Telephony 101 – Induction Coils December 10, 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/.

Now that we have some understanding of transformer properties and matching impedances, we can finally read all of Chapter 4 on pages 30-33.

Before going forward, be sure you understand the symbols and lines in Figs. 4-1 and 4-2. If you have any trouble understanding what these diagrams mean, please ask questions now. Also keep in mind that in most of the rest of this book you will only see half of the circuits (e.g., just imagine you have cut Fig. 4-2 down the middle with scissors) and another equivalent half is presumed to be on the other side

Okay, the step-up, step-down, and impedance-matching properties of transformers (induction coils) should be pretty fresh in our minds. Let me comment on the isolation property of a transformer.

Looking at Fig. 4-2, you see three parts to this circuit. On the left is a circuit (think circle) with a transmitter and a battery. In the center is a circuit with the receivers and the line. And on the right is another circuit with a transmitter and a battery. The three parts are connected together by induction coils (transformers).

Each of the circuits with a transmitter, battery, and primary winding of the induction coil is called the local-battery portion of the circuit. In this part of the circuit, a relatively large steady dc current is provided by the battery and a small up-and-down ac current is caused by variations in the transmitter resistance. So you have to get used to thinking about a dc current and an ac current in the same circuit.

The dc part of this current will generate a steady magnetic field in the primary winding of the induction coil (Oersted's principle). But this steady magnetic field will not create any voltage or current in the secondary winding because the Faraday-Henry principle requires the magnetic field to be changing to induce a voltage and hence some current. Only the ac component of the current generates a varying magnetic field, and this will induce ac voltages and currents in the secondary winding and hence in the part of the circuit with the receivers and the line. The dc current is isolated to the local-battery portions of the circuit, and no dc current flows through the line and receivers.

I believe that the rest of Chapter 4 will be self-explanatory, but if there are any questions about the current reading assignment, we will deal with the questions before moving on to the next reading assignment.

Ralph