

# ON THE UNDERGROUND RADIO COMMUNICATION

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**It has been shown experimentally, that the useful signal is being extended in the radio set ungrounded through the transit antenna grounded, through the subsurface layer. It is assumed, that the process of such signal transmission is occurred, by means of the polarization (e.g. single – ended) current.**

**The Key Words: polarization current, self – excited oscillator, grounded antenna.**

The experiments have been shown, that the underground radio communication can be carried out not only, by means of the radio waves, which are attenuated rapidly in the soil, but also by the polarization, or, in other words, the single – ended signal.

The single – ended signal we call the electro-signal, having spread, in the form of the AC voltage, on the opened electric circuit. Such signal has a number of the remarkable properties, for example, it is not subjected the Ohm's law, the Kirchhoff's laws, and etc. [1].

In [1] such signal has been called **the polarization current**, although it is distributed through the conductors. The cause of its origin, according to [1], is the polarization of the metal lattice ions, having fallen to the external electric field. N. Tesla has been, probably, the discoverer of such signal. Subsequently, the signal has been experimentally, on the new basis of the element, «rediscovered» by the Russian electrician S.V. Avramenko.

By the polarization current such signal is made its sense to be called, if only, because that disregard the laws of Ohm's and Kirchhoff's there is observed, just at the polarization currents (though, having flown through the dielectrics).[1,2].

Here, we were talking on such signal for the reason, that in the described below experiment, which was conducted in our laboratory, and this signal, had been used by us.

On the Experiment. It has been used the artificial communication link in it, having received by means of the grounded antenna, that is the antenna, in the form of the metal pin, driven into the ground to the depth of 20 centimetres. It has been brought the pin cable length of 25 centimetres (e.g. the signal source has been located close to the antenna), be means of which the 1,000 pF capacitor through the AC voltage from the signal source to the ground has been applied. More than anything in the scheme has been emitted no: no turns of the wire, or the chokes, or the transformers – that is, no the magnetic field of sources.

For the experiment carrying out, the portable self – excited oscillator has already been made with the carrier frequency of about 16 megahertz and the pulse modulator – the signal source. The carrier amplitude, having measured by the oscilloscope, has the value of 7 volts. So, the modulating pulses have the smooth edges with the repetition rate of 900 Hz, the pulses width

at the half fronts – 0,5 msec., the duty cycle – 2,2. The output power signal is turned to be equal to 0,044 watts on the oscilloscope, when the input capacitance of 20 pF oscilloscope.

By the way, it should be followed, that the higher harmonics of the signal spectrum are small and the signal is hardly the non – broadband one from these indicated spectral parameters.

The output voltage with the external self – excited oscillator via the capacitor of 1,000 pF has been supplied to the grounded antenna, that is, in the subsurface layer (see, Figure 1). The 12 voltage current storage battery powering self – excited oscillator has been equal to 0,05A. So, the DC micro-ammeter had been connected to the antenna, as the control device, at the entrance of which the bridge detector was working on the D9E diodes, and the output had been connected to the loop (e.g. the mounting wire) the length of 2 meters, the second end of which had been hung in the air (Fig.2). When operating the portable oscillator on the grounded antenna, the micro-ammeter with the hanging in the air plume had been shown 70 microamps.

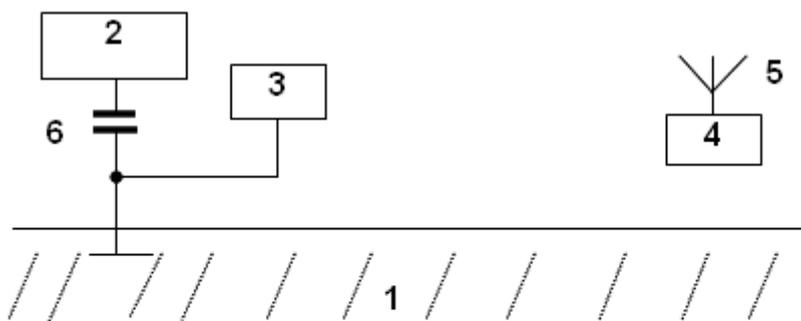


Рис. 1

1 - земля, 2 - автогенератор, 3 - контрольный прибор, 4 - радиоприемник, 5 - антенна радиоприемника, 6 - переходной конденсатор.

Figure 1

1 – ground; 2 – self – excited oscillator; 3 – control device;  
4 – radio set; 5 – radio set antenna; 6 – transition capacitor.

When the loop and the all control panel device are being moved up or the both sides (i.e. at its capacitance changing, with respect to the ground), the instrument readings have not been changed.

The circuit for the micro-ammeter had clearly been not closed, so judging by its readings, in the grounded antenna, under the created conditions by the experimenter, there was the single – ended electro-signal, or, according to [1], **the polarization current**. Let us remind, that the polarization current is not subjected the Ohm's law.

At the portable oscillator turning on in the described communication line, the baseband signal 900 Hertz has perfectly been fixed by the «Vitek» radio set, having had its sensitivity, according to the technical specifications, order of 36 dbmkv in the frequency range 13,6 – 15,85

MHz. All these measurements have been made at the height of 1m from the ground. Thus, the control device has been disconnected from the grounded antenna during all these measurements.

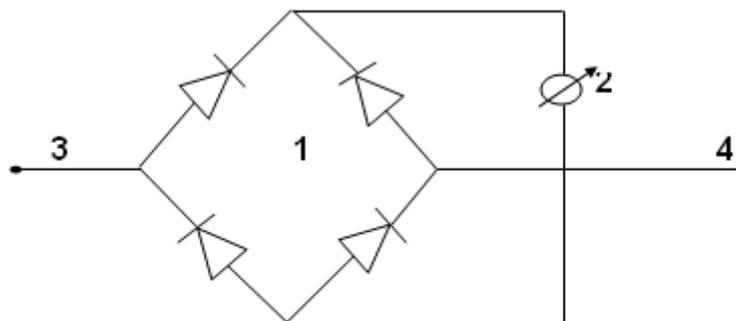


Рис.2

1 - мостовой детектор, 2 - микроамперметр, 3 - вход прибора,  
4 - шлейф.

Figure 2.

1 – bridge detector, 2 – micro-ammeter, 3 – device input, 4 – loop.

The service area reliable receiving the signal of 900 Hertz has been stretched out in all the directions from the antenna, and it has been had the radius of 200 meters. To be repeated: this is the area with the good reception signal/noise ratio of about 3 order.

So easy signal passage from the GROUNDED antenna to the antenna WITHOUT GROUNDED radio set (e.g. the receiver antenna – is the electric probe length 54 cm) is suggested, that the **polarization current, having generated in the conductor**, that is, in our case, as in the antenna, well as in the ground, it has been realized in the **polarization current, having generated in the dielectric**, i.e. in the atmosphere, and the current, having arisen in the atmosphere, is readily converted into the receiver antenna current. Indeed, the electric polarization field of the atmosphere, for our case, uniformly, its intensity is being decreased at the distance increase from the ground level upwards, so the volume electric charges are being appeared in the atmosphere [2], having modulated in time by the oscillator. And that, the receiver's antenna is being reacted upon.

And what does the underground radio communication give us? It is given the significant advantages in the industry and the agriculture. This is the radio communication, for example, in the mines, which has its **complete** independence from the explosions, the fires, the debris, and the other cataclysms and the hazards, for the polarization current, under the influence of the external voltage, is being produced at all the times. This is the radio communication in the underground storage facilities and the bunkers the warehouses, the tunnels and the geological caves, generally in those places, where the signals do not penetrate the cell, mobile phones and the various radio stations. And, possibly, it will be in the water. At what depth and at what range – the carried out experiments will be shown.

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**The References:**

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