

Hello All,

As always, please send any questions about the reading assignment directly to me at oldtimetelephones@goeaston.net. I will bundle questions if necessary, repeat the questions, and give answers in an e-mail to the TCI List Server before moving on to the next reading assignment. This way everyone will benefit from these questions and answers. By sending questions directly to me, we will avoid unnecessary clutter on the List Server.

Please start reading below Fig. 1-2 on p. 12 and read down through the quotation from Kempster Miller on the top of p. 13. Then read the next-to-last paragraph on p. 13. Also read the section on Sound in the Appendix, starting on p. 227. It's going to be helpful to understand why Reis's telephone did not work.

There are two big problems with the make-and-break principle of Reis's telephone. First, think about a sound wave. The wave consists of a positive pressure that gradually increases and then diminishes, and this is followed by a negative pressure that gradually gets more negative and then gradually returns to start the positive cycle over again. To reproduce this electrically, you would need an electric pressure (i.e., a voltage) that gradually increases in the positive sense and then gradually diminishes in the negative sense, returning to zero to start all over again. With the make-and-break principle, you get a full-on period followed by a full-off period rather than the smooth serpentine character of the sound wave. This thing would sound awful if it worked at all.

Second, think about the tones or individual frequencies in a voice sound. Some tones will be soft and others will be loud. To reproduce this, you need a low alternating voltage for some frequencies and a higher alternating voltage for others. With the make-and-break setup, you always get the full voltage when there is contact. Thus you cannot control the amplitude of different tones with a make-and-break transmitter.

Now consider the Page-effect receiver, which is a coil of wire wrapped around a metal core. This is the same arrangement as an electromagnet, but rather than using the magnetic field to move a diaphragm as Bell will do later, Reis used the fact that the core of an electromagnet will actually elongate and contract when the magnetic field changes. This is the effect that causes a transformer to hum.

I will confess that my description of the dimension change and the frequency doubling is a little bit fuzzy because my understanding of magnetostriction is a little fuzzy. There are some metals such as iron that first elongate and then contract as the magnetic field is increased. Other metals like nickel just contract when magnetized and relaxed when the magnetic field goes away. A nickel core would seem to double the frequency if a true ac current were present, but might not double it for a positive current that just went up and down a little. An iron core would seem to double the frequency even for that case.

I do not want to pursue the subjects of wave shape, amplitude control, or frequency reproduction any further. I only want to convey plausible arguments why the make-and-break transmitter and

the Page-effect receiver will not work for reproducing speech. I will then rely on Kempster Miller, a non-Bell man and a true expert of the time whose quotation is near the top of p. 13, to conclude that Reis's telephone would not work. Thus, all you need to remember from this reading assignment is that the make-and-break principle will not work for telephone transmitters and the Page-effect will not work for telephone receivers.

Much later there was this court case in which Reis's telephone was reported to have worked when maladjusted. If it did, it worked by altogether different principles than Reis had in mind so I don't think Reis deserves more credit than history gives him (just my opinion, although I tried to leave opinions out of the book).

If there are any questions about the above, we will deal with the questions before moving on to the next reading assignment.

Ralph

Hello All,

Looks like the question on wire colors set off a firestorm of e-mails on the List Server. Interesting, I guess, but we have more interesting things to discuss.

One participant asked if the e-mail “lessons” could be provided in the form of Word documents. In fact, I am saving them as pdf files, which are even easier to read. I am inquiring about a means of providing them for everyone and eventually (soon I expect) this will be done.

The only other question was about the plain English meaning of “make and break,” a term that was used without explanation in the book. The words refer to making contact and breaking contact in a switch. The contacts on the diaphragm of the Reis telephone were a switch.

If you have any follow-up questions, send them directly to me. We will move on to the next reading assignment, which I will post soon.

Ralph