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Attorneys for Plaintiff
ALFRED E. MANN FOUNDATION FOR
SCIENTIFIC RESEARCH

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

WESTERN DIVISION

Alfred E. Mann Foundation for Scientific Research,

Plaintiff,

vs.

Cochlear Corporation, et al.,

Defendants.

Case No. 2:07-cv-08108-FMO-SH

PLAINTIFF'S WITNESS LIST FOR BENCH TRIAL

Jury Trial Date: January 14, 2014
Time: 9:00 a.m.
Courtroom: 22, 5th Floor
Judge: Hon. Fernando M. Olguin

Plaintiff Alfred E. Mann Foundation for Scientific Research (the "Foundation") hereby submits the following witness list for the bench trial:

1. Joseph Schulman by written declaration. Mr. Schulman's declaration is attached hereto as **Exhibit 1**.

2. Dr. Darrin Young by written declaration. Dr. Young's declaration is attached hereto as **Exhibit 2**.

3. David Hankin by written declaration. Mr. Hankin's declaration is filed at Dkt. 403.

4. Bryant Gold by deposition designation. The relevant excerpt from Mr. Gold's deposition testimony has been lodged under Dkt. 404-1.

5. Dr. Gerald Loeb by deposition designation. The relevant excerpt from Dr. Loeb's deposition transcript has been lodged under Dkt. 404-2. The Foundation reserves the right to call Dr. Loeb at trial as an adverse witness.

6. Dr. Robert Stevenson by deposition designation. The relevant excerpt from Dr. Stevenson's deposition transcript has been lodged under Dkt. 404 -3. The Foundation reserves the right to call Dr. Stevenson at trial as an adverse witness.

7. Tony Nygard by deposition designation. The relevant excerpt from Mr. Nygard's deposition transcript has been lodged under Dkt. 404-4. The Foundation reserves the right to call Mr. Nygard at trial as an adverse witness.

8. James Findlay Patrick by deposition designation. The relevant excerpt from Mr. Patrick's deposition testimony has been lodged under Dkt. 404-5. The Foundation reserves the right to call Mr. Patrick at trial as an adverse witness.

Dated: January 13, 2014

Respectfully submitted,

MORGAN, LEWIS & BOCKIUS LLP

By /s/ Daniel Grunfeld
Daniel Grunfeld
Attorneys for Plaintiff
Alfred E. Mann Foundation for Scientific Research

EXHIBIT 1

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ALFRED E. MANN FOUNDATION FOR
SCIENTIFIC RESEARCH

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

WESTERN DIVISION

Alfred E. Mann Foundation for Scientific Research,

Plaintiff,

vs.

Cochlear Corporation, et al.,

Defendants.

Case No. 2:07-cv-08108-FMO-SH

DECLARATION OF DR. JOSEPH SCHULMAN, PH. D., RE ISSUES TRIED TO THE COURT

JURY TRIAL DEMANDED

Trial Date: January 14, 2014
Time: 9:00 a.m.
Courtroom: 22, 5th Floor

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I, Joseph Schulman, declare:

1. I have personal knowledge of the facts set forth herein, and if called upon to testify, I could and would competently testify to the statements made herein. I submit this declaration in support of Plaintiff Alfred E. Mann Foundation for Scientific Research (the "Foundation").

2. After receiving my Ph.D. in 1969, I began work at Pacesetter Systems developing pacemaker technology, working with Al Mann. I worked at Pacesetter through 1985, when the company was sold. In 1985, my title was Vice-President of Research and Development.

3. In 1985, Mr. Mann asked me to help start the Foundation. I accepted his offer and worked at the Foundation until 2007.

4. Throughout my tenure at the Foundation, I was in charge of day to day operations and personally participated in developing many of the technologies the Foundation has licensed and patented.

5. My initial title at the Foundation was "Vice President of Research." For at least the last 10 years of my time at the Foundation, my title was "President."

6. The Foundation was founded to help bring basic research in medicine into the marketplace and create products to fill unmet and poorly-met needs. The Foundation sought to work on products and to solve problems that were considered too risky, too expensive, and too long term for the general medical device market. Towards that goal, the Foundation was dedicated to providing significant improvements to the health, security and quality of life for people suffering from debilitating medical conditions.

7. To further its mission, the Foundation sought to keep overhead costs as low as possible and to devote the majority of its resources to research and development. Licensing and selling its technology was a critical source of funding for the Foundation, and the proceeds the Foundation received from these activities

were invested back into research and development at the Foundation.

8. One of the first projects undertaken by the Foundation was development of cochlear implant technology. We also developed a device to monitor pressure increases in the brain due to trauma, a long-term blood glucose sensor, an advanced neurostimulator, a microstimulator powered and controlled by radio frequencies that can be used to treat sleep apnea, shoulder subluxation and post-stroke upper limb hemiplegia, a battery powered microstimulator implant used to treat migraine headaches, an implantable myoelectric sensor that can be used to control prosthetic limbs, and an implantable drug delivery system.

9. Advanced Bionics was founded as a separate corporation in approximately 1993 and used the Foundation's cochlear implant technology, including U.S. Patent No. 5,609,616 (the "'616 patent") and U.S. Patent No. 5,938,691 (the "'691 patent").

10. After that time, the Foundation gradually reduced its involvement with Advanced Bionics and reduced the amount of resources it devoted to research in the cochlear implant field. The Foundation then shifted its focus to work more extensively on so-called "Bion" technology.

11. The Bion is a wireless, implantable microstimulator, about the size of a grain of rice, intended for use in stroke patients. It has the potential to restore use of paralyzed limbs within hours of initially being implanted. It is one of the flagship projects for the Foundation and has been in development since the Foundation was founded in 1985.

12. The Foundation has worked on developing two versions of the Bion: the Radiofrequency ("RF") Bion and the Battery Bion.

13. The RF Bion system includes a strap worn around the arm containing a battery that powers the implanted Bion stimulator via induction. The first human implantation of the RF Bion was performed in 2000.

14. The development of the Battery Bion proved to be extremely challenging and costly. The Battery Bion system has an internal battery and does not require a strap worn around the arm for use. Research and development efforts for the Battery Bion required significant expenditures, including additional scientists on staff and under contract with expertise in digital integrated circuit design, multiple chip runs for testing, further developments in chip miniaturization and construction of a battery factory for production.

15. The Battery Bion project required a significant investment from the Foundation over the years. From 2001 to 2004, a very significant portion of the Foundation's resources were devoted to the effort to develop the Battery Bion. Budgetary constraints forced the Foundation to reduce funding for the Battery Bion, as well as for other projects, travel, and overhead.

16. Another project the Foundation worked on during the same time period was development of a blood glucose sensor. Unlike competing models, this sensor could stay stable for 2 years without needing calibration.

17. The Foundation also worked to develop an insulin pump between the years of 1995 to 2001. There were two versions: an implantable model and an external model. These pumps helped eliminate the need for diabetics to keep hypodermic needles with insulin with them, as the pumps would replace the function of the pancreas and regulate dispersal of insulin into the blood stream.

18. The technology for the glucose sensor, external insulin pump and implantable insulin pump was sold to Medtronic in 2001.

19. During my tenure as President of the Foundation, I was under constant pressure to keep overhead costs low. In addition to the normal financial stresses that any company has, the Foundation was under particular financial pressure because it did not have a regular, predictable revenue stream, instead relying on licensing deals, such as the sale of the glucose monitor and insulin pump to

Medtronic, to cover operating expenses for several years.

20. Financial stress was especially high during active development of the Battery Bion. Research and development costs exceeded my original expectations and chip development for test implants was very expensive. To compensate for this expense, the Foundation limited its involvement with new projects, cut staff trips and reduced funding for staff wishing to attend conferences.

21. Because of the financial stress the Foundation was under in particular, and the uncertainty and long time scale of litigation in general, a law suit was the last choice for enforcing any of the Foundation's patent rights, and my preference and the Foundation's would have decidedly been to settle any potential infringement matters with a negotiated license.

22. In my December 17, 2008 deposition, Cochlear suggested that I knew as of 1994 that Cochlear products would have back telemetry – I did not.

23. In 1994, I attended a conference on cochlear implants in Melbourne, Australia.

24. At that conference Hugh McDermott presented an article that discussed a wearable headpiece processor for the next generation of the Cochlear Corporation's Nucleus cochlear implant system.

25. I did not learn, from that presentation or any other at the conference, as described in the Foundation's patents, that Cochlear's products would necessarily incorporate a back telemetry system, or any of the technical details of a system that Cochlear Corporation or Cochlear Limited would ultimately implement into their products.

26. Sometime in 1998, I learned that Cochlear Corporation had a cochlear implant and speech processor that included some form of telemetry features. This device was called the Nucleus 24. The details of Cochlear's back telemetry features were unknown to me. For example, I did not know whether the Nucleus 24

device and testing system monitored a pair of electrodes, or how a physician or audiologist used the Cochlear system.

27. Cochlear's implants and processors are not available to test. The publically available material I reviewed from Cochlear, such as marketing material, and conference presentations, did not reveal the technical workings of their device sufficient for me to reach any conclusion on whether the device used diagnostic telemetry features similar to the Foundation's patents.

28. In 2003, I had a meeting at the House Ear Institute. There, I obtained literature on the fitting system for Cochlear's Nucleus 24 product. A review of this literature by myself and others at the Foundation showed details of the Nucleus 24 product and how its telemetry features were used and programmed.

29. On July 21, 2003, I sent a letter to Jack O'Mahony, CEO and President of Cochlear Limited, asking Cochlear Limited to license the '616 patent. It has been marked as PTX-1071. In that letter I stated that Cochlear's Nucleus 24 Implant may infringe the '616 patent, providing them notice of infringement for the '616 patent. I also stated a desire to reach a license rather than undertake legal action. I believed that a negotiated license would be preferable for the Foundation, and more consistent with its goals and mission. In all negotiations with Cochlear, the hope was to settle the issue as a business matter rather than resort to the Courts. At the time, the Foundation did not have sufficient information to determine whether Cochlear's products infringed the '691 patent.

30. Two months after I sent my letter to Mr. O'Mahony, I received his reply on October 7, 2003. That letter has been marked as PTX-65. I did not hear anything further from Cochlear with respect to my letter. I was never contacted by Mr. O'Mahony, or by any other individuals at Cochlear Limited regarding the letter.

31. Shortly after receiving the October 7, 2003 reply from Mr. O'Mahony,

Advanced Bionics entered into negotiations with Boston Scientific for Boston Scientific to acquire Advanced Bionics. The Foundation, as a shareholder of Advanced Bionics, and a licensor of patent and other intellectual property rights to Advanced Bionics, was involved in these negotiations. The deal closed in summer 2004.

32. During my tenure at the Foundation, I followed new products and developments in the industry, however, my awareness came from public sources. In general, I was not aware of plans by the Cochlear Defendants to release new products until they were publicly announced. I never intended to convey to the Cochlear Defendants that I agreed with their assessment that the Foundation's patents were not infringed, nor did I ever intend to induce the Cochlear Defendants to introduce new lines of products based on the perception that the Cochlear Defendants did not infringe the Foundation's patents.

33. I understand that the Cochlear Defendants claim prejudice from my memory fading.

34. At my deposition, I was not able to recall every contribution to the development of the '616 and '691 patents made by Primoz Strojnik. These contributions would have been made many years ago, in the early to mid 1990s. Even had this lawsuit been filed in 2003, shortly after the Foundation sent the letter to Cochlear, it is unlikely that I would have remembered any further details beyond what I can still recall today, as those events occurred at least 8 years before 2003.

35. At my deposition, I did not initially recall when I had met Hugh McDermott. References to the 1994 conference refreshed my memory as to some, but not all, of the details of that meeting. I recall meeting Mr. McDermott briefly and in passing, but no more. Even had the suit been filed in 2003, it is unlikely that

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I would have remembered further details, as the meeting had happened nearly 10 years prior.

36. At my deposition, I was not able to recall details from several meetings in the 1980's. Even had the suit been filed in 2003, it is unlikely that I would have remembered further details, because those meeting took place up to 20 years before 2003.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 13th day of January, 2014, in Los Angeles, CA.

By: _____
Joseph Schulman

EXHIBIT 2

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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA, WESTERN DIVISION

ALFRED E. MANN FOUNDATION FOR SCIENTIFIC RESEARCH,

Plaintiff,

vs.

COCHLEAR CORPORATION, et al.,

Defendants.

Case No. 2:07-cv-08108-FMO-SH

DECLARATION OF DR. DARRIN J. YOUNG IN OPPOSITION TO COCHLEAR DEFENDANTS' INDEFINITENESS CLAIM

Judge: Hon. Fernando M. Olguin
Trial: January 13, 2014
Time: 9:00 a.m.
Place: Ctrm 22, 5th Floor

I, Dr. Darrin J. Young, declare and state as follows:

1. I make this declaration based on personal knowledge and, if called to testify in this matter, I could and would testify competently to the matters stated herein.

2. I have been retained as an expert by IMS Expert Services on behalf of the Alfred E. Mann Foundation for Scientific Research ("AMF"). I have been asked to provide this Declaration in Alfred Mann Foundation for Scientific Research v. Cochlear Corporation (nka Cochlear Americas) and Cochlear Ltd.,

Civil Action No. 07-CV-08108, pending in the United States District Court for the Central District of California.

3. In arriving at my opinions, I reviewed the following documents among others:

(a) The Court's Order on Claim Construction, June 18, 2012.

(b) Special Master's Report & Recommendation on Claim Construction, Nov. 3, 2011 ("R&R").

(c) U.S. Patent No. 5,609,616 ("the '616 Patent")

(d) U.S. Patent No. 5,938,691 ("the '691 Patent")

(e) "Comparative Studies of Speech Processing Strategies for Cochlear Implants," 98 Laryngoscope 1069, 1071 October 1988, Wilson, B.F, et. al.

(f) SP12 Firmware Architecture (COC-2083809-COC2083824)

(g) Cochlear Philips Champ-LP Manual for the Champ-LP R1 and R1A, February 2, 2006 (printed from COC-6000000 Hard Drive)

(h) SP12 Supervisor Firmware Detailed Design Description, Doc. No. E11952DD, March 16, 2005 (COC-2089812 to COC-2089870)

(i) SP12 Main Module BTE Hardware Design Description, Doc. No. S50632DD, Jan. 7, 2005 (printed from COC-6000000 Hard Drive)

(j) Functional Design Description Power Management Optimization, Doc. No. E11986DD, Aug. 30, 2006 (COC-2089505-2089539).

4. I am a Utah Science Technology and Research (USTAR) associate professor in the Department of Electrical and Computer Engineering (ECE) at the University of Utah in Salt Lake City, Utah. I currently also serve as an associate chair of the ECE Department. Prior to joining the University of Utah in 2009, I was a professor in the Department of Electrical Engineering and Computer Science at Case Western Reserve University in Cleveland, Ohio, between 1999 and 2009. I have taught graduate and undergraduate courses in electronic circuit design and

analysis and electrical interface design for microelectronic systems with a specialty in microelectro-mechanical systems (MEMS).

5. I earned my Bachelor of Science degree with honors, Master of Science degree, and Ph.D. degree from the Department of Electrical Engineering and Computer Sciences at University of California at Berkeley in 1991, 1993, and 1999, respectively. I pioneered the research work in MEMS high-Q tunable capacitors and on-chip 3-D coil inductors and their application in low phase noise radio-frequency (RF) voltage-controlled oscillators for wireless communications.

6. Between 1991 and 1993, I worked at Hewlett-Packard Laboratories in Palo Alto, California, where I designed a shared memory system for a DSP-based multiprocessor architecture. Between 1997 and 1998, I worked at Rockwell Semiconductor Systems in Newport Beach, California, where I designed silicon bipolar RF analog circuits for cellular telephony applications. I also worked at Lawrence Livermore National Laboratory as a visiting researcher developing the design and fabrication process for three-dimensional RF MEMS coil inductors for wireless communication applications.

7. I currently lead a world-class research team to develop advanced wireless microsystem technologies for biomedical implants, navigation, industrial sensing and consumer electronics applications at the University of Utah. I have demonstrated a number of the-state-of-the-art biomedical implantable devices and systems including implantable middle ear microphones, implantable EMG sensors, and implantable physiological sensors. My research work on implantable middle ear microphone was covered by a number of large media outlets in 2012, including Discovery News, IEEE Spectrum, EE Times, CNET, Wired Magazine, CNET, Investors' Business Daily, Hearing News Watch, The Engineer - London, The Salt Lake Tribune and FOX13 News.

8. I have received research supports from the U.S. Army Research Office, U.S. Defense Advanced Research Project Agency, National Science

Foundation, National Institutes of Health, NASA, and U.S. Department of Veterans Affairs. I have authored and co-authored over 100 technical papers in international journals and conferences and have delivered over 50 presentations at international conferences, university seminars and short courses. I have published six book chapters.

9. I served as an Associate Editor for the IEEE Journal of Solid-State Circuits between 2006 and 2011. I currently serve as the chair of the MEMS committee under the IEEE Electron Devices Society. I also served as a technical program committee member and session chair for a number of international conferences.

10. I have served as a proposal reviewer for the National Science Foundation and San Francisco State University. I also served as manuscript reviewer for a number of international journals, including IEEE Journal of MicroElectroMechanical Systems, IEEE Transactions on Electron Devices, IEEE Electron Devices Letter, IEEE Sensors Journal, Journal of Micromechanics and Microengineering, IEEE Transaction on Biomedical Engineering, IEEE Transaction on Biomedical Circuits and Systems, Sensors & Actuators: A. Physical, IEEE Transactions on Microwave Theory and Techniques, Journal of Micromechanics, Journal of Microelectronics Engineering, and Journal of Biosensors.

11. I have received a number of honors, including Recognition and Appreciation of Valued Services and Contributions as IEEE EDS Micro-ElectroMechanical-Systems Chair-2011, Nomination for 2003 Carl F. Wittke Award at Case Western Reserve University for Excellence in Undergraduate Teaching, Bachelor of Science degree with honors in EECS Department at U.C. Berkeley-1991, and Scholastic All American Collegiate Award-1988.

DISCLOSURE OF ALGORITHM – GENERALLY

12. The microprocessors disclosed and claimed in the '616 and '691 patents are members of a technological family of circuits known to those of skill in

the art as digital signal processors ("DSPs"), which are specialized microprocessors. A DSP performs certain well-known steps, including encoding amplitude, frequency or phase information on digital data. This process is generally known as signal modulation.

13. Further to this point, the patents specifically disclose an embodiment of the WP that includes a DSP integrated circuit:

> The filter bank may also be implemented as a group of digital filters, for example in a digital signal processor integrated circuit. In this case the signal flow would be from the audio front end and AGC 22, through an anti-aliasing filter, to an analog to digital converter, then into a digital filter bank 24 and the general processing of microprocessor 30.

'691 Patent, col. 4, lines 52-58; '616 Patent, col. 4, lines 57-63.

DISCLOSURE OF ALGORITHM – CLAIM 6 OF THE '691 PATENT

14. Claims 6 of the '691 patent, and dependent Claim 7, contains a limitation that the WP include "means for generating data indicative of the audio signal." The Court has endorsed the Special Master's understanding that the structure, or means, associated with this function is "a microprocessor." R&R at 28. The corresponding function is "generating data indicative of the audio signal." R&R at 26.

15. As described below, one of ordinary skill in the art would understand the steps (or algorithm) performed by the microprocessor in the '691 patent to be: (1) receiving digital data from the analog to digital converter and (2) using a logarithmic conversion function to format the received data to be encoded on an amplitude modulated signal.

16. One of ordinary skill in the art would understand that the DSP (microprocessor in the WP in the '691 patent) encodes the digital data from the

analog to digital ("A to D") converter with amplitude information for use in generating an amplitude modulated signal, in other words, a signal encoded with amplitude data. That is because 1) the '691 patent discloses that the WP generates "analog and pulsatile input data signals." '691 Patent, col. 3, lines 38-39; 2) the "input signal generated in the WP" is preferably in the form of a "encoded data stream comprising an amplitude-modulated RF signal consisting of a serial sequence of 83 bits representing 9 words of 9 bits each plus a parity bit and an end-of-frame marker." '691 patent, column 10, lines 1-4; 3) "the first 8 words of each frame contain the digital amplitude ... information for output channels 1 through 8 in that order;" '691 patent, column 10, lines 6-8; and 4) encoding a digital signal with amplitude data is one of the functions performed by a DSP ("The output of the microprocessor 30 is coupled through a custom gate array 32 that converts data from the microprocessor into a serial bit stream going to a data transmitter" '691 Patent, col. 4 ln. 59-61).

17. Further, the '691 patent explains that the ICS utilizes "an exponential D to A converter 64" ('691 patent at 5:62, 6:58) to convert the received amplitude data for stimulation from digital to analog form. Accordingly, the DSP of the wearable processor must perform the inverse function, i.e., it must encode a digitized signal using a logarithmic algorithm. As I explained in my deposition, that algorithm is implemented with a simple logarithmic lookup table. I know of no other way to implement such a logarithmic algorithm in a DSP. Young Dep. at 40:10-43:11.

18. I understand that for purposes of analyzing the scope of the prior art in this case, the parties have agreed that the priority date is August 29 1991. Prior to that date, logarithmic speech processing algorithms for generating pulsatile input data signals for cochlear implants as I described above were well known in the art and this further supports my understanding of the logarithmic algorithm disclosed in the '691 patent.

19. I have also analyzed the scope of the prior art assuming a priority date of September 22, 1989, the date of filing of the original application. Prior to that date, logarithmic speech processing algorithms for generating pulsatile input data signals for cochlear implants as I described above were well known in the art confirms my understanding of the logarithmic algorithm disclosed in the '691 patent.

20. As an example, in "Comparative Studies of Speech Processing Strategies for Cochlear Implants," 98 Laryngoscope 1069, 1071 October 1988, Wilson, B.F, et. al., the authors describe the generation of pulsatile input data signals from a wearable processor to a cochlear implant through application of the following logarithm speech shaping algorithm used for programming the "post-processor," which is a microprocessor:

> Next, a post-processor is programmed to scan the RMS [root-mean-square] outputs on a periodic basis. The output of a filter bank channel is coded for stimulation of its assigned electrode(s) only if the RMS [root-mean-square] energy is above a preset noise threshold. The amplitudes of the pulses delivered to the selected channels are calculated with a logarithmic mapping law of the form: pulse amplitude = A x log (RMS level) p+ k, where the parameters A and k are determined for each channel on the basis of threshold and most comfortable loudness level measurements.

21. Since this algorithm was in a published paper that was part of the speech processing literature prior to September 22, 1989, this further supports my conclusion that on of skill in the art would have appreciated that the algorithm used by the microprocessor in the WP of the '691 Patent to generate data indicative of the audio signal is the logarithm algorithm that I have described.

22. The Cochlear Defendant's documents I reviewed also indicate that a person of ordinary skill in the art would appreciate that specialized algorithms that fit the surrounding structures must be implemented in a DSP. *See, e.g.*, TX 169 at 5 ("the micro-controller is not suitable for processing audio. Processing audio is done by the DSPs."); TX 233 Table 4.10 (ADC Gain settings are on an exponential scale); TX 1287 at 55 ("The microC has a two-way link to all running DSPs. The watchdog timer for the DSP runs over this link, and also a number of commands are defined"); TX 1288 at 33 ("Derived requirements" i.e., "the speech processor, hardware, shall produce an RF signal to the implant with a PWM factor that has a range of 0-50% through a 10-bit value"); TX 1290 at 3 (discussing the necessity for a low power DSP corresponding to the low power ASIC and algorithms implemented in the Champ LP);

23. Cochlear's technical documents also reveal that a logarithmic conversion function is well know to persons with ordinary skill in the art. *See, e.g.*, TX 748 at 33-34 ("From the input dynamic range one may calculate the base level by inverting the equation D = 20log(M/B)").

24. To the extent the Cochlear Defendants argue that there is no disclosure of an algorithm used by a microprocessor for the claim term "generating data indicative of the audio signals" in claims 6 of the '691 patent, I disagree. The '691 patent describes encoding algorithms implemented by the microprocessor of the WP that generate amplitude information used to transmit the data to the ICS. Such algorithms include imposition of a logarithmic function on the data.

DISCLOSURE OF ALGORITHM – CLAIM 1 OF THE '616 PATENT

25. Claim 1 of the '616 Patent contains the limitation "external processor means coupled to the transmitting means of the external headpiece/transmitter for receiving and processing the status-indicating signals to derive information therefrom regarding the operation of the implanted stimulator and its plurality of tissue stimulating electrodes." The parties agreed that the structure that performs

this function is an "an antenna, receiver, and microprocessor." The Court acknowledged this agreement and interpreted the function as "receiving and processing the status-indicating signals to derive information therefrom regarding the operation of the implanted stimulator and its plurality of tissue stimulating electrodes." R&R at 3-4.

26. More than a microprocessor is disclosed to perform this function — the parties specifically agreed that the function is performed by the combination of an "antenna, receiver, and microprocessor" working together.

27. The function performed by a microprocessor is "processing the status indicating signals."

28. The "the physician's tester is basically a modification of the WP 16" and discloses the same microprocessor 30 that is in the WP in the '691 patent. '616 patent, col. 33, lines 7-10 & Figs. 1 & 7.

29. As a result of "processing," the microprocessor in the physician's tester "derive[s] information" from the "status-indicating signals" that are telemetered from the cochlear implant to the WP. As shown in Figure 6 and in the tables, such derived information includes impedance. By displaying impedance, the '616 patent discloses that Ohm's law has been applied to the measured voltage and current values.

30. In other words, one algorithm disclosed by the patent for microprocessor 30 includes the steps of (1) accepting from the receiver signals representative of measured voltage, (2) applying Ohm's law to convert the measured voltage or voltage and current into an impedance value.

31. A simple example of an implementation of this algorithm is described in the patent. In describing the physician's tester claimed in the '616 patent, the inventors stated that the "present invention also contemplates physician control over the selection of the voltages and currents to be measured." '616 Patent, col. 32, lines 41-43. The '616 Patent also discloses that the position of the controls for the

physician's tester "are read by the microprocessor 30 to control the commands generated thereby and hence the parameters measured and displayed by the ICS and Physician's Tester combination." '616 Patent, col. 33, lines 15-18. One of the controls of the physician's tester has an impedance setting. '616 Patent, col. 33, Table 7 ("Control Knob 308 — Position 1 = Impedance of Monopolar A configured channel.") & Figure 6 (see control setting selecting "Z," which is the traditional mathematical symbol for impedance and numeric display). By selecting the impedance setting, one of ordinary skill in the art would understand that the physician's tester would be instructing the microprocessor to make an impedance calculation. This would be done by either 1) measuring voltage and current; or 2) measuring voltage only, since the stimulus current would be known based on one of the seven pre-set current levels shown in Table 7 of the '616 patent; and then 3) making an impedance calculation.

32. In order to obtain an impedance calculation, the microprocessor calculates impedance as the ratio of voltage to current. This calculation is no different from a commercially available ohmmeter, which literally measures voltage, and displays voltage to current ratio as indicative of the impedance.

33. This is also the same way impedance is calculated in the Cochlear Defendants' device. *See, e.g.,* TX 1288 at ("Electrode impedances are calculated from the applied stimulation current and the measured electrode voltage at the end of a stimulation pulse using Ohm's law.")

34. Impedance cannot be measured per se. It is always calculated based on the ratio of voltage to current. One of ordinary skill in the art would readily understand from the disclosure in the '616 patent that this the algorithm is implemented. The algorithm for calculating impedance is Ohm's law, which is famous and well known to a person of ordinary skill in the art. It was first described over a century ago as $Z = V \div I$, in other words, Z (impedance) equals V (voltage) divided by I (current). Therefore, one of ordinary skill in the art would readily

appreciate Z = V ÷ I as the algorithm that is disclosed and would be used in the microprocessor of the physician's tester of the '616 Patent to make an impedance calculation to "derive information" from the status-indicating signals. The Cochlear Defendant's expert witness Dr. Stevenson acknowledged that Ohm's law is used to calculate impedance when the voltage and current are known. Stevenson 2009 Dep. at 171:615. Cochlear's expert Dr. Loeb described the application of Ohm's law as "straightforward." Loeb 2009 Dep. at 134:4-6. Indeed, Ohm's law is the first concept I teach in introductory electrical engineering circuit analysis courses as does Dr. Stevenson. Stevenson 2013 Dep. at 67:6-17.

35. To the extent the Cochlear Defendants argue that there are numerous ways of calculating impedance in a circuit, some of which can and others which do not utilize Ohm's law, I disagree. The Cochlear Defendants have never articulated those ways and I know of no other way of calculating impedance that does not in some way rely upon the ratio of voltage to current, which is the fundamental concept of Ohm's law.

36. To the extent the Cochlear Defendants take issue with my characterization of the Ohm's law algorithm as a relatively simple task, I disagree. For instance, even if the relative complexity or simplicity would depend in part upon, among other things, the information being sought, and the desired or tolerable reliability (e.g., accuracy) and stability of the results or information being sought, such considerations, which would be necessary in any commercial design of an electrical circuitry, would not change my opinion that the underlying algorithm, namely, Ohm's law, remains unchanged and simple.

37. To the extent the Cochlear Defendants argue that different algorithms would be used by one of ordinary skill in the art if the current were to be assumed and only voltage was measured by the implant and transmitted to the Physician's Tester, or if both voltage and current were measured by the implant and transmitted to the Physician's Tester, I disagree.

38. It is indisputable that the such "different algorithms" all have as their underlying basis Ohm's law, the very algorithm disclosed in the `616 patent.

39. To the extent that the Cochlear Defendants argue that no particular or general approach to check compliance with acceptable impedance thresholds, or to check likely impedance range(s) is taught by the '616 patent, *i.e.*, that the '616 patent does teach display of impedance, but does not specify any of a number of ways of confirming compliance of operation of the electrodes, I do not agree. As I state above, Figure 6 and Table 7, together with the other passages from the '616 patent that I cite, clearly teach to one of ordinary skill in the art that it is an actual impedance reading, not, for example, a mere pass or fail indication, that is displayed to the user.

40. To the extent the Cochlear Defendants argue that there is no disclosure of an algorithm used by a microprocessor for the claim term "processing status-indicating signals to derive information therefrom regarding the operation of the implanted stimulator and its plurality of tissue stimulating electrodes" in claim 1 of the '616 patent, I disagree. The '616 patent discloses an algorithm implemented by the microprocessor which is based on the well-known Ohm's law.

41. To the extent the Cochlear Defendants attempt to complicate the analysis of the issue by introducing the notion of impedance as a "complex quantity," I believe this is inappropriate under the circumstances. Although impedance can be represented as $Z = R + jX$ where "R" is Resistance and "X" is Reactance, and "j" represents the square root of -1, one of ordinary skill in the art realizes that Ohm's law expresses the fundamental algorithm to calculate the impedance and that any contributions made by the additional components suggested by Dr. Stevenson would be negligable. Specifically, given the stimulating frequencies utilized, the magnitude of the current and voltages at issue as well as the size of the electrodes, a person of skill in the art would still utilize the ratio of voltage to current and would further realize that any contribution to the calculation

of impedance by the reactance would be negligable. Regardless, because the '616 patent discloses Ohm's law as the algorithm used by the microprocessor to "derive[s] information" from the "status-indicating signals" that are telemetered from the cochlear implant to the WP, one of ordinary skill in the art would understand this encompasses consideration of evern the negligable complex portion of the impedance.

I further represent under the penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated: January, 13 2014

Darrin J. Young