Did Aleksandr Popov Invent Radio?

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Popov vs. Marconi: a study of the evidence. The Russian claim to the invention of Radio is examined for the first time.

Ask an American who invented radio and he will probably say "Marconi"; ask a Russian and he will very likely say "Popov." Who is right? Can either Marconi or Popov be considered the inventor of radio? For that matter, who *is* Popov?

Throughout the Communist world Aleksandr Stepanovich Popov is recognized as the sole inventor of radio. A cursory examination of any recent Russian electronics journal makes this abundantly clear, for 1959 was the centennial of Popov's birth (he was born March 16, 1859[2] in what is now the Sverdlovsk oblast). To commemorate the anniversary, a number of special events were held during 1959: scientific meetings in Moscow and elsewhere; dedication of a statue of Popov in Leningrad; the Russian amateur radio organization held an international radio contest on Popov's birthday and offered a special award to any radio amateur who contacted 100 Russian amateur stations during 1959; special postage stamps have been issued, etc. Popov is memorialized in other ways, too. The Russian equivalent of the IRE is known as the Popov Society; scientists—both Russian and foreign—who make outstanding contributions to the radio art receive Popov gold medals; the first page or so of every Soviet book on radio-electronics is ritualistically devoted to a tribute to A.S. Popov, "the inventor of radio."

The Russian claim of priority in the invention of radio is based on an event of May 7, 1895 (since 1945 this day has been celebrated as Radio Day in the Soviet Union). At a meeting of the Physics Branch of the Russian Physical-Chemical Society in Petersburg, Popov, then an instructor at the Kronstadt naval school, reported on and demonstrated his invention, a "radio receiver." The device was actually designed only to receive and record lightning discharges; the term "radio receiver" (usually prefaced with "the world's first") became commonly applied to Popov's invention only after the advent to power of the Communists in Russia. This may be not so much willful distortion as it is a problem of definition. Popov's device *did* detect and record electromagnetic radiation (if only static crashes), and in that sense it *was* a radio receiver; yet, because there were no transmitting stations at that time, can his inven-

1 This article has been accepted for publication in *Electronics World*.
2 All dates are New Style.

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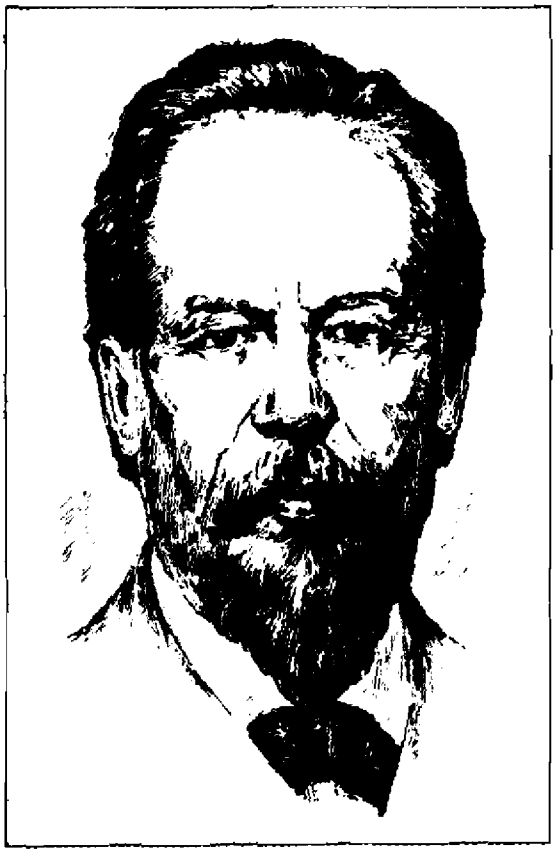

Aleksandr Popov
(1859 – 1906)

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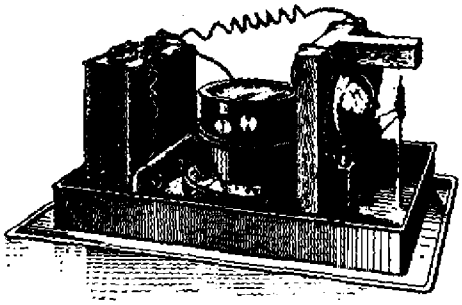
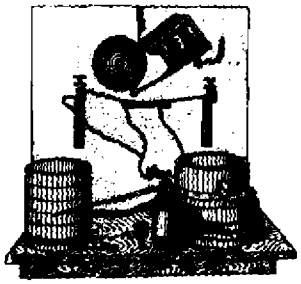


Popov's First Receiver

– from Levitan –



Popov's Lightning Detector (1894)

– from Vasilev –

tion really be called a radio receiver?[3] In a way this is the reverse of the old question: "If a tree falls in the forest but there is no one there to hear it, is there any sound?" In 1895 there *was* someone to hear, but there was no *tree*, at least not near Petersburg.

While an instructor at Kronstadt, Popov had access to a well-equipped laboratory and a library well stocked with foreign periodicals and books. Popov was particularly interested in the work of Heinrich Hertz and he repeated many of the German's experiments in electromagnetic waves. The experiments and writings of Sir Oliver Lodge, Edouard Branly, Augusto Righi and others also influenced his thinking. The detector which Popov demonstrated before the Physical-Chemical Society meeting was basically Branly's coherer (a metal-filing type) to which Popov added an arrangement for automatically tapping back the filings to a sensitive condition after they had cohered upon reception of oscillations. Each static discharge caused a bell to ring or a mark to be made on a paper tape. The implication conveyed in some Soviet descriptions of Popov's receiver is that the tapping device was original with Popov. Actually, an automatic tapper was a part of Lodge's receiver demonstrated at a meeting of the British Association for the Advancement of Science in 1894. What may have been original with Popov was the addition of choke coils to protect the coherer from the effects of local sparking at the relay contacts.

Contemporary Soviet accounts of Popov's invention attach considerable importance to the antenna which he used with his receiver. Described as a long vertical wire, insulated at the upper end and connected through the coherer to ground at the lower end, it is claimed to have been the final element needed for the reception of radio signals. The literature is not conclusive on this point; Hertz had been using a loop antenna for his experiments, but whether Popov was the first to employ a vertical antenna remains an unanswered question. There is some evidence that Marconi had been using an antenna of this type in his experiments conducted at or before this time.

It should be pointed out that Popov foresaw that his invention might be used for purposes of communication. During his demonstration of May 7, 1895 he is reported to have said:

> With further improvement, my device can be adapted to the distant reception of signals by means of rapid electric oscillations, as soon as a sufficiently powerful source of such oscillations is found.

Perhaps unknown to Popov, a source of such oscillations had already been found. Early in 1895 (perhaps as early as the summer of 1894), at Pontecchio, near Bologna, Italy, a young man named Guglielmo Marconi

3 Dictionary definition of radio: "The transmission and reception of signals by means of electric waves without a connecting wire . . ."

succeeded in receiving *and* sending wireless signals over a distance of about three-quarters of a mile. Similar experiments had also been made by Lodge and Sir Henry Jackson. From then on, progress was swift. Marconi moved to England and by the beginning of 1896 was receiving Morse code messages over a distance of nearly two miles. On June 2, 1896 Marconi applied for the first use of electric waves.[4] During 1896-97 transmitting distance was increased to four miles over land, then nine miles across the Bristol Channel. In 1899 wireless signals spanned the English Channel, the first instance of international radio communication. In the same year British warships, using Marconi equipment, exchanged messages at distances of 75 miles. Only two years later, on December 12, 1901, with Marconi at the receiving station in Newfoundland, the letter "S" was transmitted across the Atlantic. World-wide radio communication was now within reach.

What was Popov doing during this time? In January 1896 a report of his demonstration of the previous May was published in the Journal of the Russian Physical-Chemical Society under the title "A Device for Detecting and Recording Electric Oscillations." On March 24, 1896 Popov sent his first message by wireless. Transmitted over a distance of about 600 feet, the message consisted of two words: "Heinrich Hertz." Early the following year he was communicating with ships over short distances.[5] His equipment was employed in what was probably the first use of radio in the saving of human lives. In 1900 a message was flashed from Petersburg to the icebreaker *Ermak* instructing it to rescue some fishermen stranded on floating ice in the Gulf of Finland. In 1901, the year Marconi sent signals 2000 miles across the Atlantic, Popov established communication between ships on the Black Sea; the distance was about 80 miles.

How then can the Russians claim that Popov invented radio? Two arguments are used: (1) that Popov's demonstration of 1895 predated Marconi's patent of 1896, and (2) that, in any case, Marconi's invention was a direct copy of Popov's.

Popov is said to have refused to take out a patent on his invention, contending that the discovery should benefit the scientific world at large. This may be true (university professors are traditionally uninterested in patenting their discoveries), or it may be a convenient means of explaining how Marconi, rather than Popov, came to be almost universally recognized as the father of wireless communication.

With respect to the second argument, it is certainly true that no *one* inventor or invention was responsible for radio. And there *was* con-

4 This was British patent No. 12,039. The equivalent American patent, No. 586,193, was granted him on July 13, 1897.

5 A description of Marconi's wireless system was not published until June 1897.

siderable similarity between the inventions of Marconi and Popov, just as Popov's was similar to and based upon Lodge's, Lodge's upon Hertz's, etc. But this is really not the point. The thing that the Russians seem to overlook is that neither Popov, nor Lodge, nor Branly, nor Hertz really recognized the fact that radiation was the real key to wireless. And, as the courts later held, none of these scientists ever fully realized the practical possibilities of wireless as a means of communication. Marconi grasped both of these ideas. If not a creative inventor, Marconi was blessed with a genius for perfecting the crude laboratory-type apparatus of his predecessors and for promoting wireless telegraphy as a practical instrument of communication. He was, in short, the midwife of radio.

Without admitting that he was responsible for practical wireless telegraphy, Soviet sources, particularly the earlier ones, give at least some credit to Marconi for his contributions to the development of radio. A Soviet encyclopedia begins its article on Marconi by saying: "Marconi (1874–1937), Italian engineer and radio technician, the inventor, after Professor A. S. Popov, of the radiotelegraph." This 1940 source is kinder in its treatment of Marconi than one published in 1954. The latter dismisses Marconi as an opportunist who, taking advantage of the fact that Popov had not patented his invention, went ahead and obtained a patent on his device, which was, after all, only a copy of Popov's.

The contributions of the men who pioneered in the study of electricity and electromagnetic waves--Galvani, Volta, Morse, Bell, Faraday, Henry, Thompson, Branly and Lodge--are freely acknowledged, but in a condescending sort of way. The Russians take the attitude that what these men did was but prelude to Popov's "invention" of radio.

An interesting feature of Soviet accounts of Popov is that, of all the inventions claimed to have been made by Russians, radio seems to be the one first claimed. The argument that Popov was the real inventor of radio was put forth at least as early as 1938; other Russian inventions--including baseball and the hula hoop--were announced considerably later.[6]

There is no denying the fact that Popov's considerable talents were little appreciated by the tsarist government. It must have been particularly galling to Popov to see, in 1902, his rival Marconi decorated by the Tsar with the Order of St. Anne. There is no record that Popov ever received similar recognition by his government.

Popov's last few years were spent in Petersburg as a professor, then director, of the Electrotechnical Institute. He died on January 13, 1906 at the age of 47. The brain hemorrhage which caused his death was due, according to one recent Soviet source, to heated arguments between Popov and the tsarist minister to whom he was subordinate.

[6] Popov is also credited with discovering the principles of radar and radio direction finding.

Returning to our original question, did Aleksandr Popov invent radio? No, and neither did Marconi. The latter made wireless practical, but without the pioneering work of scientists like (but probably not including) Popov, Marconi's achievements would have been impossible.[7]

An American scientist who recently visited the Soviet Union brings back an interesting anecdote. In a discussion of Russian claims that Popov invented radio, a Soviet electronics engineer is quoted as saying: "Well, Marconi did something, too, and what difference does it make? We now have radio and that's good!" And it is, too.

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[7] While acknowledging the contributions of some of his predecessors and contemporaries, Marconi appears never to have recognized Popov's existence.