its automatic phones used handsets as standard. By 1913, Rotary development was under the supervision of Belgian Albert Damoiseaux (he was still in office in 1927) .

In the U.S. the technology still lagged far behind. The Bell company, now American Telephone & Telegraph, continued its reliance on manual switchboards and operators. In some cases it would buy out an independent operating company and remove their automatic exchange, and replace it with a manual switchboard.

The internal conflict between WE and Bell (now AT&T) also continued. AT&T owned 96% of WE's shares by 1913, but WE continued adding to its wide range of electrical equipment rather than concentrate on telephones. AT&T continued to grow by buying out independent telephone operating companies and converting them to WE equipment. Although the supply situation had improved as WE brought its new, bigger factories on line, they were now becoming nervous about a new opponent - the United States Government. The Government was taking an interest in the huge multinationals that were developing, and some politicians felt that this was an area that should be brought under control. AT&T was one company in which they were interested.

Enos Barton's retirement from WE in 1908 allowed AT&T to put people on the WE board who had experience in both companies. Gradually the two companies were drawing closer, but an agreement on common goals was still a long way off. For now, AT&T had to face the

U.S. Department of Justice's claims that AT&T was breaching the Sherman Anti-Trust Act, which dealt with monopolies and anti-competitive conduct. Theodore Vail, AT&T's president, took an unusual and unexpected strategy. He offered to allow the independent operating companies to connect to AT&T's long distance networks. AT&T would cease buying out the independents, except by Government approval. Western Electric's growth would now have to be from increased use of the telephone and from overseas sales, not from AT&T's buyout of competitors.

Francis Welles resigned (his own request) from the Company in 1913, aged 58, and may have returned to the United States. The reason is unknown, but possibly he could see the buildup to World War 1. He was succeeded by Alexis Mols. World War 1 caused major problems. When the war broke out in Europe in 1914, Gerard Swope, WE's General Sales Manager and now in charge of international operations, was in Germany negotiating contracts with Siemens & Halske. When he eventually reached BTMC in Antwerp he found most of the employees had left to join the Belgian Army. Troops were stationed in the factory. He tried to continue business, but on August 1 Germany invaded Belgium. He immediately left for Britain. That was the end of WE's contact with their European companies for four years. Staff at the BTMC factory smuggled out design work, buried company records, and shipped essential equipment to the U.S. The BTMC factory was thus crippled for the duration of Belgium's occupation, and its offices were destroyed by the invading army. Many employees of BTMC escaped to England, France, USA, Norway, the Netherlands and Switzerland. They developed further on the Rotary switch, and build and installed it in their new home countries.

The Russian Revolution also led to the loss of a Russian factory and investments. Before 1914 there was a lot of economic contact between Belgium and Russia during the time of the Tsar. With 160 Belgian companies operating in Russia at the time, there were more Belgians in Russia in 1914 (at that time about 20 000 people) than in the Belgian Congo colony in Africa. After the War, the question of compensation was apparently pursued with Germany, but the results are not known.

Meanwhile AT&T continued to rely on manual switchboards. In 1919 it was shocked out of its complacency when the lady operators in Baltimore went on strike for decent pay. The need for automatic exchanges in the U.S. was suddenly realized, but the only practical available system (they thought) was produced by their competitor Automatic Electric. AT&T swallowed its pride and produce AE's Strowger switchgear under license. This was strange, as the Rotary system was now back in production at BTMC and the first post-war exchange was installed in the same year, either in Canada or at Masterton in New Zealand. Subsequently exchanges were installed in Australia, Belgium, Denmark, England, France, Hungary, Italy, New Zealand, Norway, Romania, South Africa, Sweden and Switzerland.

In 1919 Swope, one of the last believers in WE as a producer of a wide range of electrical goods, left WE to take over at its competitor, General Electric. At General Electric he was able to realise Barton's dream, and GE grew to become a powerful manufacturer of all things electrical. WE was now managed by Charles DuBois, and under him WE abandoned radio manufacture, broadcasting, and vacuum tubes to concentrate more on telephones. In 1922 he wrote "*Our Patents are under control of the American Telephone and Telegraph Company and 97 percent of our capital stock is owned by it. Our programs and policies are all subject to review and censorship of the the American Telephone & Telegraph Company.....We have no secrets from AT&T's officials and no aims or ambitions except to do our part for the Bell system"*.

At AT&T, currently headed by Harry Thayer, other moves took place to consolidate the closer cooperation. In 1925 Walter Gifford, to be the next AT&T President, put all the

researchers into a new company called Bell Telephone Laboratories Inc. This was a joint AT&T and WE venture, with 4000 employees. BTMC, one of WE's strongest research centres, was not involved. There was an attitude at the time in Western Electric in the U.S. that has been called "*not invented here*". WE tended to ignore anything that had not been invented in-house. The earlier lack of an automatic switching system had highlighted this. McBerty had a good system in Rotary, but it was developed in Belgium and therefore almost beneath consideration.

The IT&T Years

Charles DuBois, President of WE, had a great interest and a certain pride in WE's overseas operations. He was aware that Western Electric International had achieved a 47 percent share of the overseas telephone market by manufacturing in most countries with a significant telephone presence. He was negotiating with Sosthenes Behn's International Telephone & Telegraph, a multinational that did not operate in the U.S., to link IT&T's telephone operating companies with WE's overseas manufacturing operations. This would strengthen WE's international position even further. The negotiations were currently at a standstill, and IT&T had bought into a WE competitor. It looked like WE would either have to buy out IT&T or have a major competitor for its overseas manufacturing. Then DuBois fell ill and left work for several months to recuperate. In August 1925 Walter Gifford orchestrated the sale of Western Electric International to IT&T, including BTMC and the European WE factories. The factories were renamed Standard Telephones and Cables in Britain and Standard Electric elsewhere. The Antwerp factory, surprisingly, kept its original BTMC name. When DuBois returned to work, the deal had been done. Although he was against any further reduction in WE's manufacturing range, he was overruled by Gifford and other members of the AT&T board. All WE's remaining non-telephone supply business was transferred to a new company called Greybar Electric Company in 1925. WE was now entirely dedicated to telephone production and still tied exclusively to AT&T. This was a dangerously restricted position for such a company. In 1928 Greybar was sold off to its employees. DuBois resigned as President of WE. In fairness to Gifford, both WE and AT&T needed the money to pay for their desperate program of building and installing automatic exchanges.

In contrast to AT&T's centralized control policy, IT&T allowed its companies a lot of independence on the understanding that they should perform well in their own countries. Behn's intention was not to make a quick profit, but to build an international network of telephone systems managed and supplied by his own companies. They would cooperate in joint matters such as research. Initially much of this research was concentrated at BTMC. International Telecommunications Laboratories Inc was set up as a global IT&T company to centralize and disseminate information on what all ITT's subsidiary companies were up to in the various technical fields. By 1927 the BTMC factory had over 10,000 staff and was building radio sets as well as telephones. They also made some phones to original BTMC and Western Electric patterns under license, and successfully made the transition to bakelite. Traditionally BTMC and its local competitor, ATEA, were suppliers of equipment to the Belgian telephone operating company called RTT. BTMC delivered switches, telephones, and later key systems. As well as this, though, they continued to produce the Rotary system and other components for worldwide export sale. IT&T's policy was that its operating companies should provide automatic service as standard.

Through ITT, BTMC got the contract of (partially) automating and expanding the Spanish Telephone Network. In Belgium, ITT tried to take over the Belgian Network, which was refused by the Belgian State. BTMC gave priority to their Spanish project and delayed deliveries in Belgium. In 1928 they came to an agreement, and BTMC received a 10 year contract to deliver rotary exchanges to the Belgian network. (In 1932, also ATEA also gained a similar contract.) Like many other countries, the Belgian Government thought it important

to support their local industries.

The rotary system was steadily improved in 1935 and before WW 2 it was installed in Belgium, Brazil, Peru, Mexico, Norway, Denmark, New Zealand and Egypt. By the end of 1938 2,120,000 rotary lines were installed in 41 countries.

With the outbreak of World War 2, Belgium was again overrun and exports from BTMC and France were closed off. Fortunately most of the design work was removed from the factory in time, and the manufacturing load was taken up by ITT's other companies. ITT set up the Federal Telephone and Radio company in the U.S. and began production there. This factory was intended to supply their markets in Latin America, but also supplied markets such as Australia after the war until local companies could recover.

Sosthenes Behn retired as President of ITT in 1956. He died the following year aged 75. His death was largely unnoticed. Worldwide, ITT's role is still debated in historical terms. It was one of the world's first multinationals, and as a result its companies got involved on both sides of a number of wars. It helped develop a modern electrical industry in many countries. In the same year the first fully automatic international connection between Brussels and Paris was installed. The Belgian part was handled by BTMC.

ITT's new management decided to wind down much of their research into some consumer electronics areas to concentrate on telephony. One of the results of this policy was the 1954 IRSIA-FRHS computer, followed by the 1960s Stantec-Zebra, one of the first general purpose computers. It was redesigned to handle telephone switching and control in a joint project between various Standard Electric companies, BTMC, and the Netherlands PTT. Although powered by vacuum tubes and punched paper tape it was clearly the way of the future. Later versions were developed using the new transistor.

BTMC also developed new technologies such as letter sorting machines for the Post Office. (In 1959 eleven were delivered to the Post Office of Providence, Rhode Island, USA). They also expanded into products such as navigation equipment for boats, industrial cooling equipment, signaling systems, remote control, television sets, telex systems, and radio receivers and transmission systems.

In the 1960s, the French- and BTMC-designed Pentaconta made large sales worldwide, finally superseding the old Rotary system. It sold as both public switching systems and as PABXs. Export orders for Pentaconta systems in India (1964) and Romania (1965) brought for BTMC a new type of contract. The delivery of equipment was coupled to the transfer of knowledge and help to start up of local production under license. In 1967 the BTMC-designed Metaconta 10C Stored Program Controlled exchanges entered the market, allowing STD operations to be introduced to many countries. By 1983 BTMC and Fabbrica Apparecchiature per Comunicazioni Elettriche Standard S.p.A., a sister company in Italy, were developing an Integrated Services Digital Network (ISDN) system. A necessary offshoot of this work was the development of expertise and research into transistor technology and integrated circuits. BTMC also became active in space technology in the 1960s. They developed and built equipment for the European Launcher Development Organisation (ELDO) for Gove, Australia. They also delivered equipment for the ESRO-I satellite, which was put in orbit in 1968 for ESRO (European Space Research Organisation).

In 1981 the first of ITT's System 12 electronic exchanges was installed at Brecht. The Alcatel 1000 S12 exchange (over 50 million lines in service by the end of the century) is a direct descendent of this, developed from the System 12 at BTMC. Unfortunately the computer programs took a while to perfect, and L M Ericsson's AXE became a major competitor in the meantime. Australia was an early adopter of the 1000 S12, with an initial

contract for 6.5 million lines. BTMC's policy of developing its new systems in cooperation with engineers from other ITT companies paid off here. The BTMC-trained Australian engineers from STC (Standard Telephones and Cables Australasia P/L) went on to help sell the system to China. This contract was to help fill Chinese demand for 10 to 12 million lines in *one year alone*.

In the 1980s the first magnetic card readers were being introduced in telephones, based on ATEA and later BTMC research. This work flowed on to identity and credit cards, with VISA adopting the first system from ATEA. Work on digital systems continued with Antwerp developing the DSL (Digital Subscriber Line).

Around 1985 RTT put out a tender for digitalisation of the Belgian exchanges. There were six competitors for the major contract, and RTT was no longer able to insist on local companies getting the contract. In the end, the three local companies, BTMC, ATEA, and MBLE were swallowed up by the larger ones. ITT centralised its telephone equipment manufacturing, and BTMC's manufacturing was merged with the French company CGE (Compagnie Générale d'Electricité) in 1987 after a proud history of making telephones and exchanges for more than a hundred years. CGE itself had been in the electrical manufacturing business for over one hundred years. In 1991 the company was renamed Alcatel Alsthom.

Its research work continued, and the company has won a number of internal awards for excellence and development. In 2006 Alcatel merged with Lucent.

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and research provided by Jan Verhelst from his just-published book on ATEA. Details will be provided shortly.

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