

An overview of Italian vacuum tube manufacturers

- Foreword

This is an overview of the known Italian vacuum tube manufacturers. I hope that it can be of some usefulness to the many collectors who want to know more, when looking at a vacuum tube of some little known manufacturers, maybe with a strange label glued on the bulb. Although fairly comprehensive, as regards the names of manufacturers, it is largely based upon memories of past readings, which may be incomplete and inaccurate. Any contribution to the given information and any additional information are welcome.

- Prehistory

We know from Tyne (*1) and from Franco Soresini (*2) that in 1912 the Italian physicist Quirino Majorana had described an electron tube, named 'deviatore elettronico', or electronic switch. Anyway, we must wait until the Great War, 1915 to 1918 in Italy, to find true productions of vacuum tubes intended for military purposes. According to Soresini, the very early Italian tube manufacturer was Ing. Prola in Rome. His double filament triode was used through the Great War by Italian Army Engineers Corps in the telegraphic receiver known as 'Epuratore Bardeloni'.

Around 1917 we see another triode, used in audio amplifiers, intended for listening to phone messages of enemy troops. The 'Gorizia' triode, designed by Quirino Majorana, was built by the firm 'Giuseppe Longoni' in Genoa, a manufacturer of electric lamps. Soon after the war, the firm Longoni was bought by Marconi and closed, to avoid their competition.

In the early twenties we find the well known 'Zenith' in Monza, near Milan, where Ing. Del Vecchio started the production of his DV2 (Del Vecchio 2) triode. For some years, Zenith was the only known Italian source of vacuum tubes.

- The radio industry in Italy between the wars and the Fascism

In the twenties in Italy we find a lot small radio manufacturers, often anonymous, to avoid the tax then existing on each set in favor of the radio broadcaster. Most of them were just small workshops or artisans, which used components and even tubes from other countries, French, Germany, Great Britain or United States. In the late twenties over than 60 radio manufacturers were sharing a very small market, which would grow only later, in the thirties, with the introduction of the popular models wanted by the fascist regime. 'The village must have the radio' was the slogan of the regime in 1931. And soon the ten best prototypes submitted by Italian radio manufacturers were selected to build the standardized 'Radio Rurale' models, supplied to communities,

schools, parishes and other associations in even the smallest municipalities across Italy. ‘Radio Rurale’ was followed soon later by the models ‘Radio Balilla’ and the improved ‘Radio Roma’, intended to spread the radio into the homes of private citizens.

In 1931 Italian government also intervened in favor of the domestic radio industry, imposing heavy customs duties on sets and components coming from abroad. Here some customs fees decided for the most relevant parts:

Receiving sets equipped with 1 to 5 tubes	Lit	80	each
Other radio sets	Lit	100	each
Vacuum tubes weighing up to 80 grams	Lit	10	each
Vacuum tubes up to 150 grams	Lit	22	each
“ “ over than 150 g	Lit	50	each
Speakers, resistors, electrolytic capacitors	Lit	50	per kg
Other radio parts	Lit	135	per kg

To give an idea of how expensive these fees could be, we remember that in those years Italian lira was changed at par with U.S. dollar. The pay of a sergeant was around 25 Italian liras per month, while a corporal just earned about 3 liras.

Customs fees had to be added to other taxes already existing on vacuum tubes and lighting equipment. Taxes were prepaid with each tube and proof of their payment was given by a glued label or by a seal. Tubes supplied to the armed forces were exempted from fees, the exemption being displayed by a stamped label as in the third image below.



Fig. 1 - Two examples of label or seal proving payment for the tube fee. The third tube shows a fee exemption label for military or other government supplies. The first label with the manufacturer’s badge and a stamp was used by authorized tube manufacturing plants, under the control of Finance Police officers.

There were all the favorable conditions for a considerable growth of the market and, at the same time, for the growth of domestic industries. To continue business in Italy, foreign manufacturers were forced either to grant production licenses to Italian

companies or to open here their own production plants. In this scenario, since the early the thirties, new vacuum tube manufacturers appeared in Italy.

- **Fivre** was the largest all-Italian company, founded in 1932 in Pavia by Magneti Marelli to produce vacuum tubes under RCA Radiotron license. For a while their tube supplies to the related company, RadioMarelli, were characterized by distinctive violet-glass bulbs. In their ads they evidenced the equivalence of their tubes with those manufactured in the United States by RCA. ‘RCA – FIVRE: From America to Italy, different brands but the same quality’ said this ad from a 1934 magazine.



Fig. 2 - Fivre ads from magazines of early thirties talk of the close equivalence of their production with RCA Radiotron tubes. Right two samples of tube boxes. (Click on thumbnails to enlarge)

- **Officine Marconi - Genova**, closely related to British Marconi and then to RCA, was the longest-running company in the manufacture of vacuum tubes. It promoted the many activities of Marconi in Italy since 1906 in wireless communications, broadcasting and maritime radio-telegraphic traffic. As tube supplier it operated in Italy from the very early beginning, probably starting as importer, up to about the mid seventies, when the production of vacuum tubes declined rapidly. Few years before Marconi had bought the factory of ATES-RCA in L'Aquila, moving there the production of radio and television receiving tubes.



Fig. 3 - Typical boxes of Officine Marconi, Genova. (Click on thumbnail to enlarge)

- **Philips** started its commercial business in Milan around 1925, importing vacuum tubes and everything else from the Netherlands. In 1928 it bought a lamp manufacturing company in Alsignano. Anyway no evidence can be found of vacuum tube productions in this plant and anywhere in Italy until 1936, when Philips bought the Zenith tube factory in Monza. It is reasonable to assume that in the early thirties, in order to save customs duties, their radio factory in Milan could somehow rework partially processed tubes, supplied in bulk already pumped by the mother company. This policy can be presumed by inaccuracies found in some ads. In the ad below they introduce the new AK1 converter. Unfortunately the ad shows a CK1 with side-contact European base and assorted subassemblies, as they had not yet received the right pumped bulbs and basing details from their mother company.



Fig. 4 - Left, some views of the Philips plant in Milano around the mid thirties. Right, the ad announcing the new frequency changer AK1 actually shows a different tube with side-contact base, maybe a CK1.

- **Telefunken** – No useful information can be found about the early tube productions by Telefunken/Siemens in Milan, Italy. Supposedly such production began in the first half of the thirties, also including processing of semi-finished bulbs and components coming from Germany.



Fig. 5 - The box of a Telefunken Milano vacuum tube. (Click on the thumbnail to enlarge)

- **Zenith** was an old tube manufacturer based in Monza, as we saw before. In the early thirties it listed a full line of receiving and power tubes, including European and American types, as well as proprietary ones. It was well introduced in military productions, even second sourcing Marconi, Philips and Telefunken types. In 1936 it was bought by Philips, but the brand continued to survive until WWII.



Fig. 6 - Two ads of Zenith, Monza around the mid thirties. Right, a box of the same firm. (Click on the thumbnails to enlarge)

- Some historical notes

In the thirties Italian government pushed for a high degree of standardization in electronic sets at any level. Quite common were military radios based upon a single tube type in every RF/IF/AF stages. To prevent excessive proliferation, tube manufacturers were asked to supply interchangeable types. Even if equivalencies are often hidden, due to the different tube coding systems adopted, usually we can find several sources for each tube. In many cases equivalence was simply based upon the basis of 3F criteria, 'Fit, Form, Function', with limited or no sharing of production details. A clear example is given by the four known Italian versions of the German RS31g transmitting triode, the Telefunken Milano RS31, the Zenith W31, the Marconi Genova MT31 and the Fivre 3C70. The four tubes look quite different in colors, materials, surface treatments and even in the visible amounts of asbestos. The Zenith one is even missing the large cap. Here a picture that shows thumbnails of the four tubes, thanks to the courtesy of Alessandro De Poi for the RS31 and of Norman Wilson for the 3C70.



Fig. 7 - Look of the four different versions of the German RS31g made in Italy by Telefunken, Zenith (Philips), Marconi Genova and Fivre. (Click to enlarge)

- Effects of the sanctions from 1935 and of the material shortages during WWII

Starting from 1935, with the sanctions imposed to Italy by the League of Nations, the electronic industry began to suffer a severe shortage of strategic materials, copper, tin, nickel, even rubber and any raw material imported before. Until the outbreak of war, something could still be purchased in U.S. on the basis of the 'cash and carry' policy, introduced by F. D. Roosevelt since the 'Neutrality Act' of 1936. Unfortunately this was not enough to cover the needs of the industry. Italian government promoted a policy of autarky. The entire industry, including the electronic one, was asked to become independent, as far as possible, from imported materials.

In this context must be evaluated many productions of Italian tubes, derived from foreign types and yet somehow different from their prototypes, as per construction details or performances. No traces remain today of the solutions used by each manufacturer to ensure their productions, even in shortage of several materials. Countless solutions were proposed and each solution could change, batch after batch, depending on varied availability over time of raw materials. We know that for the power distribution in Italy wires were used made of aluminum ribbons wound around a steel core, to replace copper. On the contrary, pure silver was used in America to replace copper in RF coils, when in 1941 it began to be scarce. Today we can just guess some of the solutions, carefully examining each vacuum tube build in those years. The four variants of the RS31g shown above even give examples of how different materials were used by their manufacturers, probably at different times.

Of course, we have to assume that exchange of information between Italian Marconi and its related company in England ceased at all at the outbreak of the war. The same certainly happened between FIVRE and RCA after Pearl Harbor and maybe even before. In the meantime, business relations with German manufacturers had increased, to the point that new Italian tubes were either entirely 'autarkic' Italian designs, or were copies of Telefunken or other European types. A mix of the two options can be found in the family WExx by Italian Telefunken, copies of German types built with poorer materials and characterized by somehow relaxed specs. The same Fivre designed new tubes to counteract the increasing competition of Telefunken and Philips. They introduced a family of high-efficiency military tubes specially suited for mobile or battery operated equipment. These tubes were very similar to the RCA types as per characteristics, but with heaters draining considerably less power. The family included some of the most popular types, as 6R (6J7GT), 6RV (6K7GT), 6T (6V6G), 6TP (807) or 6DD (6H6GT).

- Italian tube manufacturers after the war

At the end of the war we find three tube manufacturers still surviving, FIVRE, Marconi and Philips. No evidence can be found of the reopening of Telefunken vacuum tube lines, despite the relevant presence that Siemens retained in Italy in many fields of electronics and telecommunication. The three manufacturers above were helped to rebuild their facilities destroyed by bombing, even thank to funds from Marshall Plan, also known as ERP, European Reconstruction Plan.

In the fifties the electronic market grew enormously, pushed by military, by telecommunications and by the introduction of the new FM and television broadcast services. As result we see the birth of new tube manufacturers.

- **ELSI**, Elettronica Sicula, was founded in 1956 in Palermo, Sicily, by initiative of Raytheon and Machlett. For years it produced tubes for civil and military markets, cathode ray tubes and semiconductors. Its production included several microwave devices, as magnetrons and even amplitrons. Since 1962 its production was fully qualified and tubes came out marked Raytheon or Raytheon-ELSI. In 1969 ELSI became ELTEL, Industria Elettronica Telecomunicazioni, a public owned company, dedicated only to special tubes.

Around 1990 the plant was acquired by Alenia and continued to design and produce microwave tubes and components under the name ALELCO, 'Alenia Elettronica Componenti', until it became Galileo Avionica, still in business today.



Fig. 8 - Left, a Raytheon-Elsi ad, showing the wide range of commercial and industrial products offered. Right, two views of an ELSI 5C22 hydrogen thyratron NATO qualified. (Click to enlarge)

- **Sicte, Pavia** - Around the late fifties we find this company, probably founded by some retired FIVRE executives. SICTE was specialized in vacuum rectifiers and other power tubes for TV sets. They listed some quite uncommon rectifiers with separate diodes inside, designed for voltage doublers.



Fig. 9 - A Sicte ad of the early sixties and typical boxes. (Click to enlarge)

- **Magnadyne** – This company was in business in Torino since 1922, when Paolo Dequarti, then just sixteen, began to build radios. In the late fifties Magnadyne started building its own vacuum tubes, designed for optimum operation in the circuits of radio and television sets built by the several brands of the group. Tubes were identified by proprietary codes. Usually they were not interchangeable with common European or American receiving types, sometimes just for different screenings, but even for different ratings or pinout. The code was simple, a group of digits for the heater voltage, a letter for the number of electrodes and a type identification progressive number.

This is the meaning of the letters used in the code:

- D = diode, signal. (Sometimes D was also used for Double)**
- E = heptode (from Italian 'Eptodo')**
- F = beam tube, beam tetrode (from Italian 'Fascio' = beam)**
- P = pentode**
- R = rectifier**
- T = triode**

Multiple section tubes might have more than one letter. Here some examples:

- 6T1 – was an UHF triode, similar to 6AF4A**
- 6T26 – was a twin triode, equivalent to ECC85**
- 6TP6 – Triode-pentode, equivalent to 6BM8/ECL82**
- 12P1 – was a pentode, similar to 12BA6**
- 9TD35 – Twin diode – triode, similar to 9AK8/PABC80**
- 25F7 – Beam power amplifier, equivalent to 25E5/PL36**

As said before, any equivalence with tubes of other manufacturers, must be checked on a case by case basis, since Magnadyne tubes were designed or anyway screened for proper operation into given sets.



Fig. 10 - A Magnadyne tube and its box. (Click to enlarge)

- **RCA ATES** – Founded in 1959 in L’Aquila as ELIT, Elettronica Italiana, soon became ATES, Aquila Tubi Elettronici e Semiconduttori. The registered office was in Naples, the sales office was in Milan, the central management in Rome. In 1960 RCA entered into the shareholding, fully qualifying the production lines. Tubes made in the L’Aquila plant came out with the double marking RCA – ATES and were sold through RCA commercial channels.



Fig. 11 - Boxes of tubes made in the L’Aquila plant, the older one with the RCA-ATES badge. Later the tubes were sold as Marconi Italiana. (Click to enlarge)

In addition to the said manufacturers, we find two CRT makers, Eurovideo/Indesit and Videocolor.

- **Videocolor**, Anagni (FR), was founded in the sixties by RCA, which soon abandoned this market segment in Italy. Around 1970 Videocolor was bought by the French Thomson. In the golden age of cathode ray tubes, its production reached a peak of 2,5 million units per year.

- **Indesit - Eurovideo**, Teverola (Caserta) near Naples, was founded in the sixties by Indesit, a large industrial group with eight factories, to make B/W CRTs needed for their low end TV sets. Eurovideo also listed a family of green or yellow screen CRTs and OEM monitors for the computer market. The line was closed around the mid eighties and the production equipment moved to China.

References;

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- 2*) Soresini F., Di Tubo in Tubo
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