

EVP / EMF CORRELATOR

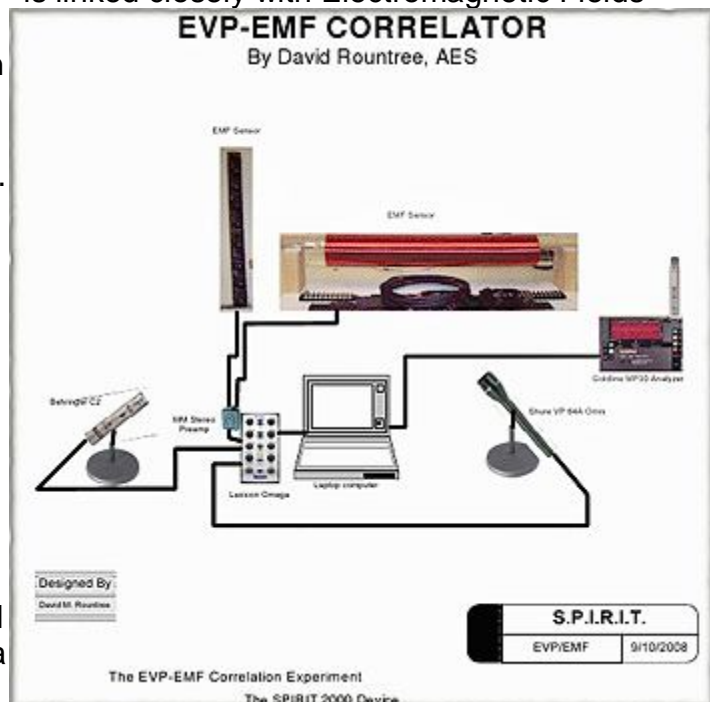
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..This is the first in a series of projects I will be working on highlighting new technology and its applications in the field of paranormal research. I have been studying **Electronic Voice Phenomena (EVP)** for many years, and have relatively recently discovered evidence that EVP is linked closely with **Electromagnetic Fields (EMF)**. After giving this concept a lot of thought, it occurred to me to design an apparatus that would allow the collection of real time correlating data that will link the two beyond any doubt. I am doing this for several reasons. **First of all, it will give us a greater understanding of what exactly is going on during an EVP event.**

..Second, it will make “**doctoring**” the evidence difficult, if not impossible. Since the systems and software I am using create a real time record of the different aspects of the phenomena I am measuring, I would have to hack the program to alter the data. Even if I could do that, I would have to spend a lot of time creating machine code that may or may not work. In essence, it will be impractical, if not impossible, to alter. This will allow the data collected to have a greater impact in research circles. Finally, it will allow me and eventually others to correlate several different types of data and compare them to real time events.

..While this is primarily designed to work in conjunction with other data collection set ups, it will work fine as a stand alone application for the study of EVP. While I have called it the **EMF-EVP Correlation Device**, to make it less of a mouthful, I have given it an operational name of “**SPIRIT 2000**”. I have started breaking out different areas of research and managing the data collection using a laptop based workstation to manage the assigned functions. While this allows for easy experimentation, it also allows for Data collection in a real time format for later comparison to other data. This will allow my group to capture a continuous data stream of everything going on during an event, in sync. **The -SPIRIT 2000- is the first prototype apparatus that we will employ in the field, both to experiment and collect viable data.**



..This device employs some very specialized equipment, such as a Gold Line 30MP microprocessor controlled 1/3 octave Audio Spectrum Analyzer using a calibrated MK8A condenser microphone. Not only does this device have an LED display, it also has a serial port connection that allows real time monitoring on its software package. Hence, we will have a graphic representation of what we are measuring, that can be saved for future comparison as an image. Additional components we are employing are a dynamic microphone, a pair of studio quality condenser microphones, and of course a laptop computer which will monitor, manage and record the audio and electromagnetic fields using some very specialized software.

The laptop is nothing real fancy, a Dell Latitude C-800 with a 1 GHz P-3 processor and 512 MB of RAM. We will also be using a USB mixer as the data interface, and the key requirement for it is the ability to send 4 discreet feeds into the analysis software.

..The set up is as follows: The calibrated microphone feeds the audio analyzer, and provides a baseline for all pure audio that is recorded. We employ a condenser microphone as a control because we need a laboratory quality microphone, and also because evidence indicates that Electronic Voice Phenomena may be caused by the result of electromagnetic fields modulated in the audio spectrum and since condenser microphones do not respond to EMF fluctuations, it is the logical choice for documenting the pure audio present, with no EVP interference. ***Actually proving that Electronic Voice Phenomena is caused by EMF is one of the goals we have underscored as part of the experiment we will be performing with this apparatus.*** In addition to the external control input, we will also employ a system control input, or a condenser microphone in the actual group data recording system for comparison purposes.

..The dynamic microphone will be used as the primary EVP sensor, recording both the audio and any EMF fluctuation that may cause EVP. The USB mixer will allow us to adjust the gain structure to balance the two microphones to achieve an equal intensity or level of operation. Additionally we will also record the out put from two different types of EMF sensors for a comparison to the audio signals to see if they correlate in any way. We want to produce a file with four in time sync inputs in order to determine the EMF/EVP relationship.

..Equipment selection: As with any new project undertaken where no one has any information to build upon, research into exactly what will be needed is paramount. Even then, there are always unforeseen problems, and this project would be no different. When we began the project we built the data management device around the Lexicon Lambda USB Studio Mixer, but we soon found that the Lambda was not going to do the job. The Lambda only used 1 data bus for audio into the software, so we could not produce 4 discreet signals, only two mixed channels. This forced an upgrade to the more expensive Lexicon Omega, which has two busses for audio distribution. This would allow us to have the 4 separate signals all recorded in sync with each other.

..The Audio Section: Building the Audio section of the set up offered no real issues as most of the equipment required was already in our inventory. We did have to dedicate a laptop specifically to this set up, as we would be using a somewhat complex software package to achieve our goals. Laptops are notorious for having very noisy soundcards, due to the power supply of the computer being relatively close to the sound card in a laptop, creating a lot of noise when recording anything at microphone level. Consequently, as mentioned we needed an independent interface for the audio inputs that could network the audio into the software application through the USB bus, circumventing the sound card altogether. This interface would also have to be able to process raw EMF signals and display them as they fell accurately within the audio spectrum. While there are several hardware solutions for this, including external sound cards such as Sound Blaster, AltoEdge, StarTech, Digigram, etc. we needed multiple discreet inputs and I wanted hand controls for adjustments.

..The Lexicon Lambda fit the bill perfectly, or so I thought. It is small, powered through the USB connection through the Laptop, and can handle two microphones and two line-level inputs. This would provide the inputs from the microphones and the two sensors. The Lambda also has the ability to supply phantom power to the condenser microphone, allowing us to power it without using an additional wall outlet. What I didn't read on about was the output bus configuration. The Lambda has only one bus, which allows for two discrete outputs. I was going to need four. Unfortunately I would realize this until later in the prototyping process.



..Using the Lambda, I could manually adjust the gain structure for the microphones to make both channels as equal in amplitude as possible. I also would be able to add EMF sensors into the Line 1 and Line 2 inputs of the Lambda, employing special low noise high gain amplifiers. After hooking up the microphones I proceeded to bring up the software and perform a test recording. I wanted to watch the audio wave forms and compare the EMF wave forms in real time. I would also be able to make the fine adjustments to the Lambda and the software to exactly match the amplitude of the two Audio wave forms as well as the EMF sensor wave forms displaying in the software. Unfortunately, this is the point when I discovered I could only record two tracks at a time with the Lambda.

..Lexicon Lambda: Before I could move forward, I would have to find a solution for the heart of the management system, the mixer/processor. Fortunately for me, I also own a Lexicon Omega, which is the big brother of the Lambda, and has some very nice additional features, such as more inputs, as well as an additional audio bus, allowing me to lay down the discrete tracks I would require for the experiments.



The Omega also requires power from an external wall outlet, which while making operations more complex in power consumption it is better suited to run multiple condenser microphones requiring phantom power. All things considered, it was a relatively painless upgrade as I had a working Omega in my Lab.

..Once I switched out the Lambda unit with the Omega unit I had no problems setting up the software, so the multiple track recording issue vaporized. The software that manages this process is extremely important, and as with any other section of this apparatus, it too provided a few challenges. My personal decision to use CubaseLE as the managing software was based on the platform essentially being a “**recording studio in a box**” type of application that works well with a variety of platforms, including the Lexicon Lambda and Omega.

..**Lexicon Omega:** The software, while complex, allows for up to 24 discreet inputs, and while the Omega only had two Microphone inputs and four line inputs the combination would be sufficient to meet our experiment objectives. The software is also capable of recording an EMF waveform if it falls within the audio spectrum. It also allows for each channel to be saved as a wave file, and played back together in sync for comparison purposes. Because it also allows a visualization of the waveforms, initial analysis can also be accomplished within the program. A word of warning about the use of professional audio software; CubeBase LE like much of the software we incorporate is designed to be used by Audio Engineers and professionals in the audio and acoustic field. It requires a good working knowledge of audio principles and terminology. If you do not have this level of expertise, then use a software solution that you can be trained on by a competent audio/acoustic engineer or music recording industry technician. Otherwise you will not be able to get the software to do what you want it to do.

..**CubaseLE software console / Dell Latitude C 800:** Our platform is a Dell Latitude C800 with 1Ghz Pentium III loaded with 512 Megs of RAM. Windows XP SP3 is the operating system and we included a CD Burner in the mix. The unit has a WiFi card to allow for future local wireless networking. With the filtration and Digital Signal Processing resources available with the hardware/software combination we are employing, it will be easy to eliminate some noise and clean up the finished product (**of course we would also archive all original data unedited for later verification of authenticity**) during the analysis stage of the experiment. In essence, we can analyze the waveform on the original recording machine, and still maintain the original data on a source specific external hard drive. To assist with this process, we also installed Sony Sound Forge 7.0, Visual Analyzer 10.0.5, Audio Spect 0.9 Voice analyzer, Frequency Analyzer, Multisine, Audio Analyzer and Snagit 8.0 for screen captures. The management logging analysis picture was now complete.

..The next thing to consider would be to establish a control wave form for comparative purposes. I employed two approaches to establishing a stable control waveform, the first being the use of a laboratory condenser microphone and a Gold Line 30MP audio spectrum analyzer networked into the control laptop on its own management software.

This would allow for an independent control signal to be recorded for future comparison during the analysis of the data after the investigation.

..The 30MP incorporates a large LED readout of the frequency sampling points which also allows a visual display of the sound being recorded. This flashing light show is very helpful in keeping one awake during the long hours of sitting in the dark with headphones on, but it also gives you a real time monitor of the wave form present. While it doesn't show you the composite waveform, it does show you the basic elements of the frequency bands present, including their level or intensity as well as variations.

..The laboratory grade microphone used on the analyzer is the Gold Line MK8A, calibrated by Gold Line and capable of inputs exceeding 123 dB. This equipment is designed to set up large P.A. systems as well as test for environmental noise hazards. It is a laboratory grade piece of equipment and as such has to be handled carefully to avoid damaging internal components, so always use good transport cases to store and move equipment of this type and nature. While we have the ability to run analysis protocols from the laptop, having an external control adds an extra layer of checks and balances to the data collected. It will also identify any inconsistencies between software analysis and the external analyzer, which will increase our measurement accuracy. Again, any audio analyzer that can interface with a laptop or PC is suitable for this part of the experiment.

..**Gold Line 30MP Real Time Audio Analyzer:** The second control signal would be provided by a condenser microphone fed into the CubaseLE software via the Omega. For this I used a pair of Behringer C-2 studio condenser microphone. The C-2s would provide a base line for visual comparison in real time in the CubaseLE console. Any deviation between this signal and the sensor microphone could be marked allowing it to be easily relocated for later analysis. I chose to use two matched pair microphones to increase the field of sound coverage to mimic the omni-directional coverage of the Shure Dynamic microphone.



..This configuration would not only allow for a savings in analysis time by eliminating the need to listen to hours of audio evidence looking for an EVP as we could simply view the wave form and zoom in on specific differences, but would also provide evidence that EVP is indeed EMF. Flagging the deviations would also assign a number to identify each one, making keeping track

of possible events simple and accurate. While operating the software is rather complex for someone with no experience in professional audio recording, anyone can learn to use it proficiently with some time, training and practice. The important thing to remember is to check and recheck all the settings prior to arming the record function.

..CubaseLE software application: A quick note on condenser microphones; “**Condenser**” is an older term that means capacitor, an electronic component which stores energy in the form of an electrostatic field. This type of microphone uses a capacitor to convert acoustical energy into electrical energy. Condenser microphones require power from a battery or external source. The resulting audio signal is a higher amplitude signal than that from a dynamic microphone. Condenser microphones are far more sensitive and responsive than dynamic microphones, making them an excellent choice for capturing subtle nuances in a sound. Since the use of a condenser microphone will provide a vital element in proving EMF is the source of EVPs I want to go over how they work in detail.

..How a condenser microphone works: A capacitor has two plates with a voltage between them. In the condenser microphone, one of these plates is made of very light material and acts as the diaphragm. The diaphragm vibrates when struck by sound waves, changing the distance between the two plates and therefore changing the capacitance. Specifically, when the plates are closer together, capacitance increases and a charge current occurs. When the plates are further apart, capacitance decreases and a discharge current occurs. A voltage is of course needed across the capacitor for this to work.



..This voltage is supplied either by a battery in the microphone or by external phantom power. In our case, phantom power for the condenser microphones is provided by the Omega unit. Behringer C-2 studio condenser microphone A condenser microphone reacts specifically to sound pressure changes, a mechanical function. It does not react to fluctuations caused by electromagnetic fields.

..The Dynamic Microphone: The sensor microphone, i.e. the one specifically used to collect an EVP had to be a dynamic microphone. Why? A dynamic microphone takes advantage of electromagnetic effects. When a magnet moves past a coil of wire, the magnet induces current to flow in the wire. In a dynamic microphone, the diaphragm moves either a magnet or a coil when sound waves hit the diaphragm, and the movement creates a small current. For testing purposes I employed an **Audio Technica ST95 MKII**. The ST95 is a relatively inexpensive professional quality dynamic microphone with an on/off switch mounted



in the body (*The C-2 also has a switch, but it is for selecting the weighting curve of the device, or the frequency pass filters*). The microphone is highly directional, with a cardioid pick up pattern of sensitivity. This will be important if we attempt to locate a source, but not so important for capturing the EVPs.

..Audio Technica ST95 MKII Dynamic Microphone: Additionally, I recognized the fact that we may also want to do general detection data gathering as well. Since a cardioid pick up pattern is also highly directional, I wanted to add an Omni-Directional microphone to the arsenal. While the directional qualities of the microphones are determined by element design, at some point I would want to establish if it made a difference to EMF. If it did, we would have to use a hand held EMF sensor and oscilloscope to attempt any source location of the EMF. This would have to be established by experimentation, and not assumption.

..The choice for the omni-mic would disclose two things. The effect of cost verses performance, and the effectiveness of detecting an EMF source using an audio inducer. ***I chose the Radio Shack Omni-Directional Microphone, Model: 33-3039 retailing at an affordable \$24.99 to cover this part of the experiment.*** These microphones are excellent choices to use as external microphones for small digital voice recorders as well, when coupled with a desk-type microphone stand.

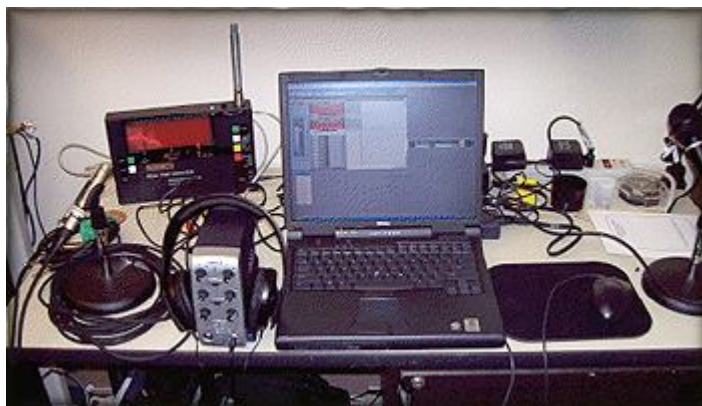


..Radio Shack Model: 33-3039 Omni-Directional Microphone: The audio section was now complete. Now I ran a testing protocol to determine what can of data I was capable of collecting. I began by setting up the system and then filled the environment with various sounds, from using signal generators coupled to amplifiers and speakers, to music. I was able to successfully record a control and detection wave file, compared them to the audio spectrum analyzer, and keep everything in sync. The equipment and the software worked flawlessly and the end result was two independent synchronized audio tracks saved as wave files. The problem was with the omni-directional dynamic microphone, specifically the Radio shack unit. Because the Omega uses balanced inputs for the microphones I ran into a quality issue due to the fact that the Radio Shack

microphone was unbalanced. **Consequently I had to use a better microphone to eliminate noise.**

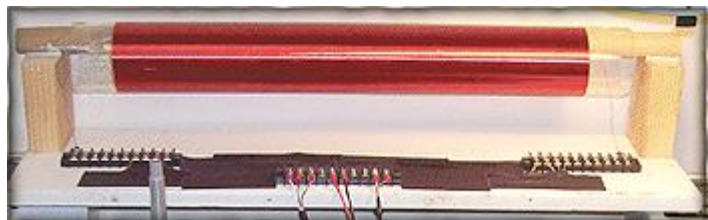
..The resolution was to use a **Shure VP64A** which does incorporate a balanced line. This cleared up the noise I had encountered during the initial test. I was also able to do a channel to channel comparison and noted key differences in microphone response. I was able to match the wave files using a signal generator and individual channel equalization to closely mirror the dynamic microphone performance to that of the control condenser microphone. It is my hope that by matching the base wave files with a control signal, deviations would be easier to identify under field recording conditions. While I am sure I have missed something, I have used due diligence to cover all my bases. Any additional modifications will more than likely be identified the first time the device is used in the field.

..The **SPIRIT 2000** with audio configuration / **The Electro-Magnetic Field Section:** I knew the EMF section would pose more issues to resolve than the audio section, but I wasn't sure where the difficulties would lie. It turns out most of the difficulties were



easily solvable. The first issue was the EMF sensors themselves. I wanted to employ sensors that had a wide area of coverage (**more or so**) and a broad bandwidth (**1 Hz to 25KHz**) so consequently commercially available sensors were very costly. Since I would be operating primarily in the audio spectrum, I decided to make my own sensors. I wanted to use two distinct types of sensor coils. The mail coil I wanted to be a roughly 3 inch diameter by 30 inch long air coil, designed to induce a lot of current from any low frequency EMF present. To achieve this, I purchased a hand wound secondary coil from a fellow Tesla coil fanatic on E-bay and converted it for my needs.

..**Large Single Coil Sensor:** The second coil would be a bit more complex. I decided to use a series of induction pickups used for telephone tapping. The device is essentially an electromagnetic field probe. It generates an AC voltage when exposed to electromagnetic fields. No one could tell me how the output from this unit varies with



frequency, but I knew that the greater the magnetic field, the higher the voltage generated (**at 60 Hz, each one produces about 1 mV per 20 mG**). Consequently, and built an array consisting of nine field sensors. The best part for my purposes is the array can be connected to the Omega input to give me an auditory "**picture**" of the

electromagnetic field. So the end result is one large single coil sensor, and one multiple small coil unit. The idea is to cover the entire audio spectrum with these two devices.

..Small multi-coil sensor: I also aligned the large single coil on a horizontal plane to make it sensitive to long lateral wavelengths, while the small multi-coil is oriented vertically to capture the higher frequency beams of EMF. Both are treated as an audio input, both are fed into a high gain-low noise preamplifier, and both can be recorded as audio outputs. That means it can be listened to. Not only will we graph it in sync to the recorded



microphone inputs, but we can listen to it separately, or as a melody of all inputs mixed together. The Low Noise High Gain preamplifier is required to boost the level of the EMF in order to balance it with the microphone inputs. By properly adjusting all of the gains structure I will be able to record four equal amplitude signals for correlation purposes.



..High gain / Low noise portable "STERO"

preamplifier: The apparatus scope is simple. Now I can go into a reported paranormal environment, and simply record audio and EMF simultaneously, with a synced time base which will give me demonstrable evidence if there is any correlation to EVP and EMF. Additionally, by using a team member with a portable Directional EMF sensor, we will attempt to trace the EMF field to its source.

..Portable Directional EMF Sensor: The PDES is a proven equipment configuration that allows us to identify the strength and frequency of an EMF Field. It also lets us know when we are getting close or moving away by the changes in signal amplitude caused by the proximity effect. The closer proximity you get to an EMF source, the higher the signal strength. This is reflected on the display device, a Velleman HPS10 2 MHz oscilloscope. The sensor is a Magnetic Sciences International Mag Check 95, with an operating bandwidth of 25 Hz to 3 kHz is the 3 dB range and a 5 Hz to 20 kHz is the 15 dB bandwidth. Also important, and vital to scientific measurement, each sensor undergoes a NIST traceable calibration to ensure an accuracy of +/- 3% typical calibration tolerance (**+/- 5% worst case**) from 50 Hz to 1000 Hz using ANSI Standard 644-1987.

..Velleman scope with Magcheck 95 sensor: The device was first deployed on an actual reportedly active location in September of 2008, with data being non-conclusive. We have since then matched twenty-four EVPs with EMF waveforms, indicating a very strong probability that EMF indeed causes EVP. We are working on ideas on how to discover the source of the EMF.