APPENDIX 1

# EXPERIMENTS WITH LOW FREQUENCY LONGITUDINAL ELECTRIC WAVES

BY

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## 1. INTRODUCTION

This appendix gives additional information to the paper "Longitudinal electric waves created by the solar wind and the Earth magnetic field". It also shows a number of experiments which supports the statements in above paper. The purpose of this appendix is to support above paper, it is a prerequisite that the reader has good knowledge of the above paper.

## 2. HOW TO MEASURE

The assumption in "Longitudinal electric waves created by the solar wind and the Earth magnetic field" is that the low frequency longitudinal electric wave consists of propagating and oscillating electrons and ions. The density of electrons and ions varies along the length of the longitudinal electric wave. This creates dipoles and an electric field which can be measured with an E-field probe.

In chapter 3 we see that the longitudinal electric wave passes through a thick metal plate without loss. It means that almost any probe we use to measure the flow of electrons (directly) will be useless because the electrons will pass through the probe. However, a thin, short wire which contains a positive charge will absorb the electrons in the longitudinal electric wave. In this way it's possible to measure the flow of electrons in the longitudinal electric wave.

The measurements that are described in this paper build primarily on the fact that the longitudinal electric wave induces an electromagnetic field when it propagates through the magnetic field lines. These electric and magnetic fields can be measured with an E- and B-field probe. These fields are in most cases rather subtle. We can use two different methods to measure such a field:

- Use a very sensitive devise and in that way directly measure the strength (size) of a specific field.
- Use the fact that two electric or electromagnetic fields will behave in a predetermined way in relation to each other. In this way we can measure the angle of diversion or the physical distance between two fields. When doing that we only have to measure the

presence of an electric or magnetic field. This method puts less constraint on the measurement equipment. This method has been used in most of the experiments that are described in this paper.

The longitudinal electric wave is a standing wave, the wavelength is many meters and the polarization of the induced fields is fixed. This implies that all components of the wave are fixed or vary slowly in space and time, their dimensions are large. We can walk around in the room with the instruments and apply them on the exact spot of the wave we want to measure or influence. Therefore it's possible to make rather accurate measurements of all characteristics by simply measuring the presence of an electric or magnetic field at a certain spot.

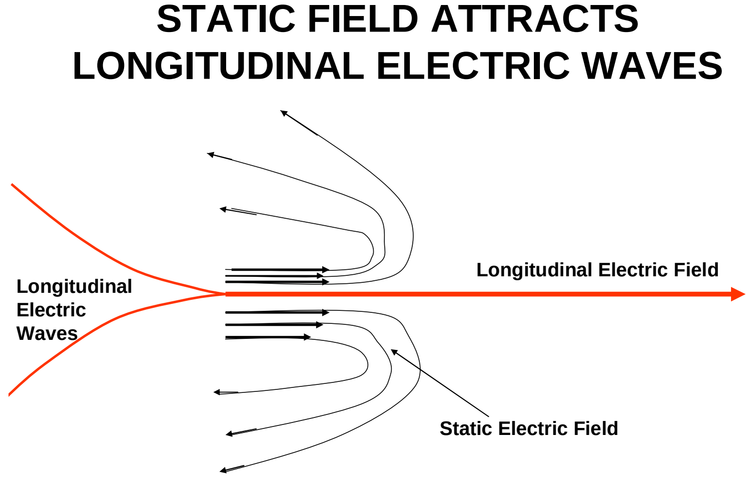
The conclusion is that we can measure the longitudinal electric wave in four ways:

- By directly measure the electrons in the longitudinal electric wave, i.e. Coulomb/second.
- By measuring the electric field that is created by propagating electrons in the longitudinal electric wave. We use an E-field probe.
- By measuring the electric and magnetic fields which are induced when the longitudinal electric wave propagates through the magnetic field lines. We use an E- and B-field probe.
- By measuring the influence from an electric field on the longitudinal electric wave. We use an E- or B-field probe.

This appendix shows how we can use all four methods. They give consistent results.

3. LONGITUDINAL ELECTRIC FIELD CREATED BY DIRECT CURRENT

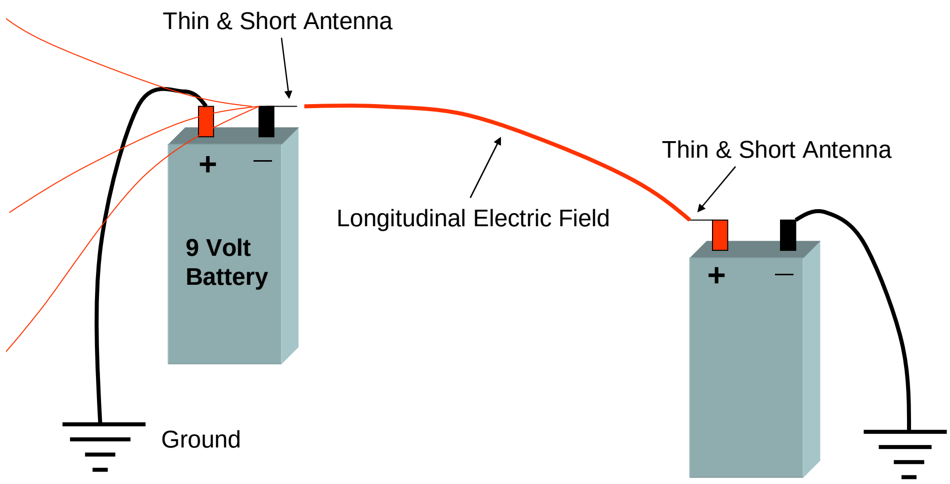
Every space on the surface of the earth is filled with longitudinal electric waves. The waves are influenced by surrounding electric fields. They will repel or attract depending on the polarity and direction of the field. An electric field that is formed like a cavity will attract and guide the longitudinal electric wave. Such a cavity will attract and guide any free electrons or negative ions close to the cavity.



The cavity attracts near by longitudinal electric waves and when they propagate through the cavity their electrons are subjected to a static electric field. This creates a uniform stream of electrons with an electric field of zero divergence. We have changed the information in the incoming longitudinal electric waves and created a longitudinal electric field with zero divergence.

We can create such a cavity by soldering a thin, short wire to the minus pole of a 9 Volt battery. The longitudinal electric field will propagate approx. 50 m and then it dissolves. We can measure the electric field that is created by the propagating electrons with an E-field probe. This can be done with a simple instrument like the German E-field probe, SFT 1 from LC-ELECTRONICS. The instrument costs 180 EURO or 200 USD. More advanced E-field probes will give better results.

## LONGITUDINAL ELECTRIC FIELD CREATED BY STATIC FIELD

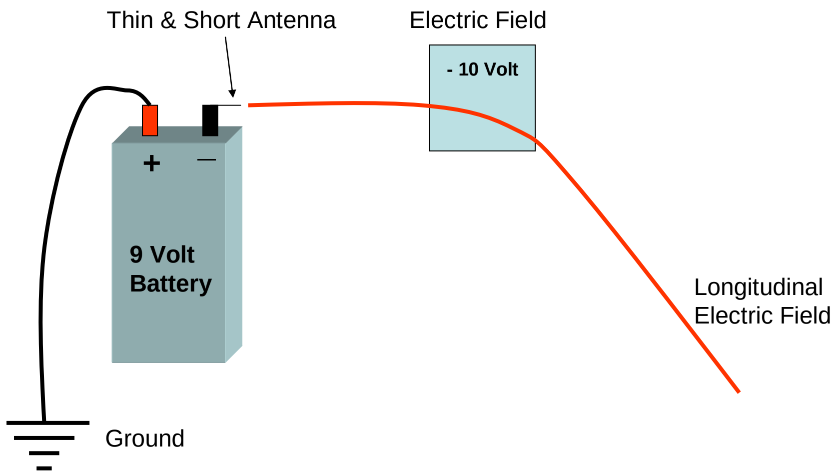



It's obvious that this experiment proves that electrons can propagate in air. This experiment is extremely easy to repeat.

We can change the direction of the field in the above cavity. Electrons, negative ions and longitudinal electric waves that propagate towards the cavity will be attracted. We can create such a cavity by soldering a thin, short wire to the plus pole of a 9 volt battery. It will attract longitudinal electric waves and conduct their electrons to ground. It's important to note that the cavity must be placed “dead on” the wave, otherwise the wave will propagate through the field outside the cavity and this field repels the electrons. Once the cavity has been placed “dead on” it can be moved, the longitudinal electric wave bends towards the field of the cavity. The above experiments are important to the understanding of the rest of the appendix. They show how we can influence the longitudinal electric wave with electric fields. It’s also the base for many of the experiments that are described in this appendix. The purpose of these experiments is to investigate the characteristics of the longitudinal electric wave.

# LONGITUDINAL ELECTRIC FIELD

## DIVERTED BY ELECTRIC FIELD

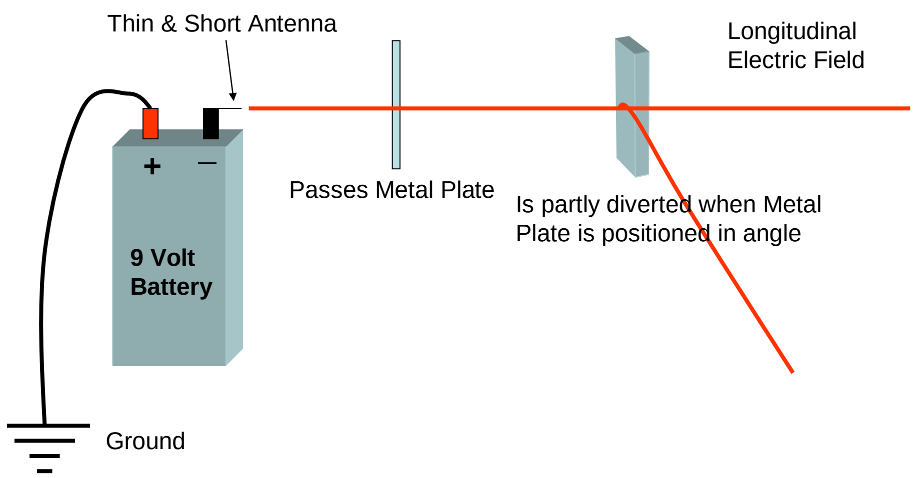



We can apply a static electric field perpendicular to the longitudinal electric field. The longitudinal electric field will divert away from the static field. This proves that the longitudinal electric field contains an electric component (E-component).

We can place a magnet close to the longitudinal electric field. It will not change the direction of the longitudinal electric field. This proves that the electric field does not contain a magnetic component (B-component).

# LONGITUDINAL ELECTRIC FIELD

## PASSES TROUGH METAL PLATE

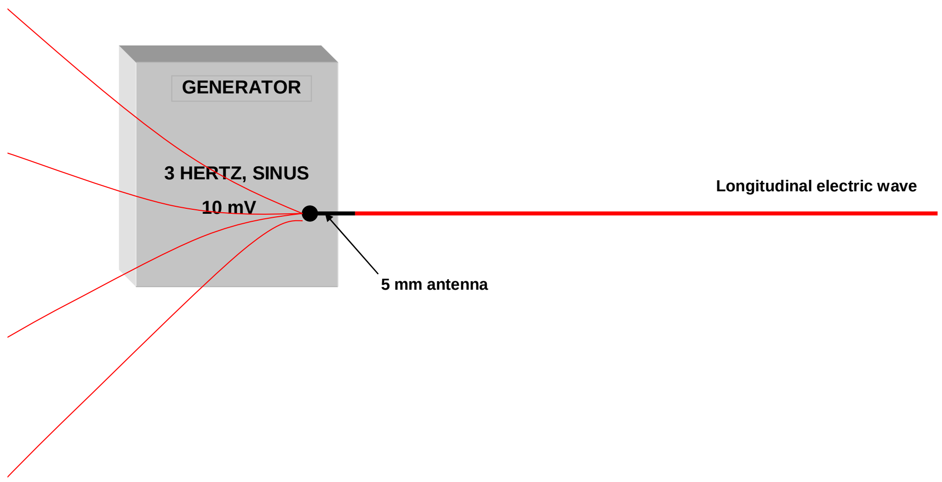


The longitudinal electric field passes through a thick metal plate without measurable loss. If the metal plate is positioned at an angle a part of the longitudinal electric field will be diverted, the direction of this diversion is tangential to the metal surface.

4. LOW FREQUENCY LONGITUDINAL ELECTRIC WAVES

The following experiment shows how we can produce a longitudinal electric wave with a certain frequency. A low frequency tone generator is set to 3 Hz and 10 mV output voltage. A thin (0.1 mm), short (5 mm) antenna (copper wire) is attached to its output terminal. The electric field of the antenna attracts near by longitudinal electric waves. The electric field in the antenna (the cavity) varies with the output voltage of the generator and this change the dipoles of the incoming longitudinal electric waves. It produces a new longitudinal electric wave with the frequency 3 Hz.

**LONGITUDINAL ELECTRIC WAVE**



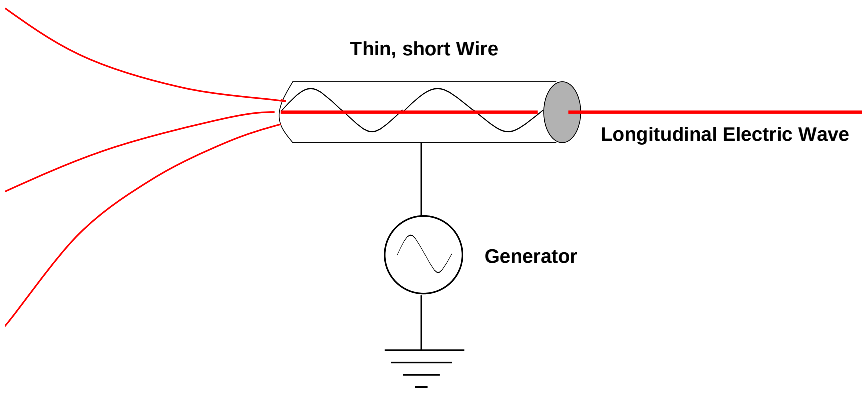

The generator produces a longitudinal electric wave that propagates straight from the wire:

- The longitudinal electric wave is sinus shaped, i.e. its electric field density in the longitudinal direction is sinus shaped.
- It's a standing wave, i.e. its nodes and antinodes don't change position.
- It's a pure electric wave and it contains only the electric field.
- It propagates like a straight "ray", tangential from the antenna surface. Its cross section is small.
- The wave propagates through thick metal plates without measurable loss. It propagates through Faraday's cage.
- The wave propagates approx 100 m and then it dissolves. However it's possible to transmit the information contained in the wave over very long distance. This is described in chapter 7.

- The amplitude of the longitudinal electric wave is proportional to the generator output voltage.
- Since it's a standing wave it transmits information, not energy.
- The longitudinal electric wave can only be created at frequencies below 6 Hz. Close to 6 Hz the amplitude goes rapidly towards zero.
- The wavelength of the longitudinal electric wave is approximately proportional to the period of the generator signal. The wavelength is approx. 8 m at 3 Hz. The wavelength is quantified, it assumes only discrete values. At certain generator frequencies the output wave dissolves directly in front of the antenna.

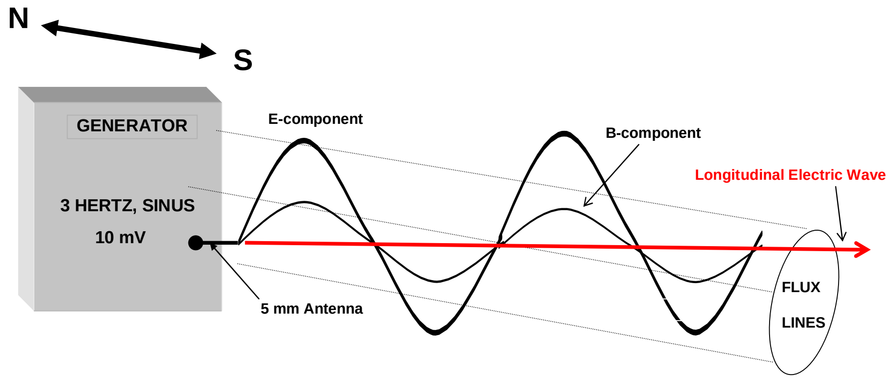
The last statements are important because it gives a plausible explanation to what happens in the antenna. The output wavelength is quantified and if we change the length of the antenna a fraction the quantified steps change. A possible explanation is that the antenna creates a standing longitudinal electric wave where the wavelength relates to the antenna length. The wavelength depends on the generator frequency, but is quantified so that an integer multiple (times a constant) equals the length of the antenna. The wavelength depends on the phase velocity of the wave. However, the phase velocity is not the speed of light. The phase velocity is 0.76 mm/second in the copper wire. Outside the copper wire, when the longitudinal electric wave propagates through air, the phase velocity is 24 m/second.

**THE LONGITUDINAL ELECTRIC WAVE IS CREATED IN THE SHORT ANTENNA**




When the longitudinal electric wave propagates through the magnetic field lines it induces one sinus shaped electric field line (E-component) in the vertical plane and one sinus shaped magnetic field line (B-component) in the horizontal plane.

# LONGITUDINAL ELECTRIC WAVE & ELECTROMAGNETIC FIELD



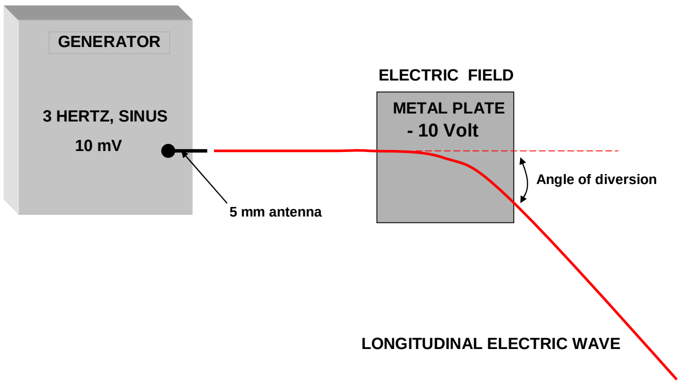

We can say that the longitudinal electric wave is accompanied by an electromagnetic field. This electromagnetic field shall not be mixed up with the (Maxwell) transversal electromagnetic wave which has completely different characteristics. This is a static or quasi stationary field.

The electromagnetic field has the following characteristics;

- The electromagnetic field is “standing”, i.e. its “nodes” and “antinodes” are fixed.
- The “wavelength” is the same as the longitudinal electric wave, its “nodes” and “antinodes” coincide with those of the longitudinal electric wave.
- The amplitude is proportional to the amplitude of the generator and the longitudinal electric wave.

In the following experiments we investigate the characteristics of the longitudinal electric wave that is created by the tone generator.

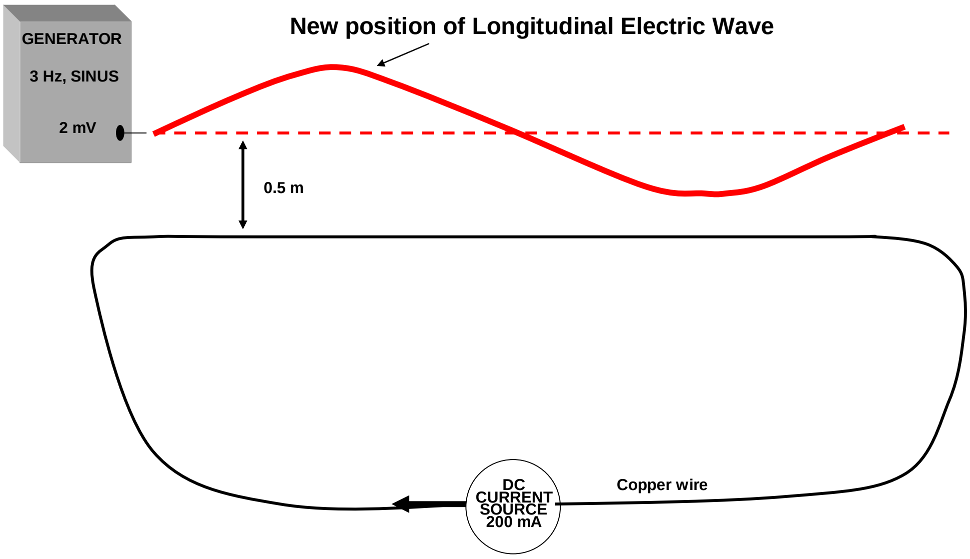
# ELECTRIC FIELD WILL DIVERT LONGITUDINAL ELECTRIC WAVE




In the first experiment we position a static electric field perpendicular to the longitudinal electric wave. The longitudinal electric wave is diverted. The angle of diversion is approx. proportional to the static electric field and also the output voltage of the generator, i.e. the amplitude of the longitudinal electric wave. We can move the static electric field along the longitudinal electric wave. The angle of diversion is proportional to the electric field of the longitudinal electric wave at that spot. In this way we see that the electric field along the longitudinal wave is sinus shaped. We also notice that the electric field changes polarity from one half cycle to the next, the wave bends from the metal plate respectively towards the metal plate.

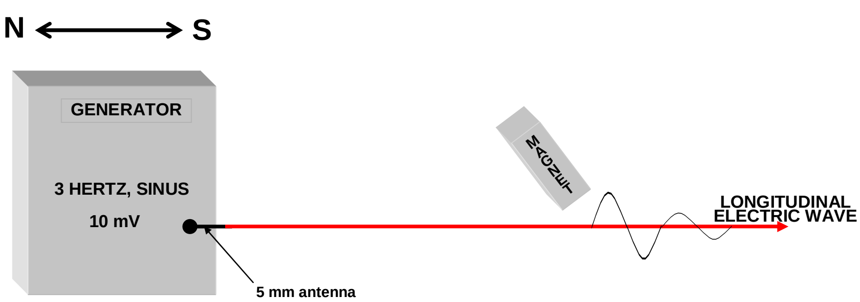
This leads us to a similar experiment. We can substitute the point source electric field with a “longitudinal static electric field” , i.e. the constant electric field that is created when DC current is fed through a long copper wire. We stretch this wire parallel to the longitudinal electric wave at a distance of 0.5 m. The longitudinal electric wave will now propagate in a sinus shaped line, i.e. the distance to the wire is equal to the electric field along the longitudinal electric wave. The electric field in the wire must be significantly higher than the field in the wave in order to make the measurement correct and linear.

# THE POSITION OF THE LONGITUDINAL ELECTRIC WAVE IS CHANGED BY ELECTRIC FIELD




The conclusion is that we can measure the electric field (and dipole density) of the longitudinal electric wave at any spot. The electric field is sinus shaped. We determine the strength (size) of the field by measuring the angle of diversion or the distance towards the copper wire.

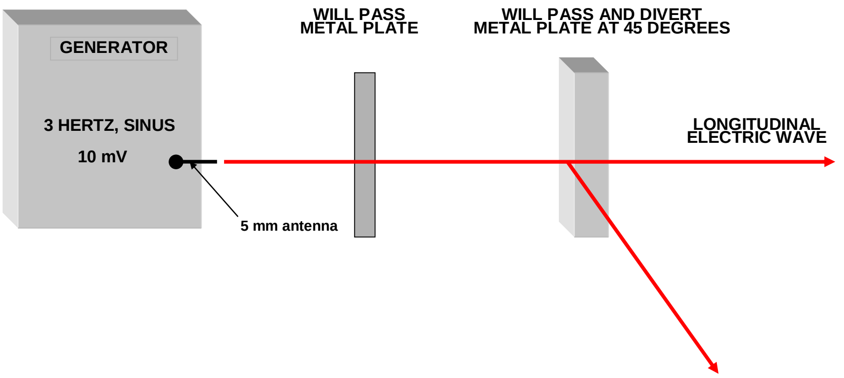
# LONGITUDINAL ELECTRIC WAVE MAGNETIC FIELD WILL NOT DIVERT




In the next experiment we substitute the static electric field with a static magnetic field, we place a magnet close to the longitudinal electric wave. The longitudinal electric wave is directed in the exact south (or north) direction. The magnet will not divert the longitudinal electric wave. This means that the longitudinal electric wave only contains an electric component. We also notice that an electromagnetic field is added to the longitudinal electric wave, the electromagnetic field disappears after a short distance (one or two wavelengths). What happens is that the magnet disturbs the Earth magnetic field lines,  at this spot they are no longer parallel to the longitudinal electric wave. Therefore an electromagnetic field is induced at this spot.

The conclusion is that the longitudinal electric wave contains only the E-component.

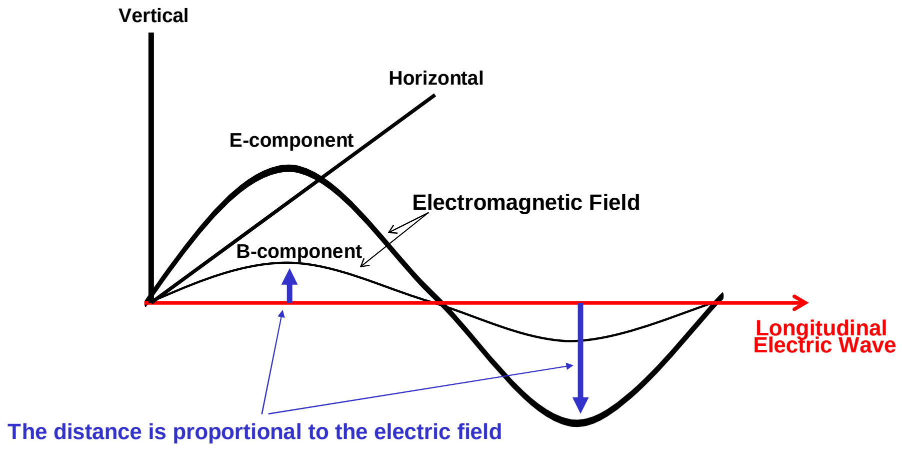
## LONGITUDINAL ELECTRIC WAVE WILL PASS METAL PLATE




In the next experiment we place a metal plate perpendicular to the longitudinal electric wave, the wave will pass trough without measurable loss. If the metal plate is placed at an angle to the longitudinal electric wave, a part of the wave will divert. We can measure the amplitude of the diverted wave and in that way decide the strength (size) of the diverted wave. The amplitude of the diverted wave is proportional to the output voltage of the generator, i.e. the amplitude of the longitudinal electric wave. When we move the metal plate along the longitudinal wave we will notice that the amplitude of the diverted wave (we measure the induced electromagnetic field) is proportional to the amplitude of the electric field of the longitudinal electric wave at that spot.

The conclusion is that we can measure the electric field of the longitudinal electric wave at any spot by measuring the amplitude of the diverted wave. This measurement gives the same result as the experiment above although we measure in completely different ways.

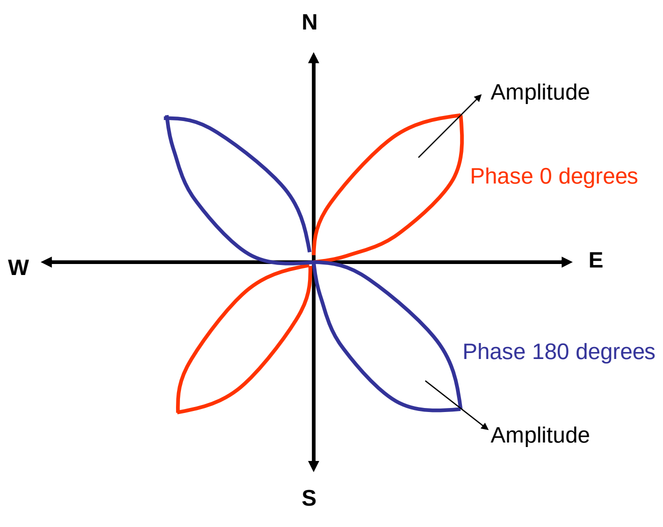
# THE DISTANCE IS PROPORTIONAL TO THE ELECTRIC FIELD




In the following experiment we direct the longitudinal electric wave at an angle to the north or south direction. The lines of flux will induce one electric flux line (E-component) in the vertical plane and one magnetic flux line (B-component) in the horizontal plane. The distance between the longitudinal electric wave and the E- and B-component is proportional to the electric field of the longitudinal electric wave at that spot. The phase of the E- and B-component depends on the polarity of the electric field.

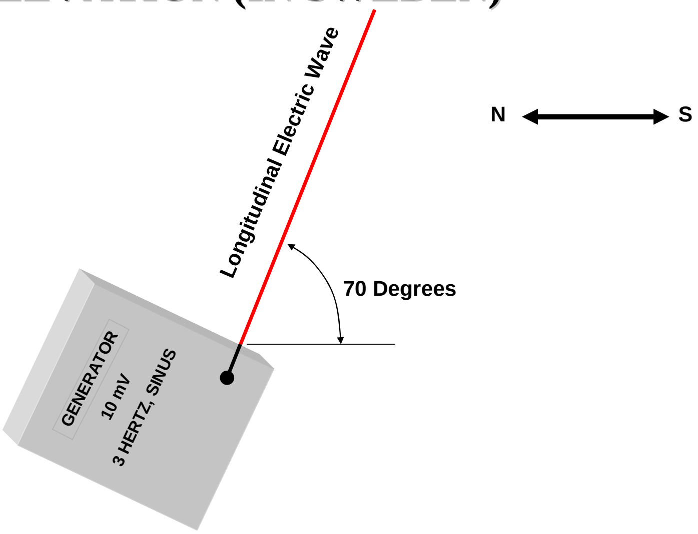
The conclusion is that we can measure the electric field of the longitudinal electric wave. We do it by measuring the distance between the longitudinal electric wave and the induced E- or B-component. This is the third way by which we can measure the field. All three methods are non-correlated, they give the same result.

# AMPLITUDE and PHASE of E- and B-COMPONENT



The amplitude (the distance to the longitudinal electric wave) of the E- and B-components depends on the angle between the longitudinal electric wave and the magnetic field lines, i.e. in which geographical direction the wave propagates. In the exact north, east, west and south directions the induced electromagnetic field is small. The induced electromagnetic field is at its maximum 45 degrees to the geographical directions. The phase of the electromagnetic field changes 180 degrees between the geographical directions.

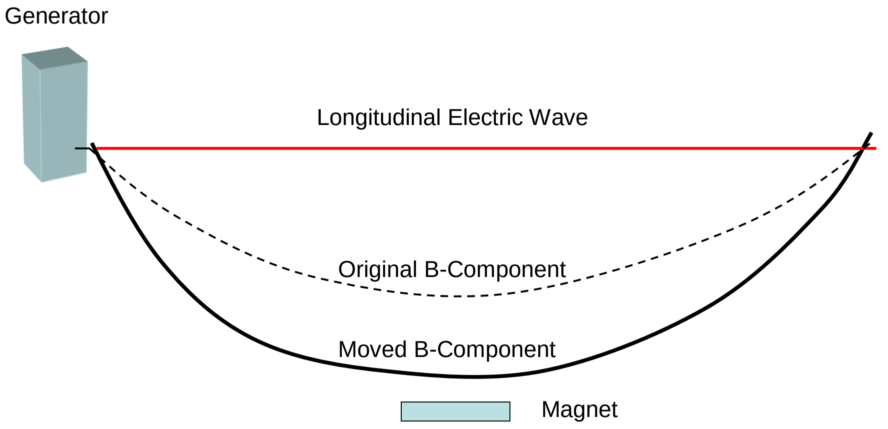
**ELECTROMAGNETIC FIELD IS ZERO IN SOUTH DIRECTION & 70 DEGREES ELEVATION (IN SWEDEN)**




When we direct the longitudinal electric wave in the exact south direction and tilt it upwards in approx. 70 degrees (in Sweden) we see that the induced electromagnetic field disappears, in this position we can only measure the electric field of the longitudinal electric wave. In this direction the longitudinal electric wave is absolutely parallel to the magnetic field lines.

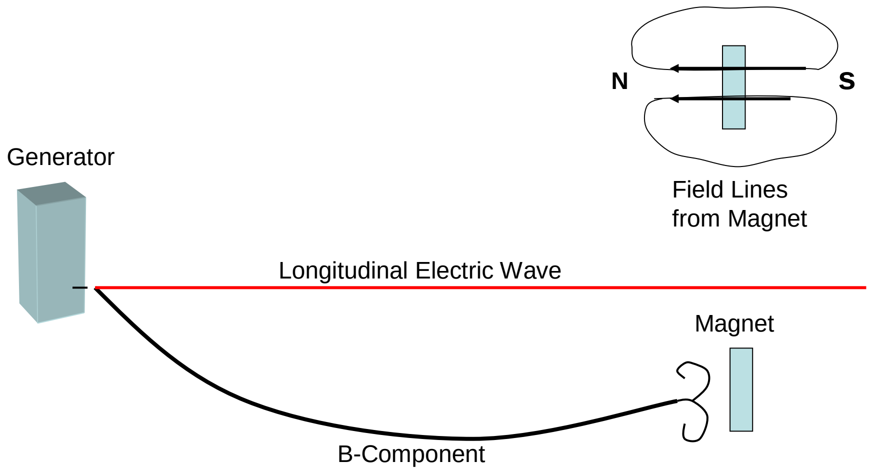
We now perform a number of experiments in order to investigate the nature of the E- and B-component in the induced electromagnetic field. In the first experiment we place a magnet close to the B-component so that the magnet’s field lines are horizontal and perpendicular to the B-component.

# B-COMPONENT IS MOVED BY MAGNETIC FIELD




The magnet will move the B-component inwards or outwards depending on the polarity of the magnet. This proves that the B-component consists of a (static) magnetic field. When the B-component is moved, the E-component is also moved. The two fields are linked. The direction of the longitudinal electric wave is not influenced. When we place the magnet "inside the wave", i.e. between the longitudinal electric wave and the B-component we do not influence the B-component. There is no magnetic field in this area (which is confirmed by measurements with a B-field probe). Now we place the magnet below the B-component. The magnetic field is positioned in the vertical plane, perpendicular to the B-component. The polarisation plane of the E- and B-component will turn around its axis at this spot. One wavelength away the original polarization plane is restored. Once again we observe that the E- and B-components are linked.

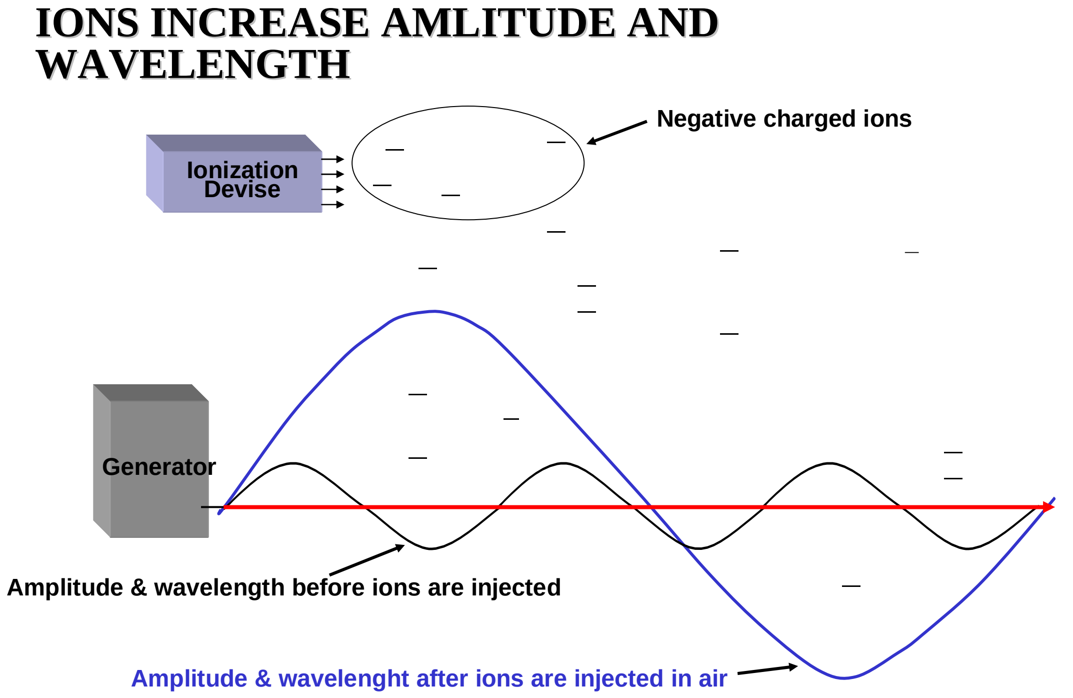
# B-COMPONENT IS STOPPED BY MAGNETIC FIELD




In the next experiment we place the magnet in front of the B-component (i.e. in the path of the B-component). The magnet's field lines are parallel to the B-component. The B-component will stop at the magnet and dissolve and the next half cycle will also disappear. Further down the wave, i.e. at the next cycle the B-component is restored. This experiment shows the direction of the B-component. In the picture above we see that the magnet has stopped the first half cycle of the B-component in the direction from left to right. If we put the magnet in the next half cycle it will stop that B-component in the direction right to left. The direction of the B-component is opposite in the two half-cycles. We can substitute the magnet with a metal plate, the result is the same, the B-component does not pass through the metal plate. We can duplicate all of these experiments by applying a static electric field on the E-component and we get the same results. The E-component does not pass through a metal plate. Its characteristics (and origin) are different than the longitudinal electric field (as expected). This experiment shows that the E- and B-component is a locally induced field and not a wave.

The following experiment shows that the longitudinal electric wave is influenced by ions in the air. We place a device that produces ions in the room where we perform our experiment. In this experiment an air purifier from the company AMCOR Clear Air 1 is used (any similar device will work). It produces negative charged ions (ionized air). At high speed the device produces 2.5 trillion (ten to the twelve) ions per second. It's left on for 3 minutes. The number of added ions in the air is approx. 2.5*180 trillion.  The room is 80 cubic m, i.e. the added ion density is then approx. 6 million ions per cubic cm if we assume a linear distribution. The added ions results in a drastic change in longitudinal electric wave produced by the generator. In the above example the wavelength and the amplitude increases three times. The increase is approx. linear with the time the ionizer is connected, i.e. the number of added negative ions in the air. When the ionizer is shut off and the windows are opened to let in fresh air, the wavelength and the amplitude goes rapidly towards its original value. The ions also influence the longitudinal waves in the 24 and 8 hour grids, however with a slight difference. Added ions increase the amplitude (linearly) but not the wavelength. The wavelength depends on the surrounding fields of the grid. This is another example that shows how stable the grid system is. In another experiment (which is not shown here) electrons are injected and subtracted from the longitudinal electric wave. It gives a similar result. In yet another experiment we use a

HEPA air cleaner from Honeywell (DA-5010-E). This cleaner filters the air in a carbon filter and this reduces the amount of ions in the air. The wavelength and amplitude decreases approx to half and it does so in an approx. linear way (with the time the cleaner is on). It's assumed that the cleaner removes the ions but not the electrons. From this we can deduct a rough estimate of the number of electron and ions involved in the oscillation.




The conclusion is that a large number of experiments have been performed where we can measure the electric field of the longitudinal electric wave, we can measure the electrons, we can inject and subtract electrons and we can add negative ions. All of these experiments lead to the same conclusion; the longitudinal electric wave consists of slowly propagating and oscillating electrons and ions.

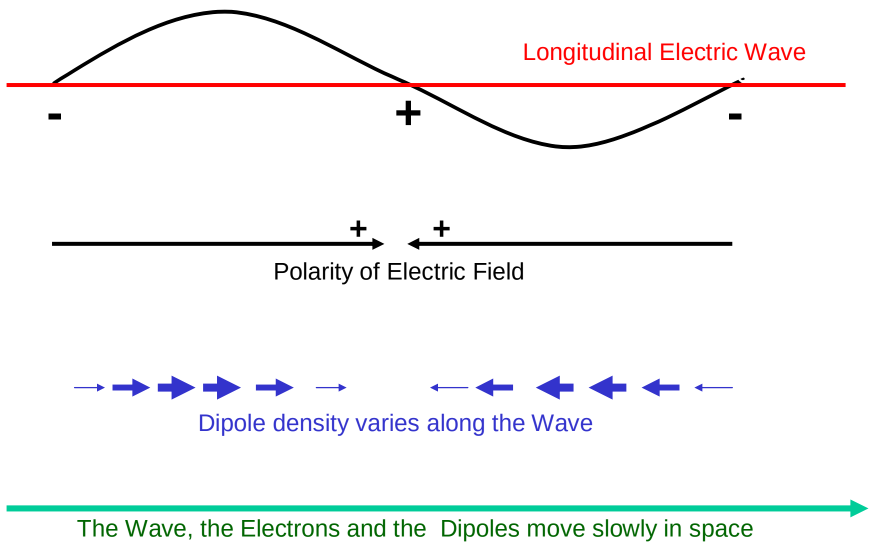
In the next experiment we switch off the tone generator. The longitudinal electric wave and the induced electromagnetic field remain. The following happens:

- The longitudinal electric wave and the induced electromagnetic E- and B-components remain and move slowly forward in the direction of the longitudinal electric wave (i.e. away from the tone generator). The speed of propagation is approx. 1.3 cm/second. We also note that the longitudinal electric field in chapter 3 behaves in the same way; when the battery is disconnected the field moves forward with a speed of approx. 1.3 cm/second.

- The amplitude of the longitudinal electric wave and the induced electromagnetic field decrease gradually and linearly. They decrease to half the amplitude every minute (approximately).

The assumption is that when we switch off the generator the electrons and ions in the longitudinal electric wave will remain in their original position relative to each other, as a group they will drift forward with a velocity of 1.3 cm/second. The assumption is that we have a “non-changing” longitudinal electric field which slowly moves through space. Then Coulomb’s law will make the electrons slowly move to a state of electric field equilibrium, the amplitude decreases.

# LONGITUDINAL ELECTRIC WAVE CONSISTING OF A SLOWLY MOVING ELECTRIC FIELD OF DIPOLES

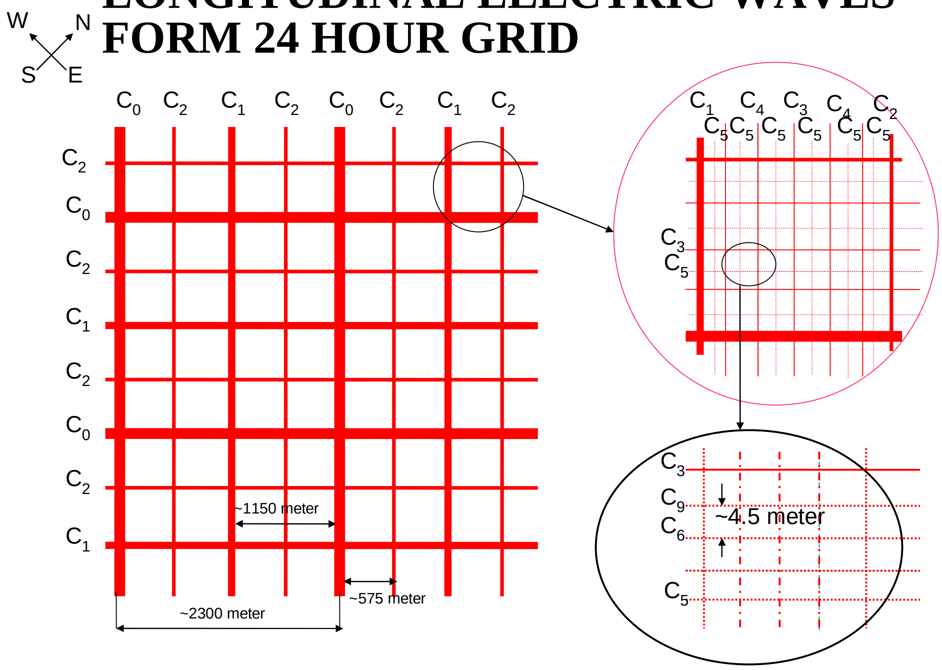



The fact that the longitudinal electric wave remains “unchanged” when the generator is switched off leads to the following assumption. We can, in the first approximation, treat the longitudinal electric wave as elements of electric fields or dipoles that are static in relation to each other, but as a group move with the same speed and in the same direction. Mathematically the longitudinal electric wave can be described as the sum of dipoles where the density and the direction of the dipoles vary according to the sinus distribution and where they all have the same vector speed **v**. This experiment shows a situation where the electrons are “free” and they are not guided by surrounding fields. Despite this fact the electrons will remain in their original relative positions during a long time.

5. THE SOLAR WIND AND THE EARTH MAGNETIC FIELD PRODUCE LONGITUDINAL ELECTRIC WAVES.

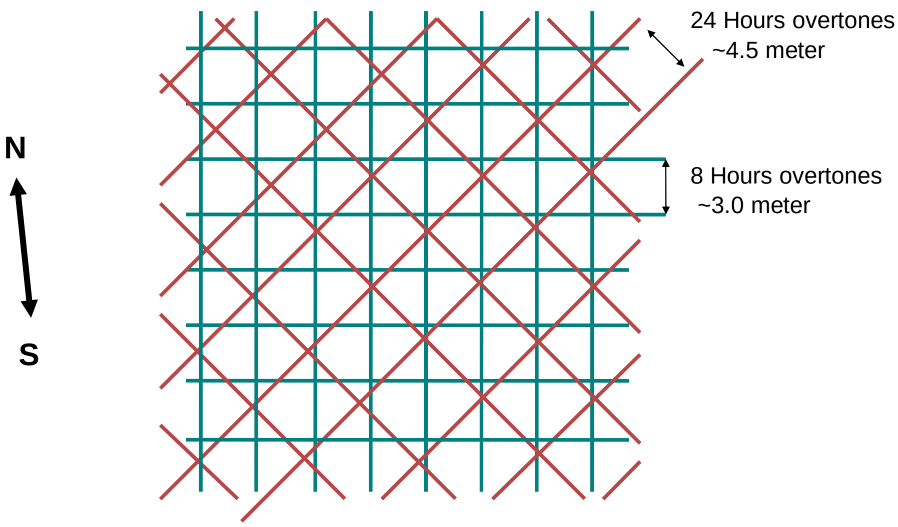
In this chapter we will describe the longitudinal electric waves that are produced by the Earth rotation to a larger depth. We start with repeating that the solar wind and the rotating magnetic field lines pump electrons in and out of the magnetosphere with a 24 hours period. The longitudinal electric waves have the period 24 hours and its even overtones. These longitudinal electric waves create the 24 hour grid.

# LONGITUDINAL ELECTRIC WAVES FORM 24 HOUR GRID




The 24 hours period also contains odd overtones. The most dominant odd overtone is the 3rd overtone, i.e. 24/3 = 8 hours. The period 8 hours and its even overtones; 4, 2, 1 hours and 30, 15, 7.5, 3.75, 1.9 minutes create the 8 hours grid. Every longitudinal electric wave contains its basic period and all even overtones. The 24 hour wave contains the periods 24, 12, 6, 3 etc hours. The 15 minutes wave contains the periods 15, 7.5, 3.75 and 1.9 minutes.

# THE 24 HOURS & 8 HOURS GRID



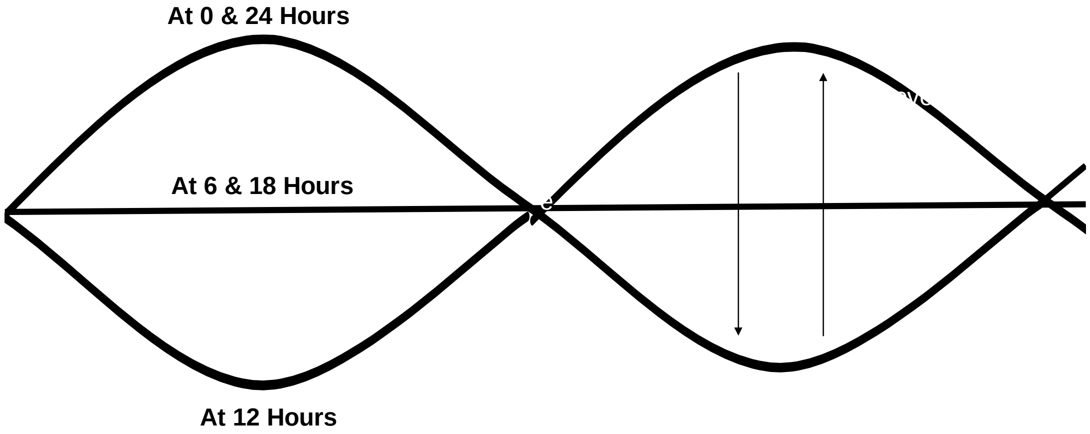
A large part of the longitudinal electric waves propagate trough the Earth crust, it’s the matter in the Earth crust that determines the phase velocity of the longitudinal electric wave. The phase velocity in matter such as rock and soil is lower than in air. Therefore the wavelength of the longitudinal electric waves that are created by the Earth rotation will be shorter than the longitudinal electric waves described in chapter 4 (waves in air). The longitudinal electric waves in chapter 4 (air) have a wavelength of 8 meters/3 Hz = approx. 24 m/Hz. The longitudinal electric waves in the 24 & 8 hours grids have a wavelength of 4600 meters/ 24 hours = approx. 5 cm/Hz. In chapter 7 we learned that the wavelength in a copper wire is 0.76 mm/Hz. A steel wire will give a somewhat different value.

When the length of a wire is the same as the wavelength of the longitudinal electric wave it will resonate (this was explained in the chapter 7). When this wire is placed close to a longitudinal electric wave it will resonate, we can measure this as an electric field around the wire. In this way we can decide/measure the frequency of a longitudinal electric wave. If the wire is placed directly on the longitudinal electric wave it will disturb its field and stop/decrease the induced electromagnetic field.  In this way we can decide the frequency and direction of the longitudinal electric wave.

A second way to measure the frequency or period of a longitudinal electric wave is to measure its wavelength. We do this by measuring the E- or B-component and observe its nodes.  Since the phase velocity varies depending on the content of the Earth crust it will only give an approximate value of the frequency or period.

A third way to measure the frequency or period is the following. In order to understand this method we compare with the behaviour of a transversal electromagnetic **standing** wave. It's created when a wave and its reflected wave are added. It creates a standing wave where the amplitude of the antinodes varies as well as change phase. The longitudinal electric waves that are created by the Earth rotation behave in the same way. The antinodes varies in amplitude, the period of this variation is exactly the same as the period of the longitudinal electric wave (since its origin is the same varying electric field). This means that we can measure the time it takes for the antinodes of the induced E- or B- component to change 360 degrees. This time is equal to the period of the longitudinal electric wave.

# THE ANTINODES OF THE LONGITUDINAL ELECTRIC WAVE VARIES WITH TIME




**The (earth) longitudinal electric wave is amplitude modulated, i.e the amplitude of the antinodes varies with the same period as the period of the wave**

The conclusion is that we can measure the period of a longitudinal electric wave in three different ways;

- By measuring its resonance in a wire.
- By measuring its wavelength (the distance between the nodes)
- By measuring the times it takes the longitudinal electric wave to change phase 360 degrees. The easiest way is to measure the time it takes the induced B-component to change 360 degrees.

Two of the methods give the same exact value and one (the wavelength) gives an approximate value.

From the above picture we notice that the divergence of the electric field is zero along the 24 hour longitudinal electric wave twice a day. In Stockholm, Sweden, this happens at exactly 13 minutes past 12 at night and noon. Since the divergence is zero, no overtones are produced at this time. At this time it's not possible to measure any induced electromagnetic waves, however we can measure the longitudinal electric wave. At these times the flow of electrons in the longitudinal electric waves change direction.

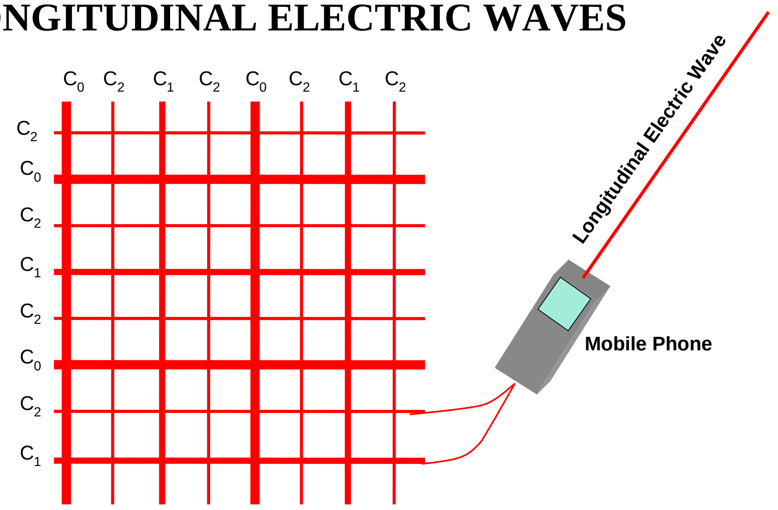
The conclusion is that when the Earth and the magnetic field lines rotate inside the solar wind electrons are pumped in and out of the magnetosphere down to the surface of the Earth. This produces longitudinal electric waves with the period 24 hours and its overtones. This creates two grids which consist of longitudinal electric waves. One grid is based on the period 24 hours and its even overtones. The other is based on 8 hours and its even overtones. These grids are stable. The longitudinal electric wave consists of an electric field and it induces an electromagnetic field. These fields intersect in their nodes and the forces between these fields create a stable system. The electric and electromagnetic fields guide the electrons and ions so that they propagate and oscillate within the existing longitudinal electric waves. It's a self sustained system. It will continue to exist as long as the solar wind and the magnetic field lines continue to pump in new electrons with 24 hours period. The grid was probably created during a very long period. The flow of electrons gradually connected into grids – after million of years.

All experiments described here have one thing in common. Every longitudinal electric wave that has been described has one and the same origin; they always origin from the longitudinal electric waves in the grid systems. The antenna attached to the battery (chapter 3) and the generator (chapter 4) only changes the content of existing longitudinal electric waves. It means that every longitudinal electric wave (of this type), on this planet, origins from the grids. Some longitudinal electric waves will change content and direction because they are subjected to resonance. Some longitudinal electric waves will change content and direction because they are subjected to electric fields, this field can come from the spin of electrons or electromagnetic fields from other sources. It's easy to change the content of the waves and in that way produce new longitudinal electric waves. Since the waves are coherent they easily create resonance. We can almost phrase it the other way around; it's difficult to avoid resonance.

## 6. MOBILE PHONES GENERATE LONGITUDINAL ELECTRIC WAVES.

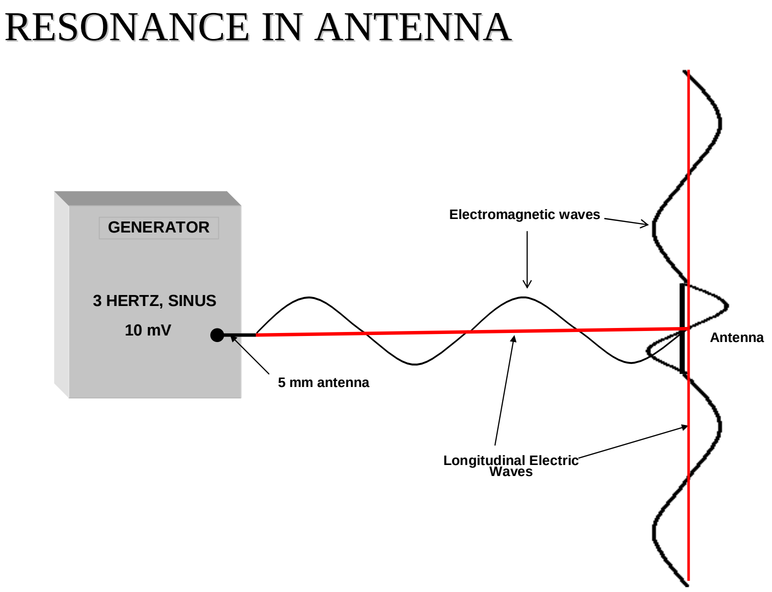
Mobile phones contain a micro processor, parts of that micro processor runs at a low speed (i.e. the clock frequency is a few Hz). The processor and the surrounding circuitry has small dimensions, it has the same function as the small antenna described in chapters 3&4. Many mobile phones produce longitudinal electric waves with a frequency of a few Hz. Many wrist-watches and clock-radios do the same. The experiment in chapter 4 shows that the generator voltage can be as low as 0.1 mV, it will still produce a longitudinal electric wave. A longitudinal wave can probably be produced by many objects that have small dimensions and the ability to generate low frequency electromagnetic energy of almost infinite power. This is made possible because the longitudinal electric wave always origins from the grid system. The object only changes the content of the dipoles and the energy needed to do that is very small. The longitudinal electric wave transmits information, not energy.

**MOBILE PHONES GENERATE LONGITUDINAL ELECTRIC WAVES**

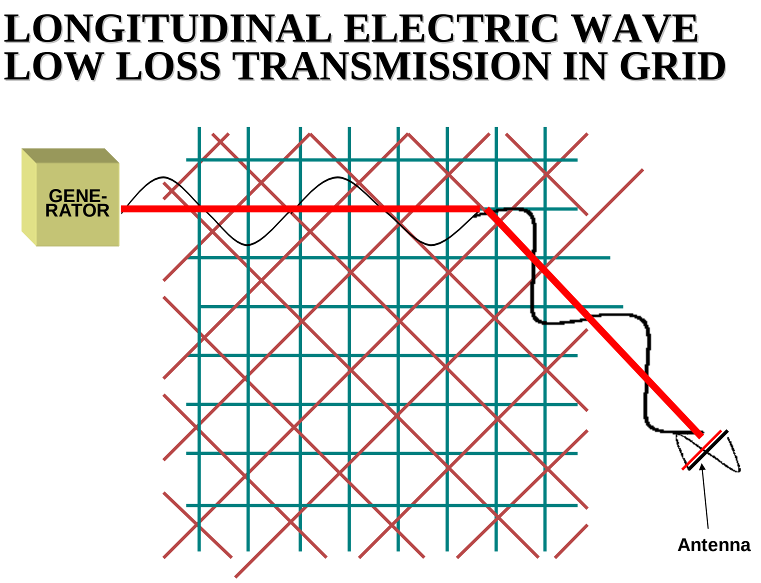


7. LONGITUDINAL ELECTRIC WAVES PROPAGATE FAR

In this experiment we use a generator that produces a longitudinal electric wave. We cut a wire (antenna) to the exact wavelength of that longitudinal electric wave (or an even multiple of the wavelength).




When we place the antenna in the longitudinal electric wave it will resonate and create a longitudinal electric wave along the antenna, the longitudinal electric wave will then propagate from the ends of the antenna into the air. The wavelength of the two longitudinal electric waves will be different because they propagate through different media, i.e. copper and air.



We direct the longitudinal electric wave from the generator into one of the longitudinal electric waves of the 24- or 8 hour grid. The longitudinal electric wave from the generator will be super positioned on that wave and it will propagate very far. We place the antenna in front of the wave and then walk away with the antenna along the longitudinal electric wave of the grid system. We will notice that the longitudinal electric wave from the generator is transferred to the antenna over a long distance, the loss is small. We can walk in any direction and the super positioned longitudinal electric wave from the generator always automatically finds the shortest way to the antenna. That route will always be along the "lines of electrons and ions in air". We can call it Ohm's law in a wider sense. It's a self routing, low loss transmission system. It's important to note that if the connection is lost it cannot be established again unless we walk back and place the antenna in front of the generator.

## 8. SUPPORT

There is a reason why the longitudinal electric wave has not been discovered by other scientists. It's not possible to measure if you have a "random" approach and if you use the wrong instruments. A good example is science within meteorology where a large number of very exact measurements of the air and atmosphere are made. It's possible to measure small electrostatic field and currents in air down to a few pico ampere. However it's not possible to measure the longitudinal electric waves with these instruments despite the fact the fields and the current is in the same order. As an example the current probes used will not work with a longitudinal electric wave, that wave will pass through without loss. However, the low frequency longitudinal electric wave is easy to measure if you do it in the correct way. Those who want to pursue serious scientific research are urged to contact the author. It will save time and frustration.

## 9. CONCLUSIONS

This paper describes a number of experiments. These experiments are aimed at describing and verifying the characteristics of the low frequency longitudinal electric wave. Its characteristics can be verified with a number of independent, uncorrelated measurement methods. All of these measurements give consistent results. The paper "Longitudinal electric waves created by the solar wind and the Earth magnetic field" builds on the assumption that the longitudinal electric wave consist of propagating and oscillating electrons and ions in the air. The results presented in this appendix support this theory.

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