

**LOUIS BREGUET**  
**His life, the company and the telegraph equipment.**  
(1804-1883),



**INTRODUCTION**

Louis Breguet's (1804-1883) apparatus has fascinated me from the beginning of my collector's activity of telegraphs around 1990 (and I have had followers). Probably it was because it was the first time that I got my hands on a technology other than the one of the morse telegraphs and that was, at the time, a revelation to me. (Since then, I've have been trying to collect as many as possible of those other technologies).

As soon as I was a bit more advanced as a collector, I started looking for 'Breguets' with some more zeal. Over the years, I have succeeded in building up a rather unique Breguet collection (and I may say that my French colleagues collectors are somewhat 'jealous' of it > "Ah ce petit Belge"!...).

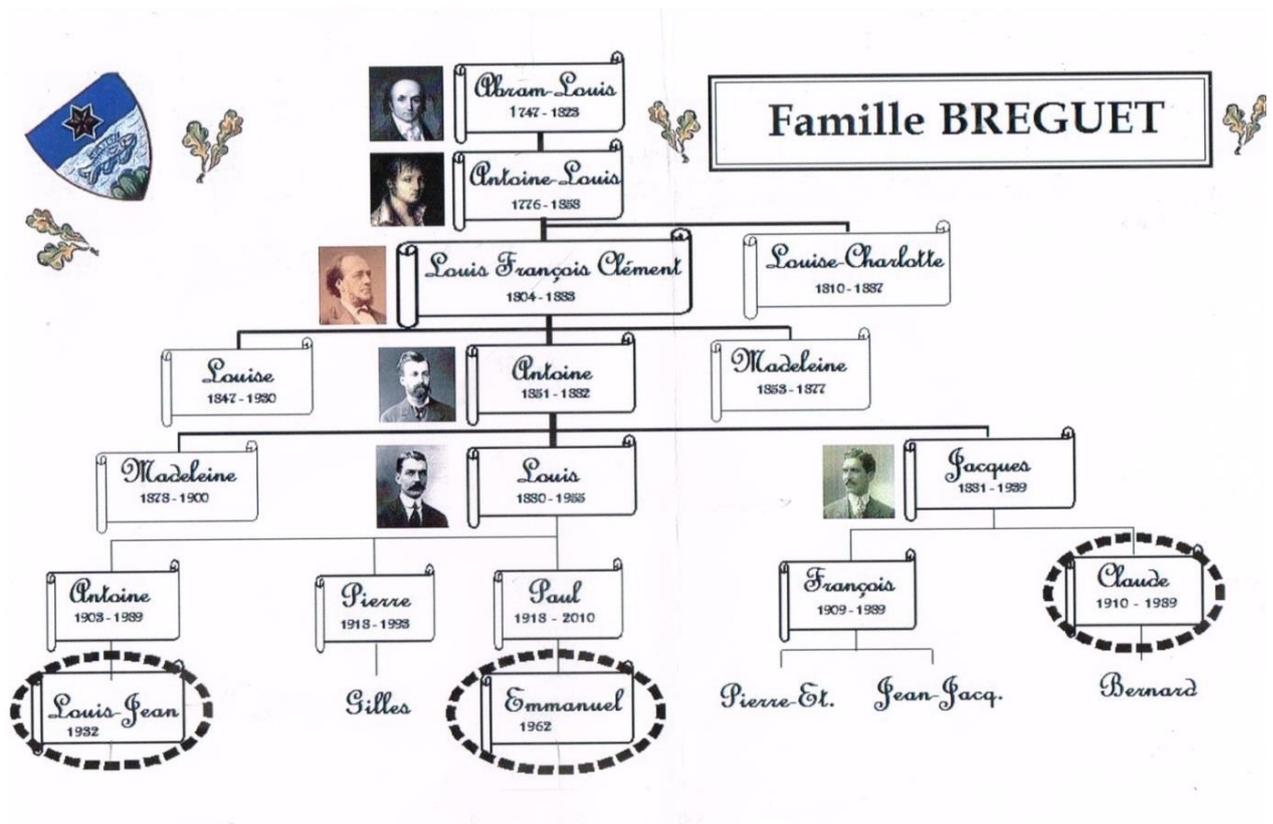
I also found it useful to study the interesting history of the 'Maison Breguet' and tried to summarize it here. More details can be found in an article (in French) that I had published in July 2003 in the magazine of the CHCR (Club Histoire et Collection Radio) and a -reworked- version in 2009 in the nr. 111 of 'Les cahiers de la FNARH' ('Fédération Nationale des Associations de personnel de La Poste et de France Télécom pour la Recherche Historique' ... a mouthful ...), an association of which I have been a member for many years.

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## PART 1: HISTORY OF THE 'MAISON BREGUET'

The history of the Breguets is so important and, as far that I could see, the knowledge about it so small, that I am plunging hereby into much more details than what I usually do.

### 1. Gynealogical overview



The 'ovals' point to my 'life' contacts.

Louis-Jean has passed away in 2012.

I have also had a contact with a member of the eight generation: Denis, the son of Emmanuel.

**First generation.** The Breguet dynasty of men of science and technicians starts with **Abraham Louis Breguet** (1747 - 1823). He was born at Neufchatel, in Switzerland, in 1747, of one of the numerous French families driven into exile by the revocation of the Edict of Nantes. He moved from Switzerland to Paris in 1762. He then started as an apprentice to a watchmaker at Versailles. In 1775 he set up his own business on Quai de l'Horloge, Ile de la Cité in Paris (that was the new name of the street that was given later to honour him, I think). Before the revolution broke out in France (1789), Breguet had already founded the *establishment* which afterwards produced so many masterpieces of mechanism and clock making, and his reputation was rapidly increasing. He invented many new features ?. He had great success with, among others, Louis XVI and Marie-Antoinette as customers, became watchmaker to Napoleon, the Duke of Wellington gave three thousand guineas for a Breguet and always wore it, and so on...



39 quai de l'Horloge en 1840

He also made numerous improvements in nautical and astronomical instruments! But then he had also to do with telegraphy! Therefore we have to go back to Claude Chappe (see chapter 1 in this book). Chappe, who was not a technician but a priest, asked Abraham in 1793 to make the technical drawings and to design and realize the mechanism for his optical telegraph (semaphore). It is amazing that a watchmaker who made the most precise timepieces in the world with tiny parts (working with a magnifying glass) got involved with big pulleys and other rough rigs...

In the Summer of 1793 Abraham-Louis Breguet took refuge in Switzerland from the excesses of the French Revolution; he came back to France in the Autumn of 1795.

He was awarded the 'Légion d'honneur' and was a member of the 'Academie des Sciences'

**Second generation.** At the end of the 18th century Abraham was joined in his workshop by his son **Antoine Louis** (1776-1858), who had been trained in watchmaking in England. Antoine-Louis in Neuchatel brought the art of watchmaking to its peak, leaving an indelible mark on the profession, both technically and aesthetically. The proof: watches were (more than before) made for several crowned heads in Europe and for the Tsar in Russia

**Third generation.** As the rest of this chapter is mainly about Louis (1804-1883) I can go here straight to the next generation.

(On his birth certificate the sequence of his first names is Louis Clément François

**Fourth generation.** Here we meet **Antoine** (1851-1882) who was a 'Polytechnicien' (student at the famous École Polytechnique). He introduced in France the telephone of Graham Bell. He was, in 1881, one of the organisers of the spectacular first 'International Exposition of Electricity' in Paris at the **Palais de l'Industrie** on the **Champs-Élysées**.

He was one of the most brilliant engineers of his time, but, unfortunately, he died prematurely at the age of 31, leaving a little girl and two little boys at a very early age.

**Fifth generation.** Those two sons, **Louis** (1880-1955) and **Jacques** (1881-1939) were excellent students: Jacques, somewhat in the tradition of the family, became a 'Polytechnicien' and Louis graduated in 1904 as an engineer at the ESE (École Supérieure d'Electricité), one of the most prestigious schools in France.

In 1905, Louis and Jacques, under the guidance of Prof. Charles Richet, began to work on a gyroplane (the forerunner of the helicopter) with flexible wings.

The breakthrough of the two brothers came in 1907 with the Breguet-Richet 'Gyroplane' an experimental single-seat helicopter-like craft with four rotors.

In 1908, Louis Breguet and Charles Richet formed the Société des Ateliers d'Aviation and turned to fixed-wing planes. They produced their first biplane, the Breguet I, in 1909.

And it ended with a Twin-engine naval reconnaissance aircraft in 1961. In between the company brought out another 47 different airplane models: transport aircrafts, fighter aircrafts, bombers, civil transport, jet strike aircrafts, hydroplanes, ... you name it.

**Sixth generation. Antoine, Pierre, Paul, François, Jean-Jacques and Bernard:** I have no particular information on them.

**Seventh generation:** Here I have to mention that I had excellent contacts with **Louis-Jean** (1932-2012) and Emmanuel (1962). I was very honoured that I could meet the late Louis in his stately apartment in Paris, near the Étoile, and have lunch with him and his wife in 2001. And I was also honoured that **Emmanuel** went to the trouble of coming to see me in my home, here in Halle (B) in 2002, to have an in depth look at my, at that time, very big collection of Breguet telegraphs and instruments.

As the enduring benchmark for watchmaking in the great European courts, Breguet has made its way through the ages among illustrious figures such as Marie-Antoinette, Napoleon Bonaparte, Tsar Alexander 1st and Winston Churchill, to mention a few.

## 2. About the life and work of LOUIS François Clément Breguet ('Louis')

Despite the troubles of the Revolution and Napoleon's wars, **Abraham Louis** Breguet had succeeded, with the help of his son Antoine Louis, his sister-in-law Suzanne L'Huillier, and a small and remarkable team of workers, in creating the first watchmaking brand in Europe whose works are nowadays highly prized by collectors for their technical quality and incomparable beauty.

Abraham Louis Breguet died in 1823, leaving a house in full prosperity, but his son **Antoine Louis**, since 1812, the date of his wife's death, had increasingly thought of retiring to the countryside to live as a British gentleman farmer. Fortunately, he had an only son whom he trained to replace him and continue the tradition of the house.

This son, **Louis** born in 1804, was nineteen years old at the time of his grandfather's death. For two years he had been returning from Neuchâtel (Switzerland), where he lived with his godfather J.F. Huguenin, to complete his apprenticeship at Versailles with Perrelet, a skilled watchmaker and strict master. Finally, he had worked in the family workshop, subject to a strict schedule established by his father: from 5:30 a.m. to 10 p.m. including Sundays in the evening, to make up for the 'too busy' years in Neuchâtel. He was thus able to complete his culture and his theoretical and practical knowledge.

At the same time, Antoine Louis Breguet and his cousin Lassieur headed the team of watchmakers working in the workshop on the 'Quai de l'Horloge'. And the 'P'tit Louis' (Petit Louis > Small Louis) – he was for a long time called that way, because his height did not exceed 1.57 metres - was sent to Geneva, where he was active as a simple worker from 1824 to 1827. On his return to Paris, and after some education, he devoted himself to the construction of marine chronometers. Much later he wrote in the notice on his work presented to the Academy of Sciences: "There are no delicate pieces in marine watches and astronomical clocks that I have not executed with my hands".

The 1830 Revolution passed... in front of the windows of the house on the Quai de l'Horloge. Louis Breguet was then a national guard.

The young man was always busy with marine parts. He gained the esteem of the famous **François Arago** (1786-1853) by developing time counters, which were useful for the progress of astronomers. Louis was fortunate enough to be encouraged in his activities by him. Arago was in fact a well-known scientist; he was a professor, director of the observatory, politician, minister,... who enabled Louis to follow a number of courses in the elite 'École Polytechnique'.

And then, on 7 March 1832, an event occurred that will be of paramount importance for the future of the house. Louis having seen a demonstration by Arago of an electromagnet based on a horseshoe, decided to engage himself also in this new area: electricity!

On 14 May 1833, Louis married Caroline Lassieur. On 20 May father Antoine Louis Breguet signed the deed of sale of his company 'Breguet & Fils' to 'Breguet, Neveu & Cie', formed by Louis Breguet, the cousin Louis Lassieur and Trédos, the accountant and faithful friend. The price was 270,000 francs, paid by the three companies, but Louis was considered to have already paid 50,000 francs, his father acknowledging in the deed that his salary had been abnormally low since he entered the house....

Between 1835 and 1840 he standardized the company product line of watches, then making 350 watches per year

Little by little, Louis Breguet left the watchmaking activities to a workshop manager so that he could devote himself to electricity applications. The design and manufacturing of electric clocks were part of it. Noteworthy is also the fact that in he published in 1841 a report "Mémoire sur l'Induction. This work lead Ruhmkorff to build his famous induction coil. 1841 was a good year: 37,000 francs of profits. Alas it was quickly lost following the bankruptcy of the Parisian bankers. At that time Louis Breguet also made a 'thermometergraph'. It recorded temperatures of -42 degrees centigrade at Kasan University in Russia and, as a consequence, he was appointed a member of this university in 1843.

Also in 1843, Louis Breguet developed, at Arago's request, and using a method attributed to Wheatstone, a rotating mirror apparatus, where three combined mirrors are seen each making more than 2,000 revolutions per second, driven solely by gears. Louis Breguet declared that by removing the mirrors, he had reached a speed of nearly 9,000 rpm! This apparatus served to measure the speed of light!

This period was full of activity, because the electric telegraph started to developed in France. Louis Breguet, at the instigation of **Alphonse Foy**, Director General of Telegraphs, invented a telegraph that simulated part of the Chappe signals and he became responsible for overseeing the construction of the first telegraph line from Paris to Rouen (late 1840's). In 1842 (?) Louis designed and made the so called 'Foy & Breguet' telegraph then (mid 1840's) followed by his famous step-by-step dial-telegraph (pointer-telegraph) and the invention of the lightning arrester,... In 1853 he published his first Telegraph Manual. Later on he also produced some portable telegraphs, morse telegraphs and printing telegraphs,... (see PART 2).

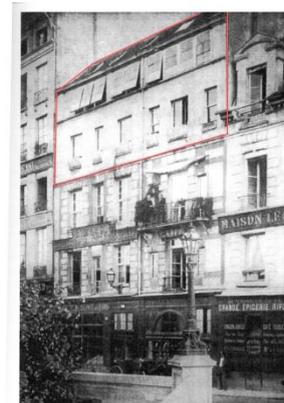
The 1848 revolution passed. Lassieur died in 1851, "Breguet, nephew and Co" then simply became the '**Maison Breguet**', a name that the company kept for a century until its end.

It was in early 1850 ( that the unfortunate Mouilleron affair took place, during which an excessively light management on the part of Louis Breguet almost caused its ruin. Mouilleron, his intelligent and enterprising workshop manager, had unwittingly become his main creditor and owner of most of the machines. He was also the tenant of a floor of the house on the Quai de l'Horloge, which had just been added for the telegraphy activities. The case was settled by financial compensation, most of which was provided by Louis' father Antoine Louis Breguet, at the cost of major sacrifices.

It should be noted in passing that a new bank failure cost him more than 150,000 francs.

Around 1855, Breguet built telegraphs for all of Europe, and even for Brazil and Japan. Other fabrications were added, which led to the rental of a larger workshop in Montparnasse. He was asked to solve the problem of remote time transmission.

In 1856, he created a system for Lyon that operated 72 clocks with an inverted current pulse every minute. In 1857, it was the realization of the remote reset of mechanical clocks. In 1876, that of the time centres, which received to the nearest second, the time of the mother clock of the Paris Observatory. Other realisations concerned the Marey sphygmograph, the Villarceau's regulator for the Observatory's equatorials, the Berlin oscillometer, the Bouquet de la Grye seismograph, the Captain Fleuriais' chronograph, and many other achievements, including the Planté accumulators and various arc lamps. He also collaborated in the development of an induction coil, later improved by Heinrich Ruhmkorff,



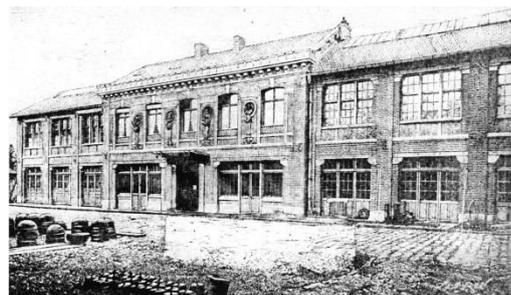
Le 39 quai de l'Horloge vers 1850, avec les deux étages d'atelier  
(Louis Breguet et son neveu sur le balcon, en compagnie de Marcelle Bonheuf)

&c... So, besides the telegraphy related activities a lot of others were going on and that had, above all, to do with scientific apparatus. But that is matter for another book by someone else...

In 1881 Louis sold the company to his son Antoine and other shareholders for 330,000 Francs and the name was changed again, this time to 'S.A. Maison Breguet'.

Antoine's death by exhaustion in 1882, at the age of 31, then that of Alfred Niaudet, his close collaborator (and son of his nephew Alfred Niaudet) on 11 October 1883, were terrible blows for Louis Breguet who died in turn in his house on the Quai de l'Horloge on 27 October 1883. He was then 79 years old. The Breguet company, which had become a public limited company the previous year, with a capital of three million euros, thanks to external contributions, was able to continue but without Breguet at its head; its grandsons Louis and Jacques were only three and two years old. The company, decapitated, went through a very difficult period but was able to work its way through it (in 1892 the capital of the company had risen to 3.000.000 Franc).

1883 – A bit over hundred years had passed since the foundation of the watchmaking workshop on the Quai de l'Horloge: we could therefore measure the changes that had occurred over four generations of Breguet. The watchmaking section had definitively left the Quai de l'Horloge in 1870, following its transfer to Edward Brown, its workshop manager. It continued following its own destiny in the luxury shopping district, that of rue de la Paix and Place Vendôme, keeping the prestigious name of its founder. Telegraphy and telephony had also just left the old house; only a commercial office and a laboratory remained there, since the creation of the annex on Boulevard Montparnasse, which had in turn proved too small. The young public limited company Maison Breguet then built modern workshops on an area of nearly one hectare in the south of the same district, rue Didot. Inaugurated on September 1, 1882 - two months after Antoine's death - they would last more than eighty years. With a staff of nearly 250 people, mechanical and electrical equipment of great diversity was built there, but in very small series, and increasingly large in size. Electrical and steam engines, pumps, gears, projectors and lighting equipment, freight elevators, special marine equipment, underwater mines, etc.... These workshops having aged, and in turn, having become too small, were abandoned after the Maison Breguet was absorbed in 1966 by the company Fives-Lille-Gall,



Maison Breguet, rue Didot

Between 1830 and 1880, Louis had no less than 80 patents on his record.

He obtained the highest awards at world exhibitions, but what gave him the greatest pleasure was to be appointed, in 1862, a member of the 'Bureau des Longitudes' (1862).

In 1874 he became a member of the 'Académie des Sciences', a position that his grandfather Abraham had also obtained (and also without having had an academic education!).

In 1877 he was promoted to 'Officier de la Légion d'Honneur'

The name Louis Breguet is one of the 72 names of French people engraved on the Eiffel Tower.

In 1874 (1876?) his son Antoine, entered the house. In 1877 his father asked him to develop with Graham Bell from the USA, the manufacture of the first telephones in Paris. He was also to produce with Ader the first stereophonic theatrical transmissions for the 1881. At the famous Electricity Exhibition in Paris, of 1881 he was the Secretary General of the installations.

As noted above, Antoine's died by exhaustion in 1882, at the age of 31.

*We have seen here in 1.1., in the description of the fifth generation, that Louis and Jacques were engaged in the design and manufacture of aircrafts., with a first vertical take-off of their Gyroplane in 1907. Louis then devoted himself entirely to the aircraft industry while Jacques became responsible for the 'Maison Breguet Électrique'. In October 1907 the company 'Société des Ateliers d'Aviation Breguet- Richet' is founded*

*Remember that the Louis Breguet's aircraft company brought out 48 different airplane models; what a great achievement!*

*Unfortunately this aircraft business came to an end at the beginning of the 1950s due to the unequal competition with the major American manufacturers. Louis died in 1955. In 1971 the company merged with that other French aircraft manufacturer 'Société des Avions Marcel Dassault' under the name 'Avions Marcel Dassault-Breguet Aviation' (AMD-BA). In 1990, the name AMD-BA was changed to 'Dassault Aviation'.*

*And on 14 September 1999 Investcorp S.A. and The Swatch Group Ltd. have reached an agreement whereby all shares of the Groupe Horloger Breguet were taken over by the Swatch Group. Breguet still produces high quality hand-assembled mechanical timepieces known for the beauty of their design as well as for their accuracy and technical innovation. Breguet timepieces are situated in the highest price segment of the 'haut-de-gamme' watch market. Emmanuel Breguet is one of the directors. He is also the curator of the Breguet Museum at 6 Place Vendôme.*

### 3. Is it Breguet or Bréguet?

I doubted the spelling for a long time because in the 19th century books the two notations are found. I only got absolute certainty in 2011 after I met, as described above, Mr Louis Jean Breguet the 'patriarch' of the family. And it was strongly confirmed when I got, in 2012, the visit of Emmanuel Breguet

It must be clear for now and always that the spelling of the name is and has always been Breguet, WITHOUT an 'accent aigu'.

I could take the pictures here in the office of Louis Jean Breguet during my visit.



Our Louis

His father, Antoine-Louis

His son Antoine

## PART 2: THE BREGUET DIAL TELEGRAPHS

### 2.1. The Foy & Breguet telegraph



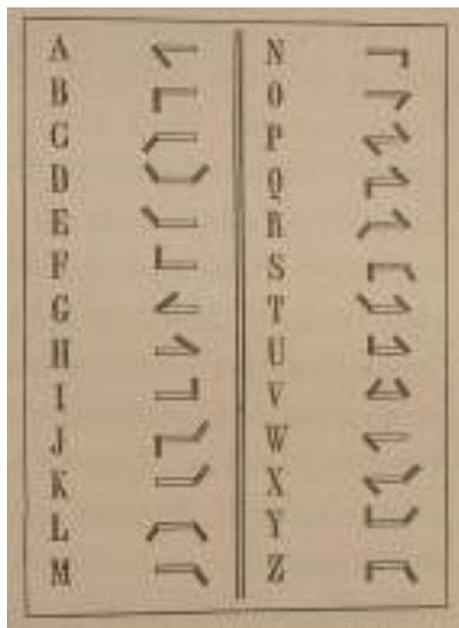
An example of a Foy & Breguet dial telegraph (in the collection of a friend)

Before describing the best known telegraph of Breguet I will elaborate concisely about the beginning of the electric telegraphy in France

We know from my chapter about Claude Chappe that France had the most extensive telegraphy (semaphore) network in the first half of the 19th century. And that was of course for the French 'the best of the best'; for them the rising electric telegraphy was a joke in comparison to their system (ever heard of 'French chauvinism'?).

Both Morse and Wheatstone started defending their products in France in the early 1840s but to no avail. But in 1845 it started because not all influential people were so chauvinistic but more realistic. Under the impetus of François Arago, who we have mentioned here earlier, the switch was made to electric telegraphy. But as a compromise they would build a telegraph which had to be based on the principle of the Chappe. The intention was indeed to imitate the Chappe signals. We remind you that the crossbar of the Chappe could only take 2 (exceptionally 4) positions and the 2 wings 8 each. The idea to also show the positions of this crossbeam was soon considered to be too difficult, both mechanically and electrically, moreover one then needed 3 wires. So they limited themselves to a two-needle system, each one simulating the eight positions of the wings ('indicateurs').

This 2-needle Chappe telegraph was and is called the Foy & Breguet telegraph. **Alphonse Foy** was at that time 'Administrateur en Chef des Télégraphes (aériens)' and the assignment was entrusted to our friend Louis Breguet.

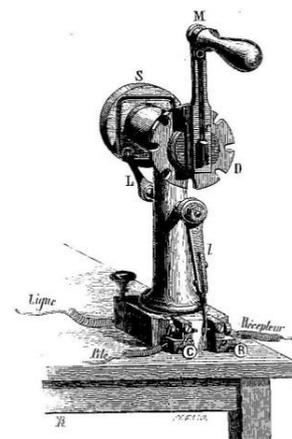


The previous page shows a Foy & Breguet receiver. Unfortunately not from my collection. If you ever meet one, you can do me a favour...

And here on the left you can see the code. Several books show different tables...This code looks like the alphabetical part of the optical telegraph (semaphore) from Claude Chappe, but is not identical to it.

The transmitter consisted of 2 'manipulateurs' where one of the 8 positions of a wing could be set each time. Such devices are unfindable, with the exception of the ones in the museum where I took the picture below...

But as the years went by, the international success of Samuel Morse's telegraph increased. Compared to the Foy & Breguet he had the advantage that he only needed one wire and also that the message was recorded (the 'dots' and the 'dashes') on a paper tape.



In order to meet the first problem (and thus to halve the cost of the connecting circuit) it was decided to build a telegraph with only one needle. The 'trick' was to first send the position of the left needle and then the position of the right needle. One wire less but now the signal was sent at half speed.

And the problem that the message was not recorded on paper remained of course. So it didn't take long before people in France also surrendered and accepted the Morse system. This 1-needle telegraph from Foy & Breguet on the next page is almost impossible to find. It came into my possession via Austria...



Next a picture with the driving mechanism of my '1-needle Foy & Breguet'.



Shortly after the retirement of Alphonse Foy in 1854, a decree was issued that marked the end of the Foy & Breguet telegraph and the breakthrough of the morse equipment in France.

## 2.2. His well-known dial telegraph

After the not so great success of the Foy & Breguet telegraph, Louis Breguet developed his famous (for collectors at least) dial-telegraph (télégraphe à cadran). In which year exactly I don't dare say, because in the literature I have seen the years from 1845 till 1849 appear... It is also mentioned that he was already in the beginning of the 1840's busy with the development of this dial telegraph but had first to develop 'by order' the 2-needle Foy & Breguet telegraph. This telegraph was first used here in Belgium on 16 April 1851 on the Brussels-Paris line.



Let us take a closer look at this model. We start with the transmitter ('manipulateur'). To transmit, we turn the crank from its resting position (at the top, the 'cross' position) until we reach the first letter to be signalled. There we stop for a while, after having pushed the crank somewhat down. Then we turn to the second letter, etc. At each step of the crank, the battery is alternatively switched on and off (one obtains an electrical pulse train on the telegraph line).

The receiver is essentially a clockwork mechanism with a seconds hand. This hand (pointer) is driven by a 'classic' spring motor. This is a spiral spring that must first be wound up and, once released, uses its power to turn the pointer via a few gears. In advance, by pressing the button at the top of the unit, the pointer is positioned at the zero position (a 'reset'). This corresponds to the position of the cross at the very top (see the figure alongside). At rest, the pointer is mechanically (simply with a spring) locked in this position. With each current pulse received, the pointer is briefly unlocked by means of

an electromagnet and continues one step (one letter), 'synchronous' with the movement of the crank through the transmitter. The pointer then stops at the letter at which the transmitter was also stopped. The telegrapher notes this letter and then follows the pointer until it stops at the next letter, and so on. When you look at the circle with the characters on the transmitters and receivers in detail, you will notice



that, usually, the letter W is missing. Exceptionally, it is the letter J as shown on the device on the previous page. The reason for this is of a technical nature. The transmitter behaves like a switch that, when you turn the crank letter per letter, it switches the power on and off successively. In the idle position (the cross at the top), the battery is turned off. This is necessary because otherwise the battery would be permanently supplying power at rest and therefore quickly exhausted. If one turns the arm to the first letter, the A, then the battery is switched on, then to the B: off, then to the C on, ....

An even number of characters is needed if the battery is to be switched off when you return to the idle position. This resting position should not, of course, be an

alphabetic character. Since the alphabet now contains 26 characters, i.e. an even number, one must therefore be dropped. Logically, in the French language this is the W since it is the least common character... And one can still signal the letter V instead of the W; or twice a V as a W is called 'double V' in French (not double U); every Frenchman will immediately interpret the word correctly. But as mentioned above, exceptionally it is the J that disappears. I suppose one typed an I instead of the J.

I myself don't understand why they didn't work standard with 28 characters; after all, nothing changes technically. On one single occasion I have seen a model with 28 characters: the extra one added was an É (26 plus the É plus the cross = 28 = even), unfortunately I didn't write down the manufacturer's name.

On almost all scales numbers are also printed. You can see them on the following picture: on the model on the left on the outer circle and on the model on the right on the inner circle.

But how did one know, e.g. when the pointer is on the A, which is also the position for the number 1, whether one should interpret that as an A or a 1? Well, that was done simply by means of a generally applicable agreement. To switch from letters to numbers, and vice versa, the transmitter positioned the pointer on the cross, and then turned it two revolutions and then turned it to the desired number.

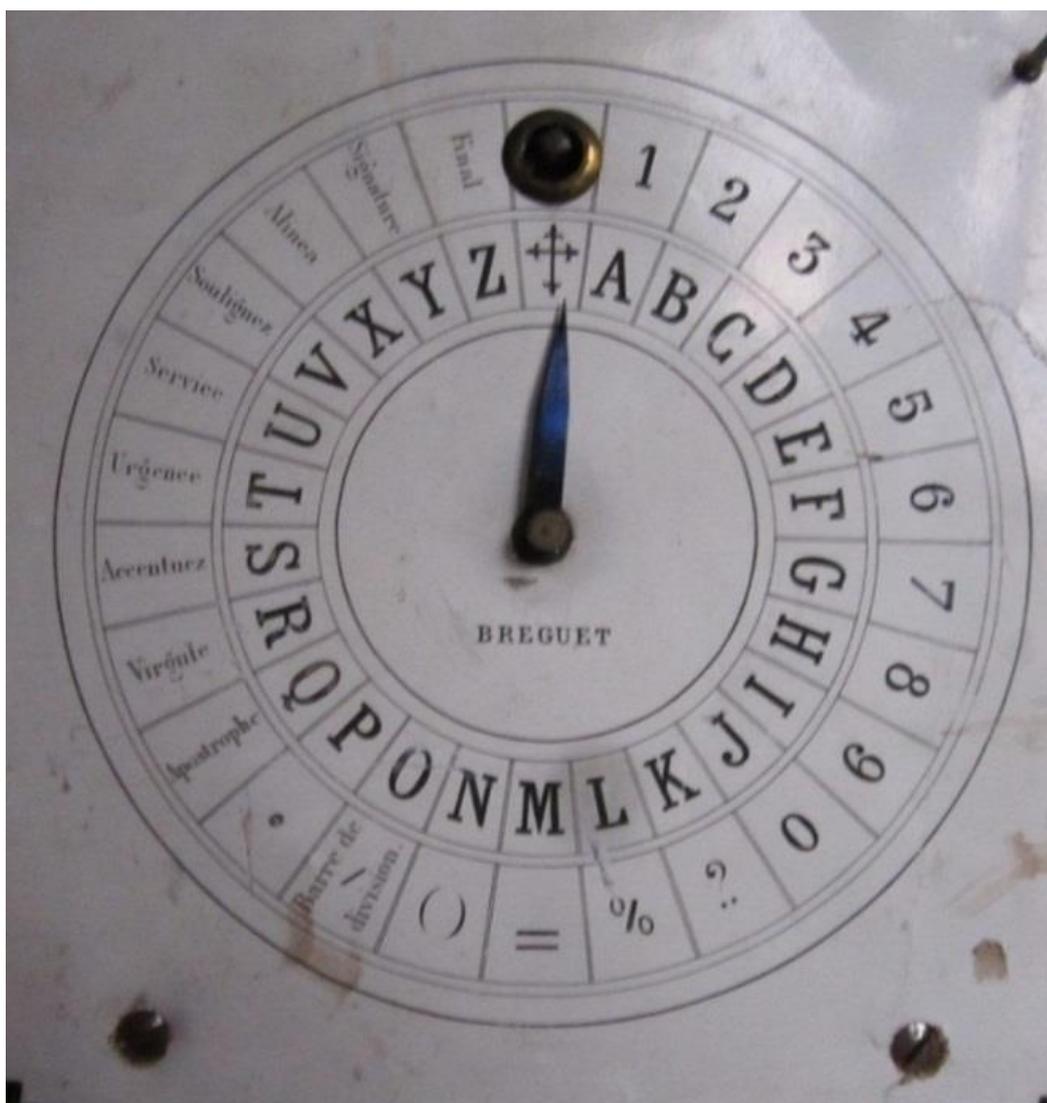
The two complete rounds were the 'shift' sign for the receiver...

The picture below shows two sizes of the receiver; on the left is the standard model and on the right the rare larger model.

The binding posts from the model left are an indication that the receiver belongs to the oldest generations.



And on the two following images you can see that the scale could also be adapted to the application.



Here it is done by adding punctuation marks and some 'service announcements'.

An Arabic language?



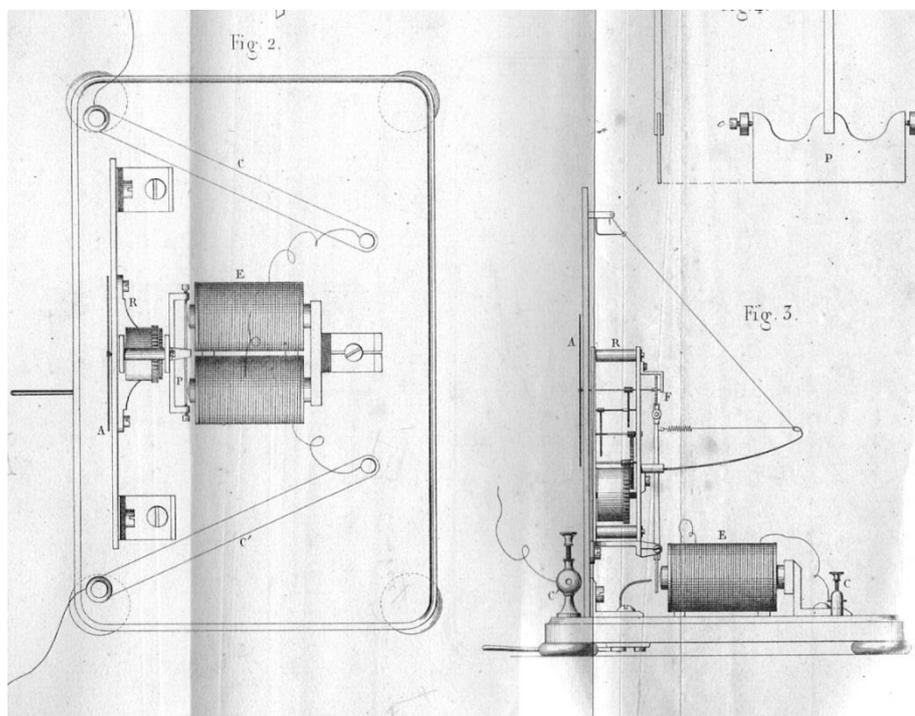
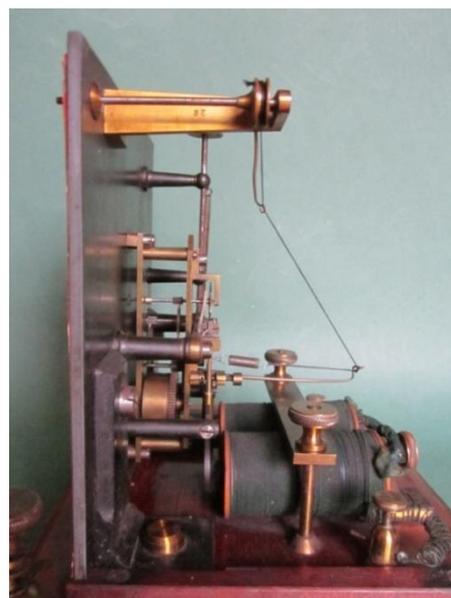
In the image below we see the inside of a 'classic' Breguet receiver.



Compare this with the mechanism of the receiver on the next image, which I have pictured together with a scan of an engraving of the interior of such a device. In both cases it is clearly the same model.

This scan comes from the book by l'Abbé Moigno: 'Traité de Télégraphie Electrique' from 1849, one of the oldest books on telegraphy. That confirms what I already thought, namely that my receiver, with the very low serial number 416, must be a device of the very first generation. Also notice the much smaller spring drum compared to later models.

The mechanism is indeed completely different from what I've seen in all the other devices (and I've had the opportunity to examine the interior of many of the Breguet telegraphs in the aforementioned fantastic 'Reserves' of the museum of the 'Arts et Métiers' in Paris, the 'CNAM'. It can also be compared to that of my 1-needle Foy & Breguet, which must also be from the second half of the 1840's...

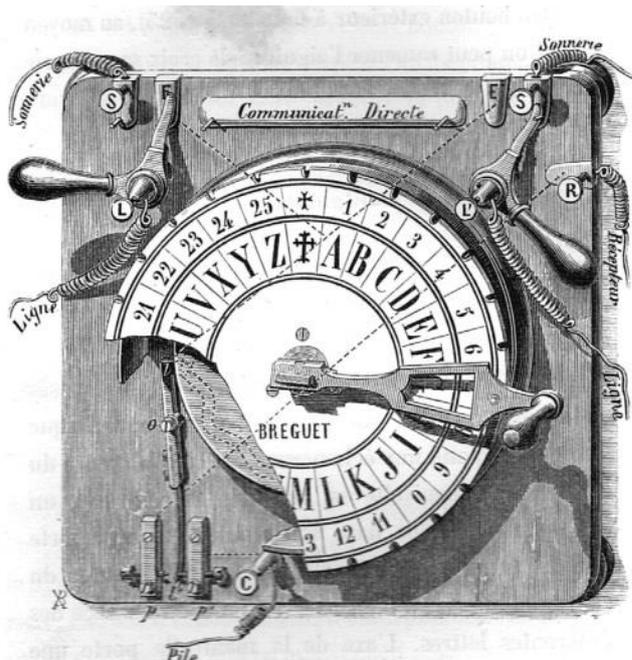


Next a group picture of a number of transmitters ('manipulateurs') of different sizes.



I will briefly discuss here the special ones.

The model below can work with two lines.



The next one is the (exceptional) model that can work with three lines.



### 2.3. Special models

2.3.1. Below is the rare 'automatic' transmitter made by Breguet according to Chambrier's patent.



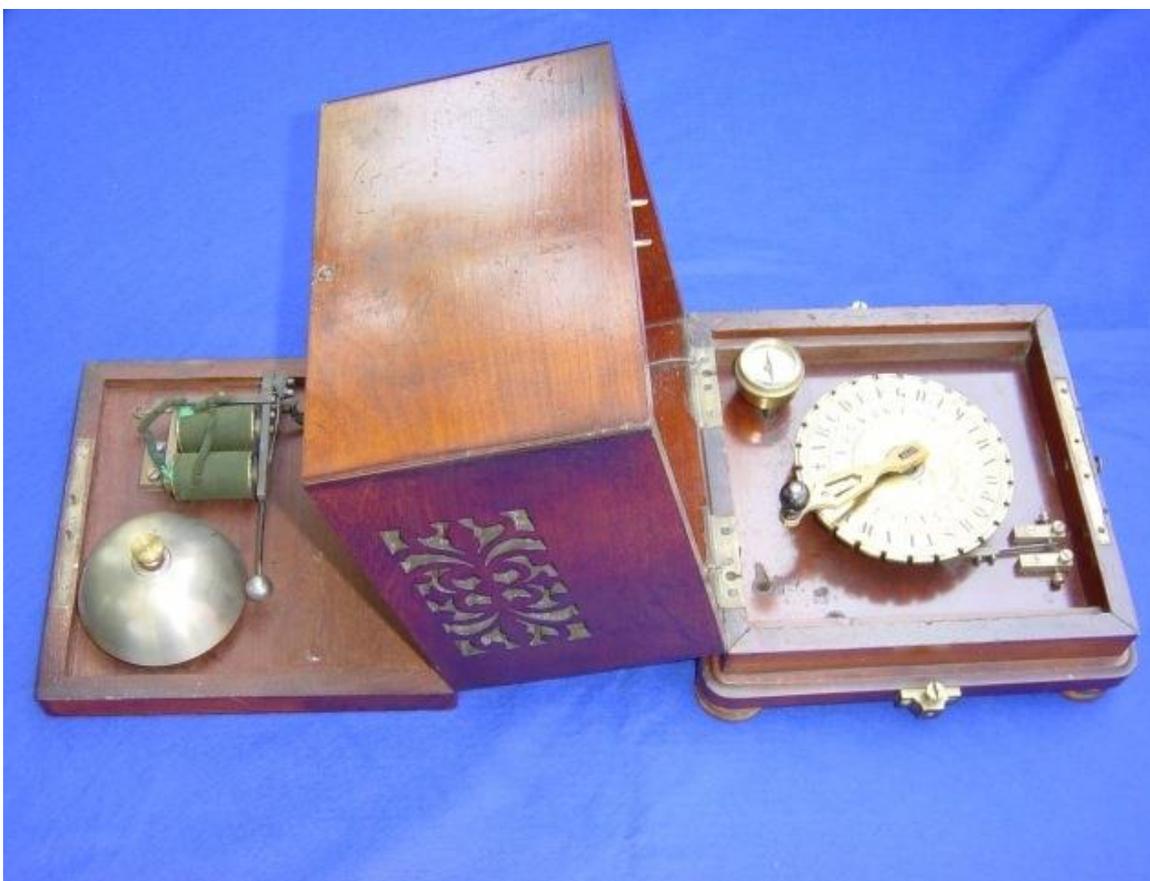
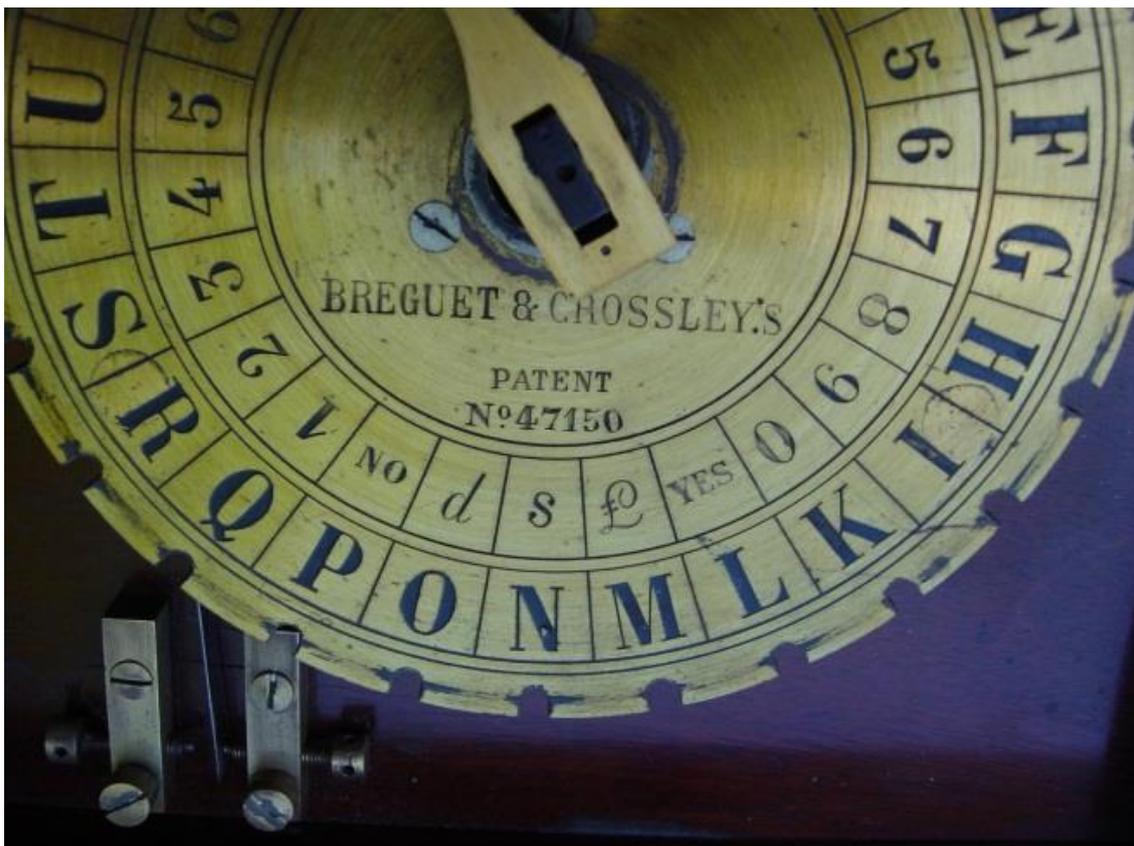
2.3.2. Another rare model is this Breguet-d'Arlincourt transmitter..



2.3.2. And here are some special transmitters/receivers.

2.3.2.1. First of all, the exceptional portable model 'all-in-one' (no scanner function, unfortunately ;o) from 1849: the 'Breguet/Crossley'. It was meant for the railways and the army. By means of the English money symbols (pound, shilling, pence,...) one can see that a model was also made for the English market. Only a few of these models are known worldwide.





2.3.2.2. And this one, also a 'rare' version, is a combined transmitter/receiver in one housing.

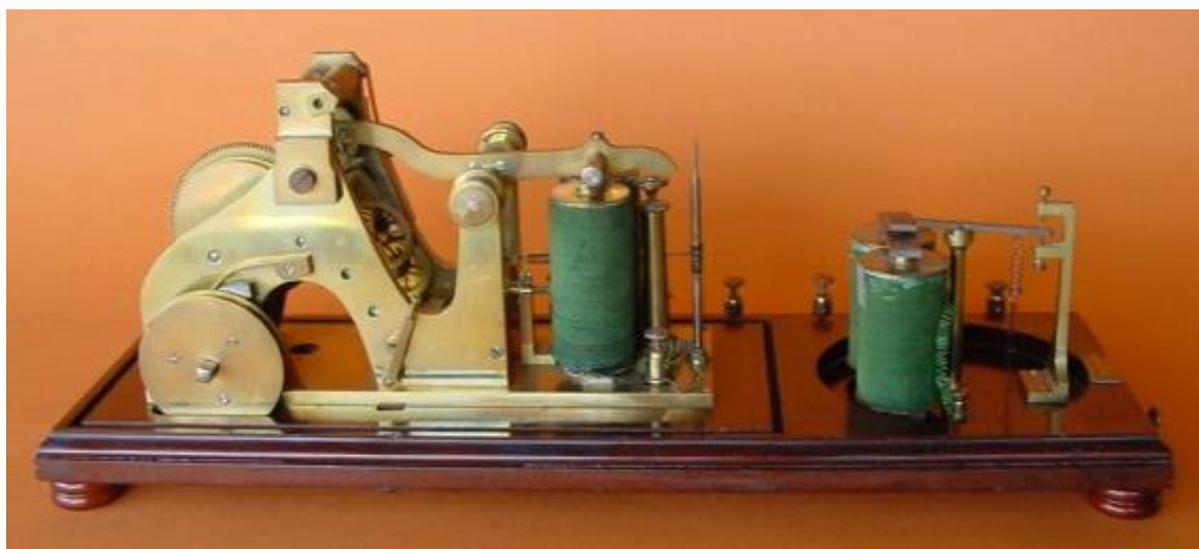


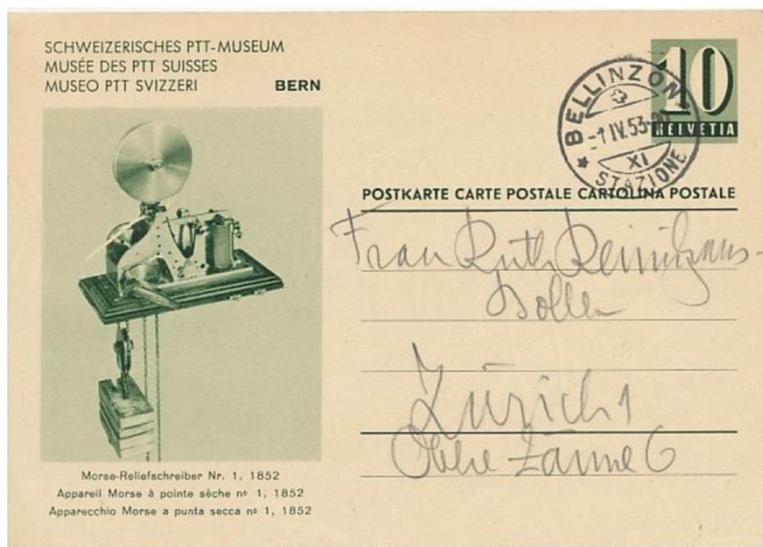
## 2.3. Morse telegraphs

### 2.3.1. The very first morse telegraph in France

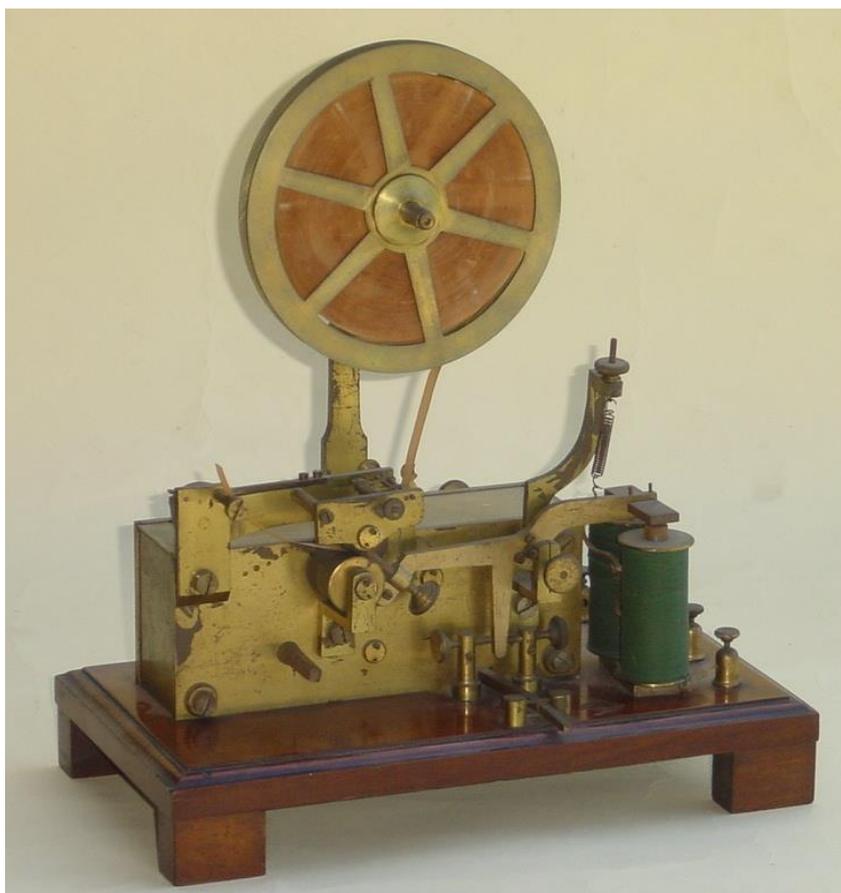
It is a 'relief writer' (embossing the dots and dashes stripes in the paper tape), driven by a weight, built into a protective glass 'cage', and fitted with a relay (right).

But... was it made in France by Breguet? For various reasons I am convinced that it was introduced from Switzerland and in Paris only the Breguet nameplate, and probably also the relay, were added... Compare this receiver with the first Swiss telegraph, on the oscarcard (next page) of the Swiss PTT on the next page, it is exactly the same. And I have the proof that this one was made by Hipp in 1852. And Breguet always engraves his name into the brass housing; here it is a simple external name plate fixed on the wooden base...

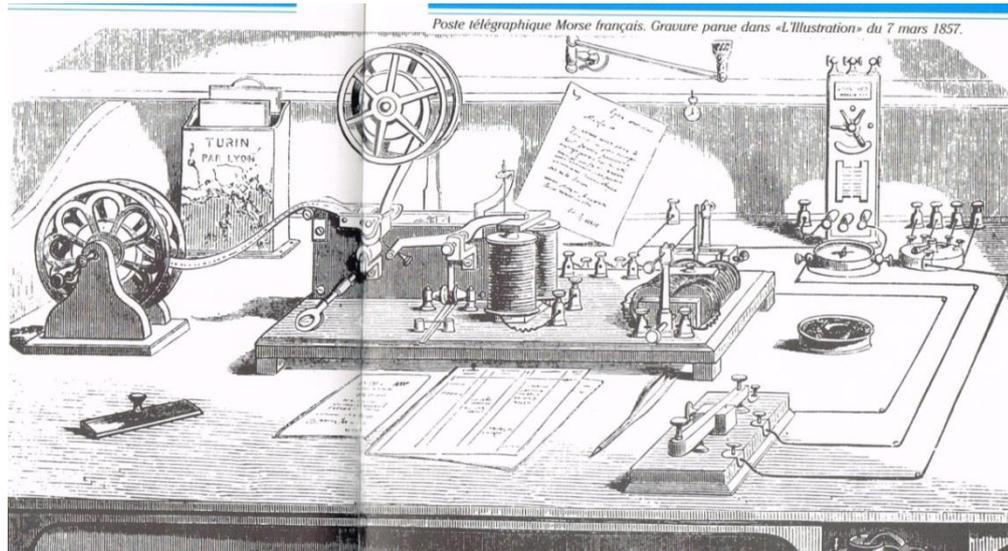




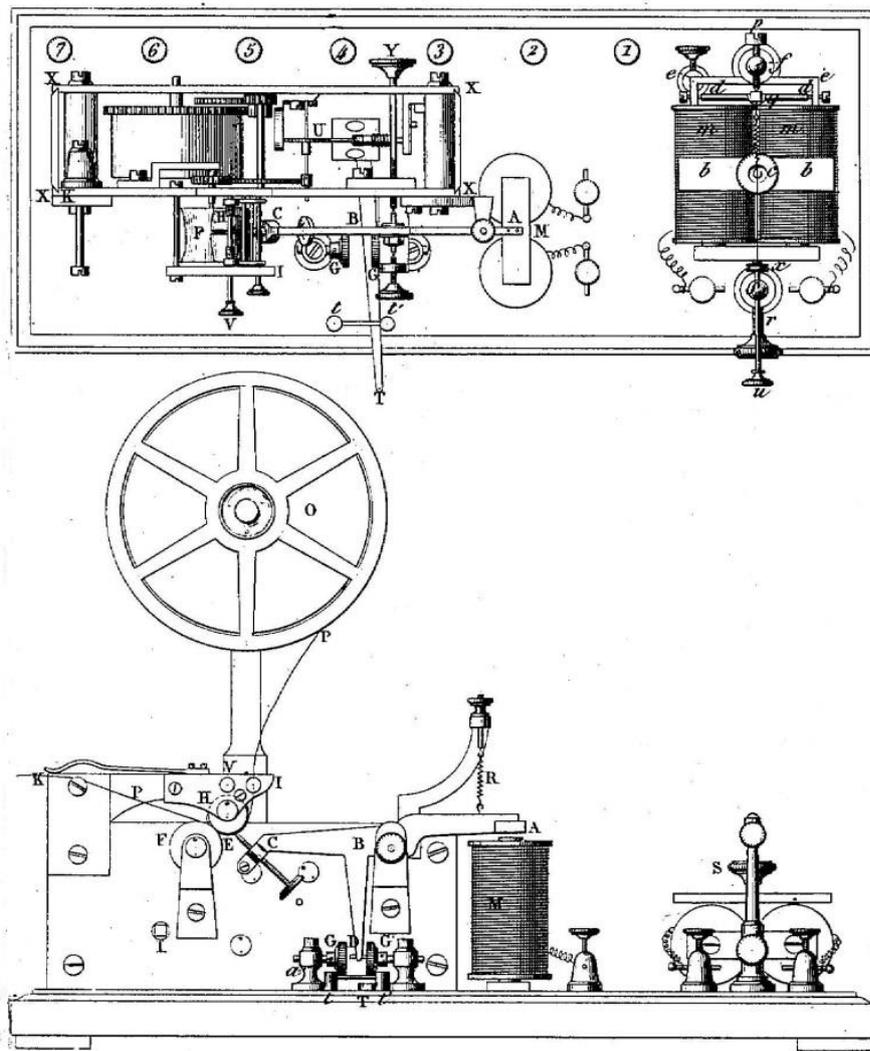
2.3.2. Later on Breguet has also manufactured 'classic' Morse telegraphs. The first one hereunder, may be his oldest model; it has some differences compared to the other models that were around.



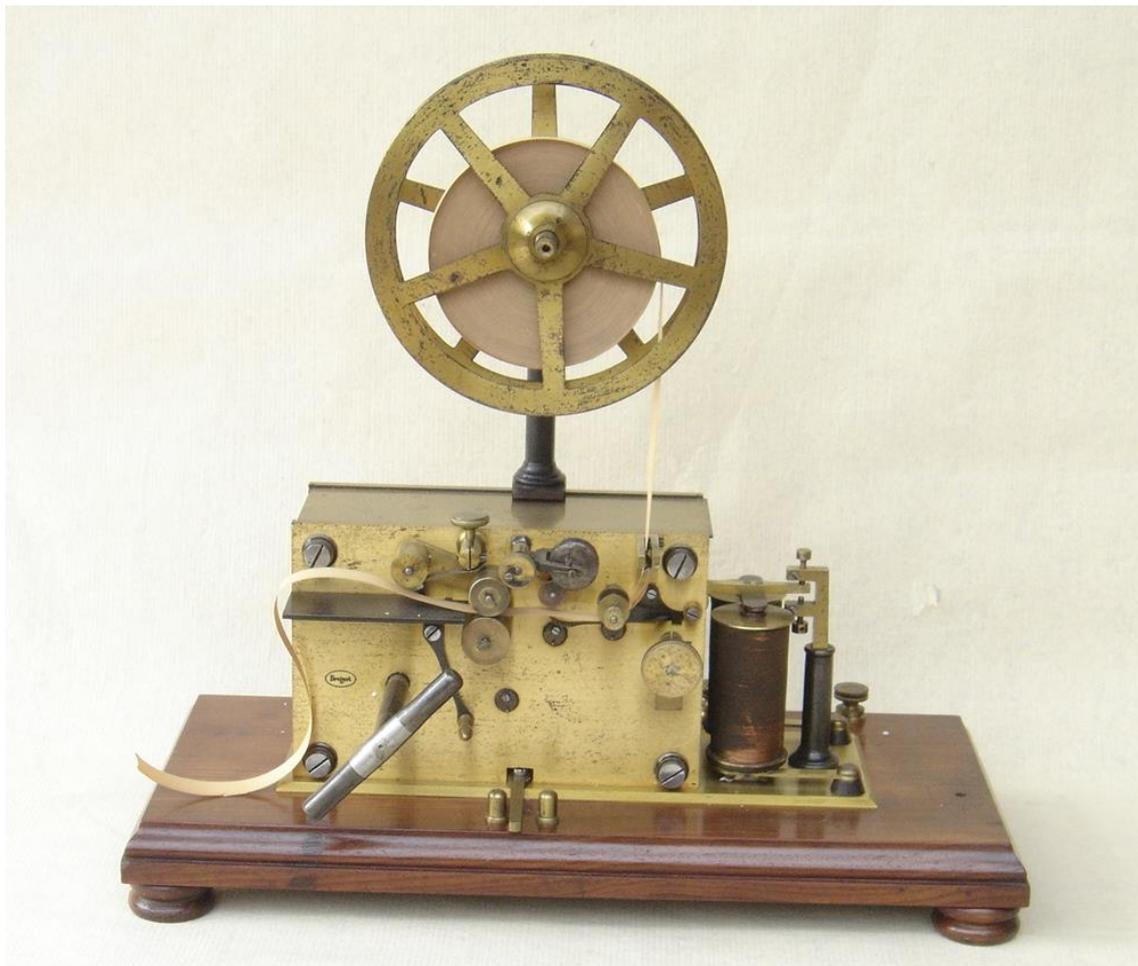
This model is already mentioned, with the engraving on the next page,, in ' L'ILLUSTRATION' of 7 March 1857 (here with an added relay):



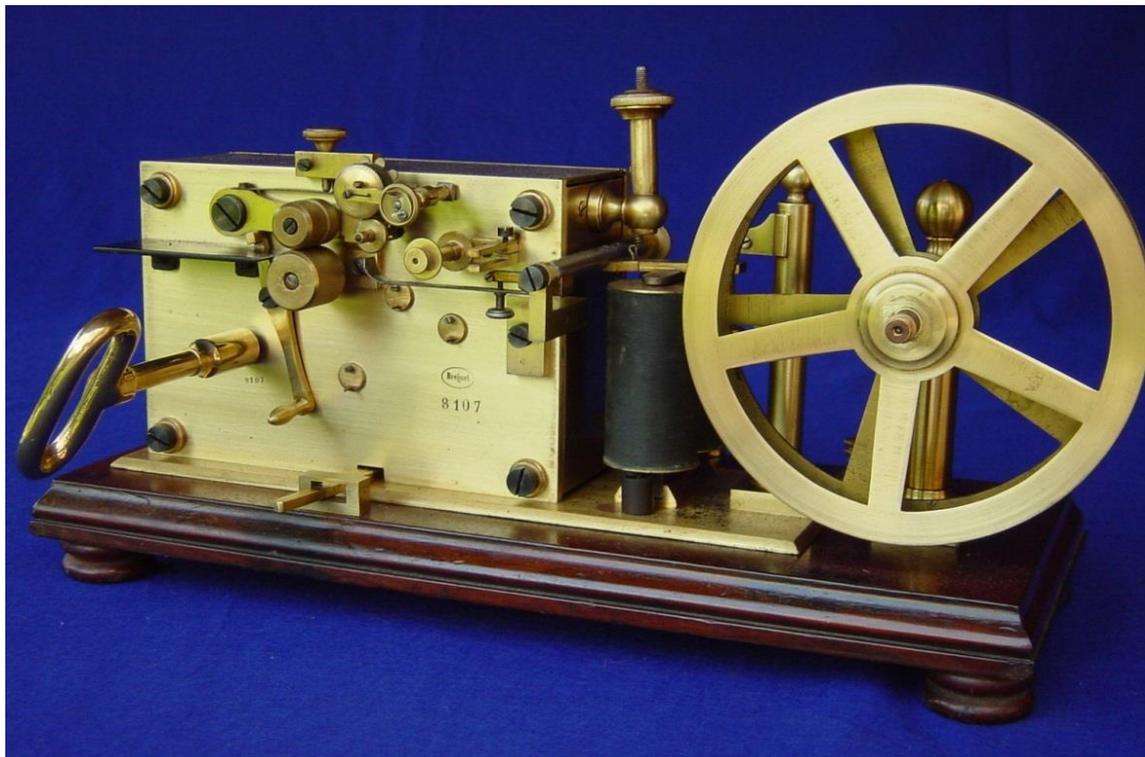
And below an engraving from the book of Du Moncel from 1856.



2.3.3. One of his more typical, but earlier, models



2.3.4. This one is a typical model that was also made, upon specifications of the government, by several other manufacturers.



## 2.4. Accessories

### 2.4.1. Keys

The simplest transmitter in a telegraph system is the key (at least for morse-type telegraphs). After all, its function is only to switch the electric current briefly on (short for a Morse dot, a bit longer for a dash). So yes, it is a switch. That does not mean that there has not been an enormous evolution, but here I must only talk about the Breguet keys.

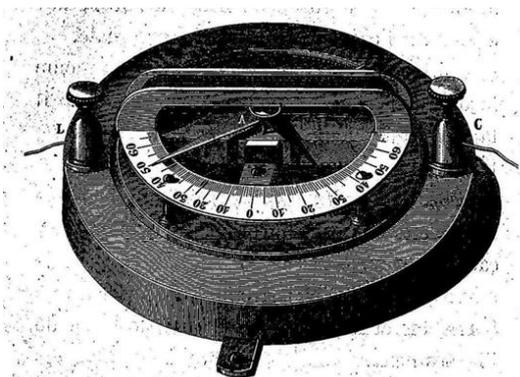
Here are some models of them. The first is special in the sense that besides the actual key, there is also a smaller key. I assume that it allowed to ring a bell in the nearby room where the telegram deliverers were. In this way they could be informed immediately when a telegram had to be carried out...





## 2.4.2. Galvanometers

### 2.4.2.1. Basic version



of the needle. The first versions looked like a primitive compass (picture below).

Here you see two very old galvanometers from Breguet



The earliest measuring and testing devices were the so-called galvanometers. These were, in general, rather rudimentary measuring devices that only give an indication of the current strength. They use the basic principle of C. Ørsted that the current through a wire, in the vicinity of a magnetic needle, turns that needle to a position that moves (all the more so as the current increases) to the direction perpendicular to the current direction. (The full explanation is given in the chapter on 'Cooke & Wheatstone' and their needle telegraphs). So, the higher the current, the wider the deviation



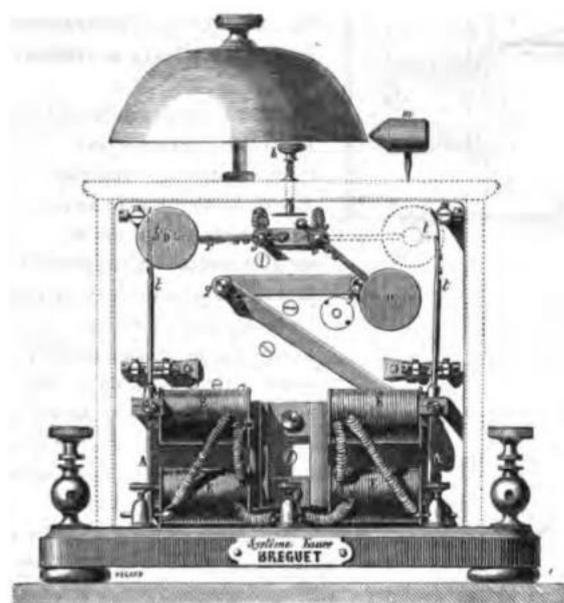
2.4.2.2. And here you see a more elaborated and beautiful version of a later Breguet model.



#### 2.4.2.3. Bell

Usually at a telegraph post the line was connected at rest with a ringing bell. When the transmitter connected his device to the line and pushed his key, he sent his battery power to the called party's bell. Upon which the receiving party switched off his bell from the line and turned on his telegraph. He then sent a short message to the transmitter, so that he knew that could start the actual transmission.

The photo shows a Breguet bell for an intermediate station, allowing to be connected to two other stations. Depending from which station there comes a request to communicate, a white cardboard will tumble in front of the left or right glass window so that the telegrapher knows from which office the call is coming.



#### 2.4.2.4. Repeater (Re-transmitter, Amplifier).

A repeater is a signal amplifier, working in the two directions between stations located at very large distances from each other. Relays are the heart of a repeater. A simple, yet ingenious, circuit allows two relays to be connected in such a way that they each regenerate, powered by a local battery, the signal in a different direction.



2.4.2.5. For 'the record' I am showing here are some different logos of the Breguet brand.





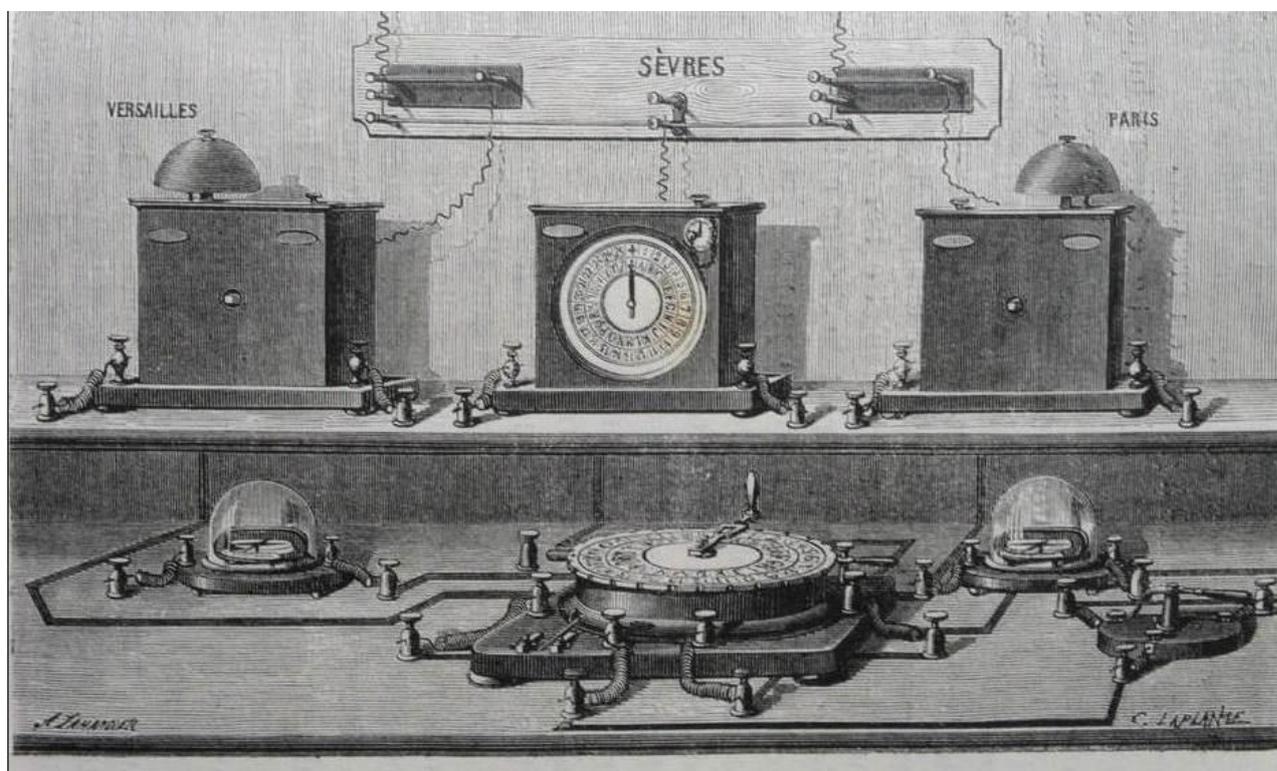
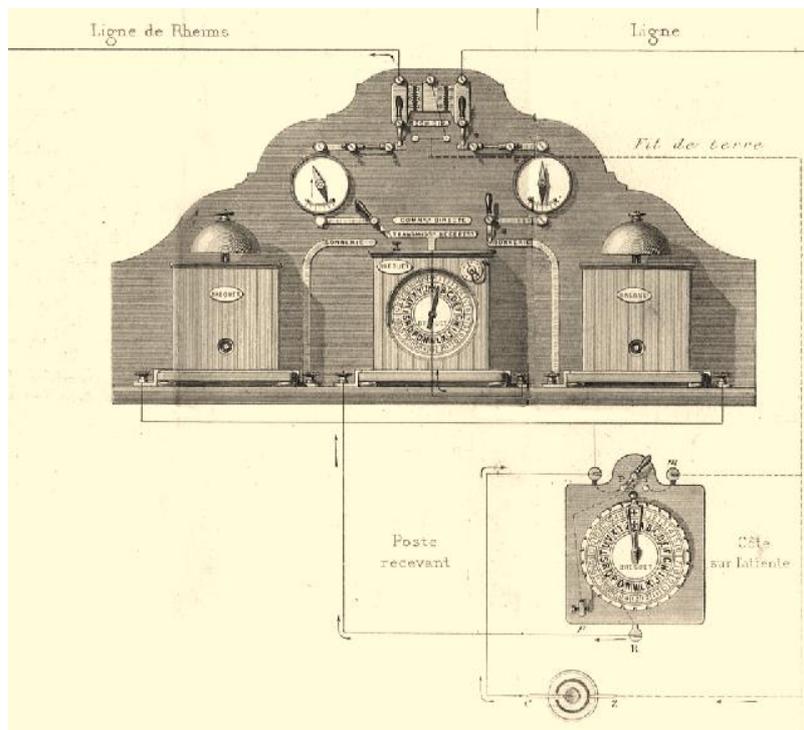
Some comments on these logos (from left to right and from top to bottom):

1. Is from my oldest dial telegraph.
2. Is from my one-needle telegraph 'Foy & Breguet'; so it is older than the previous one but it has a higher serial number; strange.
3. Stands on one of the older morse telegraphs.
4. Stands on a (PLM) railway signalling device.
5. Stands on the first morse telegraph of Breguet.
6. On the 'Thomson' galvanometer.
7. Stands on a beautiful and very old and large galvanometer.
8. On the portable Breguet-Crossley's.
9. On the integrated transmitter/receiver.
10. On the d'Arincourt transmitter.
11. On the typical telegraph of the administration.
12. On the transmitter for 2 directions.
13. On a typical transmitter (1 direction).
14. On the automatic transmitter system Chambrier; it is difficult to read here. It says in graceful letters: 'L. Breguet Constructeu'
15. On the bell.
16. At the front on the wooden base of a key.
17. On top of the arm of a key (here strongly enlarged).
18. On the underside of the wooden base of a key.

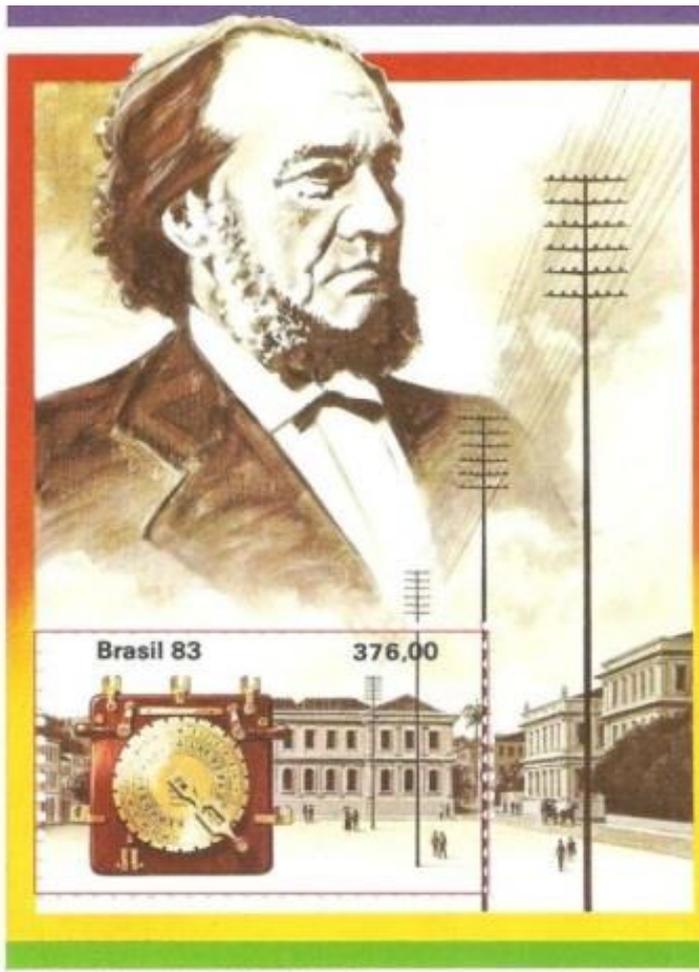
And then I also have this beautiful logo on a 'signal amplifier'



### PART 3:. SOME MORE ILLUSTRATIONS

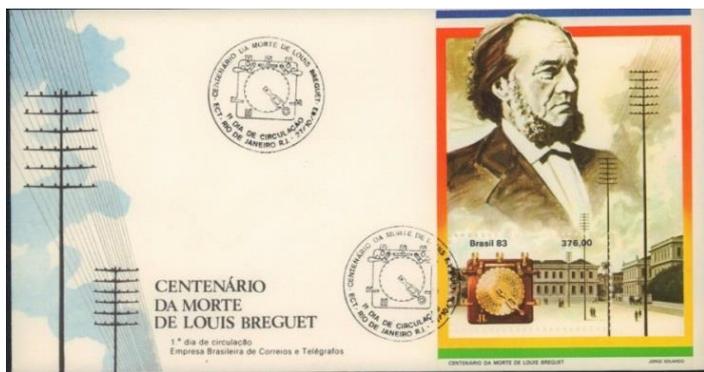
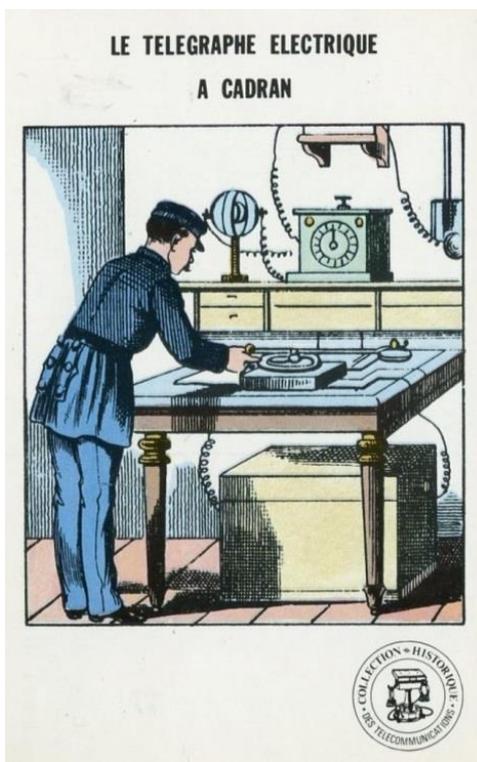
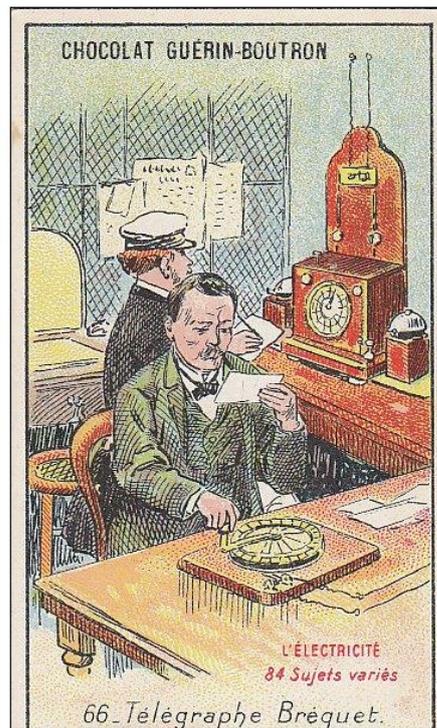


Two different set-ups of a complete intermediate Breguet station



CENTENÁRIO DA MORTE DE LOUIS BRÉGUET

JORGE EDUARDO



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### THANK YOU

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