Remote Biodynamic Sensing and the "Biogram"

by **Michael Theroux**

Methods of Biodynamic Signal Translation

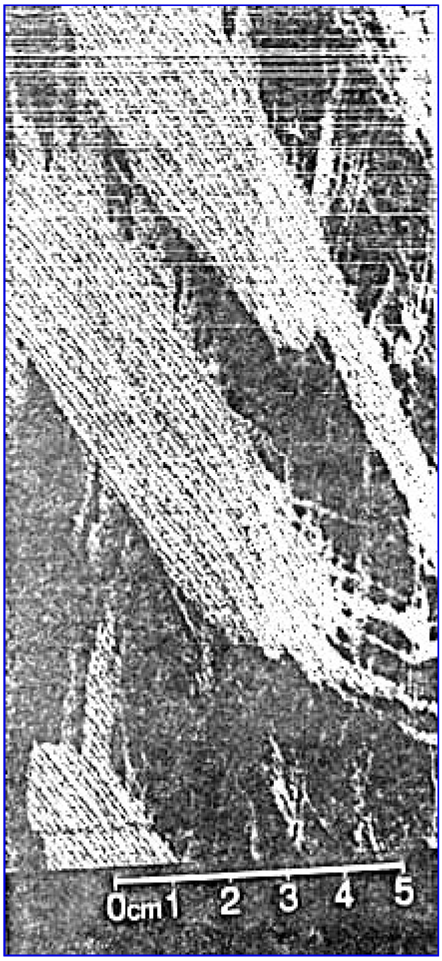
The plant response detector or signal processing translator detailed in "Detecting Biodynamic Signals" represents only a fraction of the equipment used in the disclosure of biodynamic signals. **Dr. Lawrence** utilized a system which included a telescope for sighting, a **biodetector** assembly containing biological transducers, electronic signal conversion equipment, EM artifact detection equipment, and a video attachment for the production of **biograms**. In the eighty page patent document entitled "Methods and Receiver for Biological Data Transport" (see Appendix B), **Dr. Lawrence** sites five different methods of signal processing translators as follows:

> **1) Bridge Method** - Biological semiconductors exhibiting electrical resistance changes due to external signal impingement may be arranged in a classic **Wheatstone bridge** arrangement (see schematic in previous issue).
>
> **2) Capacitance Method** - Biological semiconductors expressing variations of capacitance during stimulus events may be embodied to function as a frequency-control element in an oscillator of the FM type. Read-out may then be secured by means of a frequency counter or equally suited device. High impedance or optical devices are used to sense given piezoelectric phenomena accompanying capacitive reactions.
>
> **3) Electrostatic Method** - Biological semiconductors which are electrostatically active (active charge acquisition and depletion) as a result of local excitation and the presence of external biodynamic signal events may be read out by means of a charge-coupled device (CCD) or on photographic film.
>
> **4) Optical Method** - Biological semiconductors evidencing optical properties of a primary (luminescence) or secondary (transparency alterations) type during signal incidence may be read out by means of photoelectric devices and Bragg cells.
>
> **5) Self-Potential Method** - Biological semiconductors expressing changes in electrical self-potentials due to signal incidence, may be amplified by non-loading high impedance devices such as electrometers.

As we can see, there are a variety of means by which we may obtain and translate signals of a biodynamic character in biological semiconductors. It must be remembered, however, that biological materials exhibit characteristic actions of their own due to normal living cell function. It is the sensitization or excitation duty either as a service of the processing method or induced separately which will suspend these functions to secure diagnostic control over natural and inter-communicatively induced responses of living cells. In our experiments, methods 1, 2, and 5, offer the most continuously successful procedure of biodynamic signal procurement, and are also the most cost effective. The repeated success of this instrumentation may be primarily due to the combinative sensitizing/receiving nature of the acquiring method.

Image Acquisition and Biograms

Early on in the **RBS** experiments, **Dr. Lawrence** developed a means by which biodynamic signals could be translated into video images. Although he spoke of using **CCD technology** as an ideal, he favored the most basic biological data display technique of using facsimile recording. This system simply injects the electrical signals produced by the biological semiconductors into a type of **AM modulator**. This modulates a given frequency band in such a manner so that varying amplitudes are a precise reflection of the modulating direct current product which can then be rendered into facsimile images. In our experiments, we have utilized the same protocols with greater flexibility regarding image resolution and acquisition.



In the first system we used to produce **biogram**, the signal processing translator's modulated biodynamic signal output was fed directly into a PC via a Digital Signal Processing (**DSP**) interface (first tests were conducted on an old 80386 but for portability and speed, a Pentium 100 laptop was used). Special software was used to provide the images on the screen which could then be saved and later printed out. The **Biograms** we generated begin with a complex of individual frequency components and harmonics of the modulated biodynamic audio output, which covers a wide frequency range and varies in intensity over time. The software simply plots the frequency content of the biodynamic signal as a function of time with harmonic intensity represented by a variable color scale. The software uses a mathematical **Fast Fourier Transform** (**FFT**) in performing the frequency analysis. **FFTs** are usually specified by the number of input data points used in each calculation. For a sampling rate of F (cps), an N input point **FFT** will produce a frequency analysis over a frequency range of F/2.

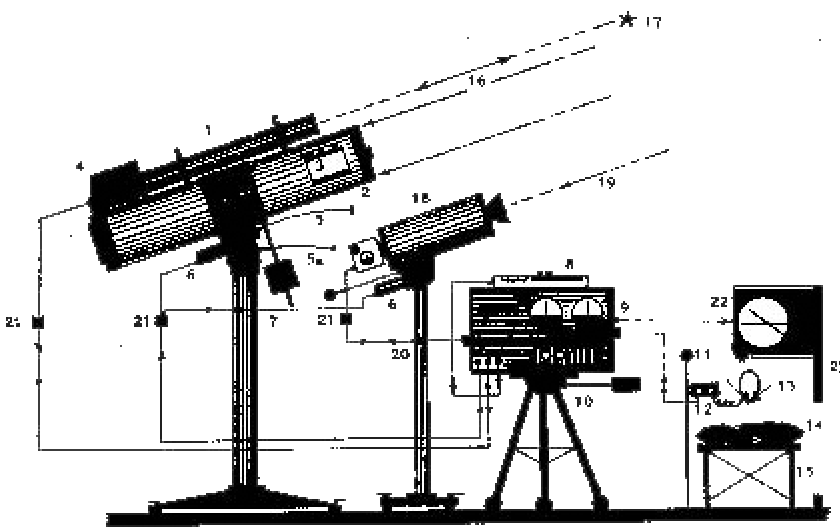
Signal amplitude will be calculated at N/2 frequency increments in this range. The software provides both narrowband and broadband processing options. Narrowband processing produces a display of high frequency resolution which resolves the individual harmonics of the audio sample. Broadband processing broadens the frequency response of the **FFT** and produces a display which smoothes over the individual harmonics to show broad areas of intensity. To simplify, the software package samples the input, performs an **FFT**, and graphs the output in the form of a 3D time-frequency plot or spectrogram, where one axis is time, the second is frequency, and the vertical axis is the signal level at the specific time and frequency. These **Biograms** were finally extracted from the complex modulated portions of the emergent spectrographic image. Then very small sections of the image — little more than a few microseconds in duration — were enlarged to an appropriate viewing magnification. These completed **Biograms** could later be rendered into video presentations in a frame-by-frame sequence. While this system is not the ultimate in **Biogram** acquisition (mainly due to its dependence on the linear time constraints of the received signals), it presents specific imaging of the perceived biodynamic modulations. One of the major advantages of this system is that the AM modulated biodynamic signals can be recorded and stored on analog or digital media to be later played back for image processing.

Our newer system involves a more direct approach to image acquisition, although it is still impaired by the linearity of time. In this system, **real-time Biograms** are produced utilizing software and some hardware designed for radio-facsimile reception. This method is closer to what **Dr. Lawrence** used with the exception that it is easier to control specific parameters through the computer software applications.

It was **Dr. Lawrence**'s goal to secure biodynamic signal images without the need for a time dependent scanning process — to procure complete frames instantly — much like the older Radionic systems of **Drown** and **De laWarr**. Since **Dr. Lawrence** assumed the character of biodynamic information was strictly of an eidetic nature (meaning that its reception is in the form of whole images), and it appeared to propagate in a longitudinal (time independent) fashion, the prior systems of instant frame acquisition would be ideal. Charge-coupled device (**CCD**) technology while promising, is expensive and provides a somewhat distorted biodynamic image resolution. Photographic film techniques, while procuring the highest resolution images, are time consuming and relatively unmanageable in most field situations. Work is currently in progress to modify and develop similar systems in conjunction with present technology.

Field Tests and Biodynamic Signal Acquisition

L. George Lawrence spent much of his time in isolated desert locations performing remote biological sensing operations. Many parts of the desert are free from electromagnetic interference which can complicate biodynamic signal interpretation, so it is an ideal place to perform experiments in remote biological sensing. As we have already discussed, **Dr. Lawrence**'s system incorporated many instruments in his field operation system. This system is best observed in the patent figures and instrumentation diagrams.



A typical field operational setup for remote biological sensing includes the following: An astronomical telescope, a Faraday chamber that contains the biological transducer complex, a rotating shutter for "chopping" incident electromagnetic interference for easier detection, a temperature controller, a regulated power supply, a local oscillator to permit an AC-rendition (for AC recording) of the data envelope modulated by a DC amplifier, and final recording of data by a field recorder. A processing amplifier and meter provide primary, unmodulated monitoring of the incoming signals.

Initially, **Dr. Lawrence** conducted his field experiments with the goal of obtaining signals from living systems such as Joshua trees. He would simply inject a premeasured amount of DC electricity into the tree by remote control while training the sights of his field equipment containing the biological transducers directly on the subject tree. As the tree began to respond to the current, the biological transducers would simultaneously react to the irritation experienced by the tree. Increasing the distance from the subject (up to several miles) proved no obstacle to the reception of signals with no decrease in signal intensity. With these many inaugural tests, **Dr. Lawrence** was able to perfect his system of the reception of biodynamic signals.

The **RBS** field equipment in current use at **BSRF** (see photo top page) is nearly identical to **Dr. Lawrence**'s with a few minor adaptations and modifications. In comparing the photo with the diagram, one can see that our system has been condensed into a smaller package, and this is mainly due to technological advances in the miniaturization of specific components since **Dr. Lawence**'s day. The telescope, a 4.5 inch reflector with equatorial mount and motor drive, is standard and is identical to the one used by **Dr. Lawrence**. The Faraday chamber has been reduced in size, and incorporates specific geometric proportions (the Golden Section) for optimum **Biodynamic** signal procurement. The system is "shutterless" as incident electromagnetic interference is easily detected within the biomass cavity by a highly sensitive **EM probe** (newer designs in **biodynamic** sensor technology are completely insensitive to any **EMR** and need no shielding). Temperature control and monitoring is also done from within the biomass cavity. All electronics for monitoring incoming signals are housed in a single unit, and the field recorder is of the microcassette type. A countdown timer is used to indicate time elapsed, and to signal the end of the tape. In addition to the standard equipment, a laptop portable computer is used to continually render images of the modulated biodynamic signals for visual monitoring while in the field. Ancillary equipment may include star chart software, magnetometers for monitoring geomagnetic disturbances, and various other electronic devices used for detecting **EM artifact**.

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