Telephony 101 – The Gallows Telephone November 13, 2012

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. Previous reading assignments, notes, questions, and answers are available in the TCI Library at http://www.telephonecollectors.info/telephony-101/.

Please read the last three paragraphs on p. 14 and the first three paragraphs on p. 15. With your background in the basics we have covered so far, you will be among a very small group of people who are able to understand the significance of the Gallows telephone. It was a big, big deal!

That evening of June 2, 1875, Bell heard the same thing that Gray had heard five months earlier and, like Gray, Bell understood its significance. The big deal was that Bell alone knew exactly how it had happened – and it's not all that simple.

When the reed on the transmitter got stuck and Watson plucked it, it then still vibrated a little (boing, boing) but of course not at its natural frequency. Now the reed was steel, which has some permanent magnetism, and that stuck reed was vibrating near a coil of wire. Remember Faraday's and Henry's observations that a changing magnetic field will generate a voltage in a nearby wire. Well you had a vibrating magnet, and you not only had a nearby wire, you had an ideal bunch of wire in the form of a coil around a soft iron core. The voltage that was produced was mimicking the tones and overtones of the stuck vibrating reed, and this caused the reed on the receiver to vibrate accordingly. Voila!

This first of Bell's tests were obviously made with batteries in the line because he and Watson were using the harmonic telegraph transmitter. But Bell also did some tests without batteries, and he writes that night to Gardner Hubbard: "I have succeeded today in transmitting signals without any battery whatsoever!" In one case with batteries, he was perturbing an existing magnetic field. In the other case without batteries, he was waving a permanent magnet over a bunch of wire. In both cases, Bell was varying the magnetic field thus setting up a voltage corresponding to Farday's and Henry's observations. This way of generating an electric signal was called "induction" because Bell was inducing a voltage in the circuit with a vibrating piece of magnetic material.

Bell's epiphany was put into practical application within 24 hours in a very sophisticated design, which is called the gallows telephone because of the perverse view of someone (dunno). In Fig. 1-8, a beautiful drawing from Rhodes classic book, you see a hinged armature A that takes the place of the reed in the harmonic telegraph. In the gallows telephone, the armature does not touch the core of the electromagnet, but simply waves in front of it. The electromagnet is always

connected to batteries and thence to the line using the binding posts that can be seen in the figure.

You might ask how in the world did Bell manage to connect Faraday's and Henry's observations to the botched experiment with the harmonic telegraph. The answer is undoubtedly the consequence of an event just 3 months earlier. On March 1, Bell took a train from Boston to Washington for a visit with the director of the Smithsonian Institute. The director was none other than Joseph Henry, who discovered the principle years earlier and was now an old man. During that interview it is reported that Bell said he did not have enough electrical knowledge, and Henry told him to "Get It." You have to believe that Bell subsequently was well aware of Henry's (and Faraday's) observation.

In my view the gallows telephone was absolutely brilliant and sets Bell apart from any of his contemporaries. But the gallows telephone didn't work – at least not yet.

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

Ralph

P.S. You can see Bell's letter to Gardner Hubbard at the following internet address:

http://memory.loc.gov/cgi-bin/ampage?collId=magbell&fileName=079/07900208/bellpage.db&recNum=0&tempFile=./temp/~ammem_EOHN&filecode=magbell&next_filecode=magbell&prev_filecode=magbell&itemnum=5&ndocs=100

Telephony 101 – The Gallows Telephone November 16, 2012

Hello All,

The only question I received was whether the gallows telephone was a transmitter or a receiver – and if there was another apparatus like that at the end of the line?

Although I have not gone back to look closely at historical accounts, I believe that on June 3, the day after Bell's discovery, the gallows telephone was used only as a transmitter and one of the harmonic telegraph receivers was used as the receiver at the end of the line. But as you will see in Fig. 1-10 (next reading assignment), both the transmitter and receiver were basically the same as the gallows telephone. The only difference was in the shape of the sound cones. There will be more on this subject soon.

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

Ralph